Encyclopædia Britannica

ENCYCLOPÆDIA BRITANNICA.

Gothofred, Gottenburg.

GOTHOFRED, or GODFREY, DENIS or DIONYSIUS, an eminent civil lawyer, born of an illuſtrious houſe at Paris in 1549. Finding his country involved in the confuſion of the leaguers, he accepted of a profeſſor's chair at Geneva, until he was patronized and employed by Henry IV.; but being afterwards ſtripped of his employments as a Huguenot, he at length retired to Heidelburg, from whence no offers were able to detach him. He was, however, diſappointed of his intention to end his days there; for the diſturbances that broke out in the Palatinate obliged him, in 1621, to take refuge in Straſburgh, where he died the following year. He wrote a great number of books; but his principal work is the *Corpus Juris Civilis cum notis*.

GOTHOFRED, *Theodore*, ſon of the former, was born at Geneva in 1580. As ſoon as he had finiſhed his ſtudies, he went to Paris; where he conformed to the Romiſh religion, and applied with indefatigable induſtry to the ſtudy of hiſtory, that of France particularly, wherein he became very eminent, as appears by his works. In 1632, the king made him one of his hiſtoriographers, with a ſtipend of 3000 livres; and, in 1636, he was ſent to Cologne, to aſſiſt at the treaty of peace negociating there, on the part of France, by the cardinal of Lyons. This treaty being removed to Munſter, Gothofred was ſent thither, where he drew up Memoirs on the ſubject; and continued in that city, in the king's ſervice, to his death in 1649. His principal work is his "Account of the Ceremonial of the kings of France."

GOTTENBURG, a rich and ſtrong town of Weſt Gothland, in Sweden, with a good harbour, at the mouth of the river Gothelba; which is the beſt ſituated for foreign trade of any in Sweden, as it lies without the Sound. It occupies the ſite of an ancient town, named *Lodeſe*, which was built by Guſtavus Vaſa; and being endowed with conſiderable privileges, ſoon became the great emporium for the trade of the weſtern provinces. Charles IX. when duke of Gothland, having in 1604 laid the foundations of a new town in the iſland of Hiſingen at no great diſtance from Lodeſe, called it *Gotheborg* (ſince corrupted into *Gottenburg*,) in honour of his duchy. Upon his acceſſion to the throne, he erected in his new town a trading company; drew thither many foreigners, particularly the Dutch, to whom he allowed an exemption from all duties of export and import during 20 years; a corps of Engliſh and Scotch troops, under the command of William Stewart; and granted to the Calviniſts eſtabliſhed therein the free exerciſe of their religion, the firſt place in Sweden where this toleration was permitted. The town being in 1611 reduced to aſhes by the Danes, was rebuilt in the reign of Guſtavus Adolphus in its preſent ſituation, and obtained a confirmation of its ancient rights, with the grant of ſeveral additional privileges.—It is built in a very ſingular ſituation. At a ſmall diſtance from the ſea is a marſhy plain, ſcarcely more than half a mile in breadth, watered by the rivers Gotha and Moldal, and almoſt entirely encloſed with high ridges of rocks ſo bare and rugged, that they ſcarcely produce a ſingle blade of graſs, and exhibit as barren an appearance as the ſummits of the loftieſt Alps. Gottenburg ſtands partly upon the ridges, and partly in the plain; and is divided from theſe different ſituations into the Upper and Lower Town. The latter is entirely level, interſected by ſeveral canals in the manner of the Dutch towns; and its houſes are all conſtructed upon piles; the upper part hangs on the declivities; and rows of buildings riſe one above the other like the ſeats of an amphitheatre. The whole is regularly fortified; and its circumference is near three miles, excluſive of the ſuburbs, called *Haga*, which lie toward the harbour. The ſtreets are all uniformly ſtraight: a few of the houſes are of brick; but the generality are conſtructed with wood painted red. The harbour is formed by two chains of rocks, and is about a quarter of a mile in breadth. Its entrance is defended by the fort of New Elfsborg, which ſtands upon a ſmall rocky iſland, and contains a garriſon of 250 men. There has been lately eſtabliſhed at Gottenburg a Royal Society of Sciences and Literature, upon the plan of that of Upſala.—Mr Coxe was informed by a merchant who had reſided 22 years at Gottenburg, that, during that period, its population had increaſed conſiderably, and that it now contained about 30,000 inhabitants. This flouriſhing ſtate is attributed to the extenſion of its commerce, particularly its Eaſt India Company, and the ſucceſs of the herring-fiſhery. An Engliſh conſul and ſeveral merchants of our nation reſide at Gottenburg: and a chapel, with a regular chaplain, is appropriated to their uſe. E. Long. 11. 50. N. Lat. 57. 44.

Gottenburg, Gottingen.

GOTTINGEN, a conſiderable town of Lower Saxony in Germany, and in the duchy of Brunſwick; formerly free and imperial, but afterwards ſubject to the elector of Hanover. Here his late majeſty George II. founded

Gottorp || Goudt.

founded an univerſity. It is ſeated on the river Leine, in E. Long. 10. 5. N. Lat. 51. 32.

GOTTORP, a town of the duchy of Heſwic, in Denmark, and capital of the duchy of Holſtein Gottorp, where the duke has a very fine palace.

GOUANIA, in *Botany*, a genus of plants belonging to the polygamia claſs. See BOTANY *Index*.

GOUDA, or TURGOW, a conſiderable town of South Holland, in the United Provinces, remarkable for its ſtately church. It is ſeated on the river Iſſel, in E. Long. 4. 37. N. Lat. 52. 2.

GOUDT, HENRY, uſually called *Count Goudt*, was born of a noble family at Utrecht, in 1570; and was a knight of the Palatinate. Being paſſionately fond of the arts, particularly painting and engraving, and deſirous of engaging in them, he applied himſelf diligently to drawing, and made a great proficiency therein. He went to Rome to examine the works of the great maſters in that city. Here he contracted an intimacy with that excellent artiſt Adam Elſheimer; ſtudied his manner of penciling, deſigning, and colouring; and made his works models for his own imitation. He pre-engaged all the pictures that his friend and favourite could finiſh, and even paid liberally for them before-hand; by which means he found himſelf in poſſeſſion of a moſt deſirable treaſure. Thoſe pictures which Goudt himſelf painted were neatly and delicately touched, in colour and pencil reſembling Elſheimer, though they were in no degree equal to the paintings of that admirable maſter. On his return to his native country, a young woman who was in love with him, and deſirous of fixing his affections upon her, gave him in his drink a love philtre: which, however, terminated in a very melancholy manner, by depriving him totally of his ſenſes; and in the dreadful ſtate of idiotiſm he dragged on a miſerable life to the age of 69, his death happening in 1636. It is remarkable, that though loſt to every other ſubject, when painting was ſpoken of he would diſcourſe upon it in a very rational manner.

Goudt practiſed engraving as well as painting, and made ſeven beautiful prints after the pictures of Elſheimer, which are well known to the curious, and are to be met with in moſt choice collections. He worked with the graver only, in a very neat ſtyle; and produced a moſt powerful effect, not by ſtrengthening the ſtrokes, according to the uſual method, but by croſſing them with additional ſtrokes, equally neat, and that five or ſix times, one over another, in the deep ſhadows. Conſidering the preciſion with which he executed his engravings, the freedom of handling the graver which may be diſcovered in them is very aſtoniſhing. The weeds and other parts of the fore-ground in that admirable print of the Ceres, are very finely expreſſed. The heads of the figures are correctly drawn, and the other extremities are managed in a judicious manner. The ſeven prints done by him, from Elſheimer, mentioned above, are, 1. Ceres drinking from a pitcher. An old woman appears holding a candle at the door of the cottage, and a boy naked ſtanding by her is laughing and pointing at the goddeſs; for which contempt he was metamorphoſed by her into a frog. The powerful and ſtriking effect of this engraving cannot be properly deſcribed. This print is diſtinguiſhed alſo by the name of the *ſorcery*. 2. The flight into Egypt: A night-ſcene, in which the moon and ſtars are introduced with great ſucceſs. 3. The angel with Tobit, who is drawing a fiſh by his ſide. The back-ground is a landſcape; the weeds in the fore-ground, and the branches of the trees in front, as well as the foliage and weeds hanging from them, are beautifully expreſſed. 4. The angel with Tobit, croſſing a ſtream of water: The back-ground, a landſcape. 5. Baucis and Philemon entertaining Jupiter and Mercury. 6. A landſcape, called the *Aurora*, repreſenting the dawn of day. The effect is very beautiful. 7. The beheading of St John in priſon, a very ſmall upright oval print, which is by far the ſcarceſt.

Government || Gourgues.

GOVERNMENT, in general, is the polity of a ſtate, or an orderly power conſtituted for the public good.

Civil government was inſtituted for the preſervation and advancement of mens civil intereſts, and for the better ſecurity of their lives, liberties, and properties. The uſe and neceſſity of government is ſuch, that there never was an age or country without ſome ſort of civil authority: but as men are ſeldom unanimous in the means of attaining their ends, ſo their differences in opinion in relation to government have produced a variety of forms of it. To enumerate them would be to recapitulate the hiſtory of the whole earth. But, according to Monteſquieu, and moſt other writers, they may, in general, be reduced to one of theſe three kinds. 1. The republican. 2. The monarchical. 3. The deſpotic.—The firſt is that, where the people in a body, or only a part of the people, have the ſovereign power; the ſecond, where one alone governs, but by fixed and eſtabliſhed laws; but in the deſpotic government, one perſon alone, without law and without rule, directs every thing by his own will and caprice. See the article LAW, N° 1. 3—10.—On the ſubject of government at large, ſee Monteſquieu's *L'Eſprit des Loix*, l. 2. c. 1.; Locke, ii. 129, &c. quarto edition, 1768; Sidney on Government; Sir Thomas Smith *de Repub. Angl.* and Acherly's Britannic Conſtitution.—As to Gothic government, its original and faults, &c. ſee Monteſquieu's *L'Eſprit des Loix*, l. 11. c. 8.—With reſpect to the feudal policy, how it limited government, ſee *FEODAL System*.

GOVERNMENT is alſo a poſt or office, which gives a perſon the power or right to rule over a place, a city, or a province, either ſupremely or by deputation.

GOVERNMENT is likewiſe uſed for the city, country, or place to which the power of governing is extended.

GOUGE, an inſtrument uſed by divers artificers, being a ſort of round hollow chiſel; ſerving to cut holes, channels, grooves, &c. in wood, ſtone, &c.

GOULART, SIMON, a famous miniſter of Geneva, was born at Senlis in 1543; and was one of the moſt indefatigable writers of his time. He made conſiderable additions to the Catalogue of witneſſes of the truth, compoſed by Illyricus; and acquired a great reputation by his works; the principal of which are, 1. A tranſlation of Seneca. 2. A collection of memorable hiſtories. 3. A tranſlation of St Cyprian *De lapſis*. 4. Several devotional and moral treatiſes. He died at Geneva in 1628.

GOURD. See CUCURBITA, BOTANY *Index*.

GOURGUES, DOMINIQUE DE, an illuſtrious French patriot,

Gournay || Gown.

patriot, a private gentleman of Gaſcony. The Spaniards having inhumanly maſſacred a colony of Frenchmen who had ſettled in Florida, Gourgues took a ſevere revenge on them, an account of which is given under the article FLORIDA. On his return he was received with acclamations by his countrymen, but was forbidden to appear at court. Queen Elizabeth invited him to command an Engliſh fleet againſt the Spaniards in 1593; but he died at Tours in his way to England.

GOURNAY, a town of France, in the duchy of Normandy and territory of Bray, celebrated for its butter-market. It is ſituated on the river Ept, in E. Long. 0. 33. N. Lat. 49. 25.

GOURNAY, *Mary de Jars de*, a lady celebrated for her learning, was the daughter of William de Jars, lord of Neufvi and Gournay. After the death of her father, ſhe was protected by Montaigne and Cardinal Richelieu. To the daughter of the former ſhe dedicated her Noſegay of Pindus; and compoſed ſeveral other works, the moſt conſiderable of which is *Les Avis*. She died at Paris in 1685, aged 80. The critics are divided concerning the reputation of this lady: by ſome ſhe is ſtyled the *Syren of France;* others ſay her works ſhould have been buried with her.

GOUT. See MEDICINE *Index*.

GOWER, JOHN, one of our moſt ancient Engliſh poets, was contemporary with Chaucer, and his intimate friend. Of what family, or in what country he was born, is uncertain. He ſtudied the law, and was ſome time a member of the ſociety of Lincoln's-inn, where his acquaintance with Chaucer began. Some have aſſerted that he was a judge; but this is by no means certain. In the firſt year of Henry IV. he became blind; a misfortune which he laments in one of his Latin poems. He died in the year 1402; and was buried in St Mary Overie, which church he had rebuilt chiefly at his own expence, ſo that he muſt have lived in affluent circumſtances. His tomb was magnificent, and curiouſly ornamented. It ſtill remains, but hath been repaired in later times. From the collar of SS round the neck of his effigies, which lies upon the tomb, it is conjectured that he had been knighted. As to his character as a man, it is impoſſible, at this diſtance of time, to ſay any thing with certainty. With regard to his poetical talents, he was undoubtedly admired at the time when he wrote, though a modern reader may find it difficult to diſcover much harmony or genius in any of his compoſitions. He wrote, 1. *Speculum meditantis*, in French, in ten books. There are two copies of this in the Bodleian library. 2. *Vox clamantis*, in Latin verſe, in ſeven books. Preſerved alſo in the Bodleian library, and in that of All-Souls. It is a chronicle of the inſurrection of the commons in the reign of Richard II. 3. *Confeſſio amantis;* printed at Weſtminſter by Caxton in 1493. Lond. 1532, 1554. It is a ſort of poetical ſyſtem of morality, interſperſed with a variety of moral tales. 4. *De rege Henrico IV.* Printed in Chaucer's works. There are likewiſe ſeveral hiſtorical tracts, in manuſcript, written by our author, which are to be found in different libraries; alſo ſome ſhort poems printed in Chaucer's works.

GOWN, ROBE, a long upper garment, worn by lawyers, divines, and other graduates; who are hence called *men of the gown*, or *gownmen*.

Gown, Gowran.

The gown is an ample ſort of garment, worn over the ordinary clothes, hanging down to the feet.—It is faſhioned differently for eccleſiaſtics and for laymen.

At Rome they gave the name "virile gown," *toga virilis*, to a plain kind of gown which their youth aſſumed when arrived at puberty. This they particularly denominated *prætexta*. See TOGA, PRÆTEXTA, &c.

"The remarkable dreſs of our Britiſh anceſtors (Mr Whitaker obſerves), which continued very nearly the ſame to the commencement of the laſt century among the natives of Ireland, and has actually deſcended to the preſent among the mountaineers of Scotland, and is therefore rendered very familiar to our ideas, carried in it an aſtoniſhing appearance to the Romans. And it ſeems to have been equally the dreſs of the men and women among the nobles of Britain. But in a few years after the erection of the Roman Britiſh towns in the north, and in the progreſs of refinement among them, this ancient habit began to be diſeſteemed by the chiefs of the cities, and looked upon as the badge of ancient barbariſm. And the growing prejudices were ſoon ſo greatly improved, that within 20 years only after the conſtruction of the towns, the Britiſh ſagum was actually reſigned, and the Roman *toga* or gown aſſumed by many of them." *Hiſtory of Manchester*; i. 302.

"The gown, however, never became univerſal in Britain: and it ſeems to have been adopted only by the barons of the cities and the officers of the crown; and has therefore been tranſmitted to us as the robe of reverence, the enſign of literature, and the mantle of magiſtracy. The woollen and plaided garments of the chiefs having naturally ſuperſeded the leathern veſtures of their clients, the former were ſtill wore by the generality of the Britons; and they were retained by the gentlemen of the country, and by the commonalty both in country and city. That this was the caſe, appears evident from the correſpondent conduct of the Gauls and Britons; who kept their Virgata Sagula to the laſt, and communicated them to the Franks and Saxons. The plaided drapery of the Britons ſtill appeared general in the ſtreets of Manchester; and muſt have formed a ſtriking contraſt to the gown of the chief, the dark mantle of Italy: and it and the ornamented buttons on the ſhoulder are preſerved among us even to the preſent moment, in the parti-coloured clothing and the taſſeled ſhoulder knots of our footmen."

In ſome univerſities phyſicians wear a ſcarlet gown. In the Sorbonne, the doctors were always in gowns and caps. Beadles, &c. wear gowns of two or more colours.

Among the French officers, &c. they diſtinguiſh thoſe of the *ſhort gown* or *robe;* which are ſuch as have not been regularly examined. They have alſo barbers of the *ſhort gown*, who are ſuch as are obliged to practiſe in an inferior way to thoſe of the long robe.

GOWN is alſo taken in the general for civil magiſtrature, or the profeſſion oppoſite to that of arms. In this ſenſe it was that Cicero ſaid *cedant arma togæ*.

GOWRAN, a borough town, in the county of Kilkenny and province of Leinſter, Ireland. N. Lat.

Goyen, Graaf.

52. 34. W. Long. 7. 0. It is governed by a portrieve, recorder, and town clerk. Here are the ruins of an old church, alſo the handſome ſeat of the late Lord Clifden; and three miles beyond Gowran the ruins of Ballinabola caſtle.

GOYEN, JOHN VAN, painter of landſcapes, cattle, and ſea pieces, was born at Leyden in 1596; and was for ſome time inſtructed by Iſaac Nicholai, who was reputed a good painter; but afterwards he became the diſciple of Eſaias Vandervelde, the moſt celebrated landſcape painter of his time. Van Goyen very ſoon roſe into general eſteem; and his works are more univerſally ſpread through all Europe than the works of any other maſter, for he poſſeſſed an uncommon readineſs of hand and freedom of pencil. It was his conſtant pleaſure and practice to ſketch the views of villages and towns ſituated on the banks of rivers or canals; of the ſea-ports in the Low Countries; and ſometimes of inland villages, where the ſcenes around them appeared to him pleaſing or pictureſque. Thoſe he afterwards uſed as ſubjects for his future landſcapes; enriching them with cattle, boats, and figures in character, juſt as the livelineſs of his imagination directed. He underſtood perſpective extremely well, and alſo the principles of the chiaro-ſcuro; which branches of knowledge enabled him to give his pictures a ſtrong and agreeable effect. He died in 1656, aged 60.—His uſual ſubjects were ſea-pieces, or landſcapes with views of rivers, enlivened with figures of peaſants either ferrying over cattle, drawing their nets in ſtill water, or going to or returning from market. Sometimes he repreſented huts of boors on the banks of rivers, with overhanging trees, and a beautiful reflection of their branches from the tranſparent ſurface of the waters. Theſe were the ſubjects of his beſt time, which he generally marked with his name and the year; and the high finiſhed pictures of Van Goyen will be for ever eſtimable. But as he painted abundance of pictures, ſome are ſlight, ſome too yellow, and ſome negligently finiſhed; though all of them have merit, being marked with a free, expeditious, and eaſy pencil, and a light touch. His pictures frequently have a grayiſh caſt; which did not ariſe from any miſmanagement of the tints, or any want of ſkill in laying on the colours; but was occaſioned by his uſing a colour called *Haerlem blue*, much approved of at that time, though now entirely diſuſed, becauſe the artiſts found it apt to fade into that grayiſh tint; and it hath alſo rendered the pictures of this maſter exceedingly difficult to be cleaned without injuring the finer touches of the finiſhing. His beſt works are valued ſo highly in moſt parts of Europe, and eſpecially in the Low Countries, that they deſervedly afford large prices, being ranked in Holland with the pictures of Teniers; and at this time are not eaſily procured, particularly if they are undamaged, though his ſlighter performances are ſufficiently common.

GRAAF, REGNIER DE, a celebrated phyſician, born at Schoonhaven, in Holland, in 1641. He ſtudied phyſic at Pruſſia. He was educated in Leyden, where he acquired great honour by publiſhing a treatiſe *De Succo Pancreatico*. He alſo publiſhed three pieces upon the organs of generation, both male and female; upon which ſubject he had a controverſy with Swammerdam. He died young, in 1673; and his works, with his life prefixed, were publiſhed at Leyden in 1677, in 8vo.

Grabe || Grace.

GRABE, JOHN ERNEST, a very learned writer in the beginning of the 18th century, a native of Koniggſberg, in Pruſſia. He was educated in the Lutheran religion; but the reading of the fathers led him into doubts. He preſented to the electoral conſiſtory at Sambia in Pruſſia a memorial containing his doubts. The elector gave orders to three eminent divines to anſwer them. Their anſwers ſhook him a little in his reſolution of embracing the Roman Catholic religion; and one of them, Spener, adviſed him to go to England. He went; and King William gave him a penſion, which was continued by Queen Anne. He was ordained a prieſt of the church of England, and honoured with the degree of doctor of divinity by the univerſity of Oxford; upon which occaſion Dr George Smalridge pronounced two Latin orations, which were afterwards printed. He wrote, 1. *Spicelegium S. S. Patrum, ut et Hereticorum ſæculi poſt Chriſtum natum*, 8vo. 2. An edition of the Septuagint, from the Alexandrian manuſcript in St James's library. 3. Notes on Juſtin, &c.; and other works, which are eſteemed by the learned.

GRACCHUS, TIBERIUS, elected tribune of the Roman people, demanded in the ſenate, in their name, the execution of the Agrarian law; by which all perſons poſſeſſing above 200 acres of land were to be deprived of the ſurplus, for the benefit of the poor citizens, amongſt whom an equal diſtribution of them was to be made. Having carried his plan into execution by violent meaſures, he fell a victim to his zeal, being aſſaſſinated by his own party, 133 B. C. Caius his brother, purſuing the ſame ſteps, was killed by the conſul Opimius, 121 B. C. See (hiſtory of) ROME.

GRACE, among divines, is taken, 1. For the free love and favour of God, which is the ſpring and ſource of all the benefits we receive from him. 2. For the work of the Spirit renewing the ſoul after the image of God; and continually guiding and ſtrengthening the believer to obey his will, to reſiſt and mortify ſin, and overcome it.

GRACE is alſo uſed, in a peculiar ſenſe, for a ſhort prayer ſaid before and after meat.

The proofs of the moral obligation of this ceremony, drawn from different paſſages of the New Teſtament, are ſo well known, that it is needleſs to inſiſt on them here. Some others, drawn from the practice of different nations, and of very remote antiquity, may not be diſagreeable to our readers.

1. Athenæus tells us, in his *Deipnoſoph.* lib. ii. that in the famous regulation made by Amphictyon king of Athens with reſpect to the uſe of wine, both in ſacrifices and at home, he required that the name of *Jupiter the Suſtainer* ſhould be decently and reverently pronounced. The ſame writer, in lib. iv. p. 149, quotes Hermeias, an author extant in his time, who informs us of a people in Egypt, inhabitants of the city of Naucratis, whoſe cuſtom it was on certain occaſions, after they had placed themſelves in the uſual poſture of eating at the table, to riſe again and kneel; when the prieſt or precentor of the ſolemnity began to chant a grace, according to a ſtated form amongſt them; and when that was over, they joined in the meal in a ſolemn ſacrificial manner. Heliodorus has a

paſſage

Grace. paſſage in his *Æthiopics* to the ſame purpoſe, that it was the cuſtom of the Egyptian philoſophers to pour out libations and put up ejaculations before they ſat down to meals. Porphyry, in his treatiſe *De abſtin.* lib. iv. p. 408. gives a great character of the Samnean gymnoſophiſts in Egypt for the ſtrictneſs of their life: as one article in their favour, he obſerves, that at the ſounding of a bell before their meals, which conſiſted only of rice, bread, fruits, and herbs, they went to prayers; which being ended, and not before, the bell ſounded again, and they ſat down to eating. In general this was a religious uſage or rite among the ancient Greeks; and derived from yet older ages, if Clement of Alexandria rightly informs us. He mentions, that theſe people when they met together to refreſh themſelves with the juice of the grape, ſung a piece of muſic, in imitation of the Hebrew pſalms, which they called a *ſcholion*. Livy, lib. xxxix. ſpeaks of it as a ſettled cuſtom among the old Romans, that they offered ſacrifice and prayer to the gods at their meals and compotations. But one of the fulleſt teſtimonies to our purpoſe is given by Quintilian, *Declam.* 301. *Adiſti menſam*, ſays he, *ad quam cum venire cœpimus, Deos invocamus;* "We approached the table (at ſupper together), and then invoked the gods."

The Jeſuit Trigautius, in his very elegant and inſtructive narrative of the Chriſtian expedition of their miſſionaries into China, book i. p. 69. gives this account of the people there in the particular now under conſideration. "Before they place themſelves for partaking of an entertainment, the perſon who makes it ſets a veſſel, either of gold, or ſilver, or marble, or ſome ſuch valuable material, in a charger full of wine, which he holds with both his hands, and then makes a low bow to the perſon of chief quality or character at the table. Then from the hall or dining-room, he goes into the porch or entry, where he again makes a very low bow, and turning his face to the ſouth, pours out this wine upon the ground as a thankful oblation to the Lord of heaven. After this, repeating his reverential obeiſance, he returns into the hall," &c.

The Turks pray for a bleſſing on their meat; and many more inſtances might be produced of infidels who have conſtantly obſerved the like cuſtom in ſome way or other.

2. The fact, therefore, with reſpect to the heathen world, being thus evident, we proceed to the ſentiments and behaviour of the Jews in this particular. Their celebrated hiſtorian Joſephus, giving a detail of the rites and cuſtoms of the Eſſenes, who were confeſſedly the ſtricteſt and moſt pious profeſſors of the Jewiſh religion, has this remarkable paſſage to the preſent purpoſe: "The prieſt," ſays he, "begs a bleſſing before they preſume to take any nouriſhment; and it is looked upon as a great ſin to take or taſte before." Then follows the thankſgiving before meat: and "when the meal," proceeds he, "is over, the prieſt prays again; and the company with him bleſs and praiſe God as their preſerver, and the donor of their life and nouriſhment."

Philo, in his book *De vita contemplativa*, gives an account of a body of men and women ſtricter than even the Eſſenes themſelves. He diſtinguiſhes them by no particular name, though his relation is very accurate and circumſtantial; namely, that on certain ſpecial occaſions, before "they took their meals, they placed themſelves in a proper decent order; when, lifting up their hands and eyes to heaven, they prayed to God that he would be pleaſed to be propitious to them in the uſe of thoſe his good creatures." Grace.

From the Hebrew ritual it appears, that the Jews had their hymns and pſalms of thankſgiving, not only after eating their paſſover, but on a variety of other occaſions, at and after meals, and even between their ſeveral courſes and diſhes; as when the beſt of their wine was brought upon the table, or their aromatic confections, or the fruit of the garden, &c. On the day of the paſſover was ſung Pſalm cxiv. "When Iſrael came out of Egypt," &c.

Ariſtæus has a paſſage full on the preſent ſubject. "Moſes," ſays he, "commands that when the Jews are going to eat or drink, the company ſhould immediately join in ſacrifice or prayer." Where Rabbi Eleazar (upon that author) met with this ſentence, has been controverted. But ſuppoſing it not to be found *in ſcriptis*, it is ſufficient for us to know that the Jews did conſtantly practiſe this cuſtom, upon the foundation of an ancient and general tradition and uſage. That the prophet Daniel gave thanks before meat, is evident from the Apocryphal book concerning Bel and the Dragon, where, ver. 38, 39, we find, that "Daniel ſaid, Thou haſt remembered me, O God! neither haſt thou forſaken them who ſeek thee and love thee. So Daniel aroſe, and did eat." Of this text Prudentia takes notice in Cathemirin, hymn iv.

His ſumptis Danielis excitavit
In cælum faciem, ciboque fortis,
Amen reddidit, allelujah dixit.
The much-belov'd took the repaſt,
And up to heav'n his eyes he caſt;
By which refreſh'd, he ſung aloud,
Amen, and allelujah to his God.

Where, by the way, it may be obſerved, that the poet is a little miſtaken in making the prophet give thanks after meat; whereas, according to the text, he did it before.

GRACE, or *Gracefulneſs*, in the human character; an aggreeable attribute, inſeparable from motion as oppoſed to reſt, and as comprehending ſpeech, looks, geſture, and loco-motion.

As ſome motions are homely, the oppoſite to graceful; it is to be inquired, With what motions is this attribute connected? No man appears graceful in a maſk; and therefore, laying aſide the expreſſions of the countenance, the other motions may be genteel, may be elegant, but of themſelves never are graceful. A motion adjuſted in the moſt perfect manner to anſwer its end, is elegant; but ſtill ſomewhat more is required to complete our idea of grace or gracefulneſs.

What this unknown *more* may be, is the nice point. One thing is clear from what is ſaid, that this *more* muſt ariſe from the expreſſions of the countenance: and from what expreſſions ſo naturally as from thoſe which indicate mental qualities, ſuch as ſweetneſs, benevolence, elevation, dignity? This promiſes to be a fair analyſis: becauſe of all objects mental qualities affect us the moſt; and

Grace, Graces. and the impreſſion made by graceful appearance upon every ſpectator of taſte, is too deep for any cauſe purely corporeal.

The next ſtep is, to examine what are the mental qualities, that, in conjunction with elegance of motion, produce a graceful appearance. Sweetneſs, cheerfulneſs, affability, are not ſeparately ſufficient, nor even in conjunction. Dignity alone, with elegant motion, produce a graceful appearance; but ſtill more graceful with the aid of other qualities, thoſe eſpecially that are the moſt exalted. See DIGNITY.

But this is not all. The moſt exalted virtues may be the lot of a perſon whoſe countenance has little expreſſion: ſuch a perſon cannot be graceful. Therefore to produce this appearance, we muſt add another circumſtance, viz. an expreſſive countenance, diſplaying to every ſpectator of taſte, with life and energy, every thing that paſſes in the mind.

Collecting theſe circumſtances together, grace may be defined, "that agreeable appearance which ariſes from elegance of motion and from a countenance expreſſive of dignity." Expreſſions of other mental qualities are not eſſential to that appearance, but they heighten it greatly.

Of all external objects, a graceful perſon is the moſt agreeable.

Dancing affords great opportunity for diſplaying grace, and haranguing ſtill more. See DANCING, DECLAMATION, and ORATORY.

But in vain will a perſon attempt to be graceful who is deficient in amiable qualities. A man, it is true, may form an idea of qualities he is deſtitute of; and, by means of that idea, may endeavour to expreſs theſe qualities by looks and geſtures: but ſuch ſtudied expreſſion will be too faint and obſcure to be graceful.

Act of GRACE, the appellation given to the act of parliament 1696, c. 32. which allows priſoners for civil debts to be ſet at liberty, upon making oath that they have not wherewithal to ſupport themſelves in priſon, unleſs they are alimented by the creditors on whoſe diligences they were impriſoned, within ten days after intimation made for that purpoſe.

Days of GRACE, three days immediately following the term of payment of a bill, within which the creditor muſt proteſt it if payment is not obtained, in order to intitle him to recourſe againſt the drawer.

GRACE is alſo a title of dignity given to dukes, archbiſhops, and in Germany to barons and other inferior princes.

GRACES, GRATIÆ, *Charites*, in the heathen theology, were fabulous deities, three in number, who attended on Venus. Their names are, Aglia, Thalia, and Euphroſyne; i. e. ſhining, flouriſhing, and gay; or, according to ſome authors, Paſithea, Euphroſyne, and Ægiale. They were ſuppoſed by ſome to be the daughters of Jupiter and Eurynome the daughter of Oceanus; and by others, to be the daughters of Bacchus and Venus.

Some will have the Graces to have been four; and make them the ſame with the *Horæ* "hours", or rather with the four ſeaſons of the year. A marble in the king of Pruſſia's cabinet repreſents the three Graces in the uſual manner, with a fourth ſeated and covered with a large veil, with the words underneath, *Ad Soſores* IIII. But this groupe we may underſtand to be the three Graces, and Venus, who was their ſiſter, as being daughter of Jupiter and Dione. Gracilis || Grafting.

The graces are always ſuppoſed to have hold of each other's hands, and never parted. They were painted naked, to ſhow that the Graces borrow nothing from art, and that they have no other beauties than what are natural.

Yet in the firſt ages they were not repreſented naked, as appears from Pauſanias, lib. vi. and lib. ix. who deſcribes their temple and ſtatues. They were of wood, all but their head, feet, and hands, which were white marble. Their robe or gown was gilt: one of them held in her hand a roſe, another a dye, and the third a ſprig of myrtle.

GRACILIS, a muſcle of the leg, thus called from its ſlender ſhape. See ANATOMY, *Table of the Muſcles*.

GRACULA, the GRAKLE, a genus of birds belonging to the order of picæ. See ORNITHOLOGY *Index*.

GRACULUS. See CORVUS, ORNITHOLOGY *Index*.

GRADATION, in general, the aſcending ſtep by ſtep, or in a regular and uniform manner.

GRADATION, in *Logic*, a form of reaſoning, otherwiſe called SORITES.

GRADATION, in *Painting*, a gradual and inſenſible change of colour, by the diminution of the tints and ſhades.

GRADATION, in *Rhetoric*, the ſame with CLIMAX.

GRADISKA, a ſtrong town of Hungary in Sclavonia, on the frontiers of Croatia, taken by the Turks in 1691. It is ſeated on the river Save, in E. Long. 17. 55. N. Lat. 45. 38.

GRADISKA, a ſtrong town of Italy, in a ſmall iſland of the ſame name on the frontiers of Friuli, in E. Long. 13. 37. N. Lat. 46. 6. It is ſubject to the houſe of Auſtria.

GRADO, a ſtrong town of Italy, in a ſmall iſland of the ſame name, on the coaſt of Friuli, and in the teritory of Venice. E. Long. 13. 35. N. Lat. 45. 52.

GRADUATE, a perſon who has taken a degree in the univerſity. See DEGREE.

GRÆVIUS, JOHN GEORGE, one of the moſt learned writers in the 17th century. In the 24th year of his age, the elector of Brandenburg made him profeſſor at Doiſbourg. In 1658, he was invited to Deventer to ſucceed his former maſter Gronovius. In 1661, he was appointed profeſſor of eloquence at Utrecht; and 12 years after he had the profeſſorſhip of politics and hiſtory conferred on him. He fixed his thoughts here, and refuſed ſeveral advantageous offers. He had, however, the ſatisfaction to be ſought after by divers princes, and to ſee ſeveral of them come from Germany to ſtudy under him. He died in 1703, aged 71. His *Theſaurus antiquitatum et hiſtoriarum Italiæ*, &c. and other works are well known.

GRAFTING, or ENGRAFTING, in *Gardening*, is the taking a ſhoot from one tree, and inſerting it into another, in ſuch a manner that both may unite cloſely and become one tree. By the ancient writers on huſbandry and gardening, this operation is called *inciſion*, to diſtinguiſh it from inoculation or budding, which they call *inſerere oculos*.

Grafting has been practiſed from the moſt remote antiquity;

Graham. antiquity; but its origin and invention is differently related by naturaliſts. Theophraſtus tells us, that a bird having ſwallowed a fruit whole, caſt it forth into a cleft or cavity of a rotten tree; where mixing with ſome of the putrified parts of the wood, and being waſhed with the rains, it budded, and produced within this tree another tree of a different kind. This led the huſbandman to certain reflections, from which ſoon afterwards aroſe the art of engrafting. For the different methods of performing this operation, ſee GARDENING *Index*.

GRAHAM, JAMES, Marquis of Montroſe, was comparable to the greateſt heroes of antiquity. He undertook, againſt almoſt every obſtacle that could terrify a leſs enterpriſing genius, to reduce the kingdom of Scotland to the obedience of the king; and his ſucceſs was anſwerable to the greatneſs of the undertaking. By valour, he in a few months, almoſt effectuated his deſign; but, for want of ſupplies, was forced to abandon his conqueſts. After the death of Charles I. he, with a few men, made a ſecond attempt, but was immediately defeated by a numerous army. As he was leaving the kingdom in diſguiſe, he was betrayed into the hands of his enemy, by the Lord Aſton, his intimate friend. He was carried to his execution with every circumſtance of indignity that wanton cruelty could invent; and hanged upon a gibbet 30 feet high, with the book of his exploits appended to his neck. He bore this reverſe of fortune with his uſual greatneſs of mind, and expreſſed a juſt ſcorn at the rage and the inſult of his enemies. We meet with many inſtances of valour in this active reign; but Montroſe is the only inſtance of heroiſm. He was executed May 21. 1650. See BRITAIN, N° 137, 138, 143, 165.

GRAHAM, *Sir Richard*, lord viſcount Preſton, eldeſt ſon of Sir George Graham of Netherby, in Cumberland, Bart. was born in 1648. He was ſent ambaſſador by Charles II. to Louis XIV. and was maſter of the wardrobe and ſecretary of ſtate under James II. But when the revolution took place, he was tried and condemned, on an accuſation of attempting the reſtoration of that prince; though he obtained a pardon by the queen's interceſſion. He ſpent the remainder of his days in retirement, and publiſhed an elegant tranſlation of "Boethius on the conſolation of philoſophy." He died in 1695.

GRAHAM, *George*, clock and watch-maker, the moſt ingenious and accurate artiſt in his time, was born in 1675. After his apprenticeſhip, Mr Tompion received him into his family, purely on account of his merit; and treated him with a kind of parental affection as long as he lived. Beſides his univerſally acknowledged ſkill in his profeſſion, he was a complete mechanic and aſtronomer; the great mural arch in the obſervatory at Greenwich was made for Dr Halley, under his immediate inſpection, and divided by his own hand: and from this incomparable original, the beſt foreign inſtruments of the kind are copies made by Engliſh artiſts. The ſector by which Dr Bradley firſt diſcovered two new motions in the fixed ſtars, was of his invention and fabric: and when the French academicians were ſent to the north to aſcertain the figure of the earth, Mr Graham was thought the fitteſt perſon in Europe to ſupply them with inſtruments; thoſe who went to the ſouth were not ſo well furniſhed. He was for many years a member of the Royal Society, to which he communicated ſeveral ingenious and important diſcoveries; and regarded the advancement of ſcience more than the accumulation of wealth. He died in 1751. Graham || Gramina.

GRAHAM's Dyke. See *ANTONINUS's Wall*.

GRAIN, corn of all ſorts, as barley, oats, rye, &c. See CORN, WHEAT, &c.

GRAIN is alſo the name of a ſmall weight, the twentieth part of a ſcruple in apothecaries weight, and the twenty-fourth of a pennyweight troy.

A grain-weight of gold-bullion is worth two-pence, and that of ſilver but half a farthing.

GRAIN alſo denotes the component particles of ſtones and metals, the veins of wood, &c. Hence croſs-grained, or againſt the grain, means contrary to the fibres of wood, &c.

GRALLÆ, in *Ornithology*, is an order of birds analogous to the *bruta* in the claſs of *mammalia* in the Linnæan ſyſtem. See ORNITHOLOGY.

GRAMINA, GRASSES; one of the ſeven tribes or natural families, into which all vegetables are diſtributed by Linnæus in his *Philoſophia Botanica*. They are defined to be plants which have very ſimple leaves, a jointed ſtem, a huſky calyx termed *gluma*, and a ſingle ſeed. This deſcription includes the ſeveral ſorts of corn as well as graſſes. In Tournefort they conſtitute a part of the fifteenth claſs, termed *apetali*; and in Linnæus's ſexual method, they are moſtly contained in the ſecond order of the third claſs, called *triandria digynia*.

This numerous and natural family of the graſſes has engaged the attention and reſearches of ſeveral eminent botaniſts. The principal of theſe are, Ray, Monti, Micheli, and Linnæus.

M. Monti, in his *Catalogus ſtirpium agri Bononienſis gramina ac hujus modi-affinia complectens*, printed at Bononia in 1719, divides the graſſes from the diſpoſition of their flowers, as Theophraſtus and Ray have divided them before him, into three ſections or orders.—Theſe are, 1. Graſſes having flowers collected in a ſpike. 2. Graſſes having their flowers collected in a panicle or looſe ſpike. 3. Plants that in their habit and external appearance are allied to the graſſes.

This claſs would have been natural if the author had not improperly introduced ſweet-ruſh, juncus, and arrow-headed graſs, into the third ſection. Monti enumerates about 306 ſpecies of the graſſes, which he reduces under Tournefort's genera; to theſe he has added three new genera.

Scheuchzer, in his *Ariſtographia*, publiſhed likewiſe in 1719, divides the graſſes, as Monti, from the diſpoſition of their flowers, into the five following ſections: 1. Graſſes with flowers in a ſpike, as phalaris, anthoxanthum, and frumentum. 2. Irregular graſſes, as ſchœnanthus, and cornucopiæ. 3. Graſſes with flowers growing in a ſimple panicle or looſe ſpike, as reed and millet. 4. Graſſes with flowers growing in a compound panicle, or diffuſed ſpike, as oats and poa. 5. Plants by their habit nearly allied to the graſſes, as cypreſs-graſs, ſcirpus, linagroſtis, ruſh, and ſcheuchzeria.

Scheuchzer has enumerated about four hundred ſpecies, which he deſcribes with amazing exactneſs.

Micheli

Gramina. Micheli has divided the graſſes into ſix ſections, which contain in all 44 genera, and are arranged from the ſituation and number of the flowers.

GRAMINA, the name of the fourth order in Linnæus's Fragments of a Natural Method, conſiſting of the numerous and natural family of the graſſes, viz. agroſtis, aira, alopecurus or fox-tail graſs, anthoxanthum or vernal graſs, ariſtida, arundo or reed, avena or oats, bobartia, briza, bromus, cinna, cornucopiæ or horn of plenty graſs, cynoſurus, dactylis, elymus, feſtuca or feſcue-graſs, hordeum or barley, lagurus or hare's-tail graſs, lolium or darnel, lygeum or hooded matweed, melica, milium or millet, nardus, oryza or rice, panicum or panic-graſs, paſpalum, phalaris or canary-graſs, phleum, poa, ſaccharum or ſugar-cane, ſecale or rye, ſtipa or winged ſpike-graſs, triticum or wheat, uniola or ſea-ſide oats of Carolina, coix or Job's tears, olyra, pharus, tripſacum, zea, Indian Turkey wheat or Indian corn, zizania, ægilops or wild feſcue-graſs, andropogon, apluda, cenchrus, holcus or Indian millet, iſchæmum. See BOTANY. Gramina.

GRAMMAR.

Definition 1. GRAMMAR *is the art of ſpeaking or of writing any language with propriety;* and the purpoſe of *language* is to communicate our *thoughts.*

2. Grammar, conſidered as an *art*, neceſſarily ſuppoſes the previous exiſtence of language; and as its deſign is to teach any language to thoſe who are ignorant of it, it muſt be adapted to the genius of that particular language of which it treats. A juſt method of grammar, therefore, without attempting any alterations in a language already introduced, furniſhes certain obſervations called *rules*, to which the methods of ſpeaking uſed in that language may be reduced; and this collection of rules is called *the grammar* of that particular language. For the greater diſtinctneſs with regard to theſe rules, grammarians have uſually divided this ſubject into four diſtinct heads, viz. ORTHOGRAPHY, or *the art of combining letters into ſyllables, and ſyllables into words;* ETYMOLOGY, or *the art of deducing one word from another, and the various modifications by which the ſenſe of any one word can be diverſified conſiſtently with its original meaning or its relation to the theme whence it is derived;* SYNTAX, or what relates to *the conſtruction or due diſpoſition of the words of a language into ſentences or phraſes;* and PROSODY, or that which treats of *the quantities and accents of ſyllables, and the art of making verſes.*

2 Grammar particular,

3 Or univerſal.

3. But grammar, conſidered as a *ſcience*, views language only as it is ſignificant of *thought*. Neglecting particular and arbitrary modifications introduced for the ſake of beauty or elegance, it examines the analogy and relation between *words* and *ideas;* diſtinguiſhes between thoſe particulars which are *eſſential* to language and thoſe which are only *accidental;* and thus furniſhes a certain ſtandard, by which different languages may be compared, and their ſeveral excellencies or defects pointed out. This is what is called PHILOSOPHIC or

UNIVERSAL GRAMMAR.

4 The deſign of ſpeech.

4. THE origin of language is a ſubject which has employed much learned inveſtigation, and about which there is ſtill a diverſity of opinion. The deſign of ſpeech is to communicate to others the thoughts and perceptions of the mind of the ſpeaker: but it is obvious, that between an internal idea and any external ſound there is no natural relation; that the word *fire*, for inſtance, might have denominated the ſubſtance which we call *ice*, and that the word *ice* might have ſignified *fire*. Some of the moſt acute feelings of man, as well as of every other animal, are indeed expreſſed by ſimple inarticulate ſounds, which as they tend to the preſervation of the individual or the continuance of the ſpecies, and invariably indicate either pain or pleaſure, are univerſally underſtood: but theſe inarticulate and ſignificant ſounds are very few in number; and if they can with any propriety be ſaid to conſtitute a natural and univerſal language, it is a language of which man as a mere ſenſitive being partakes in common with the other animals.

5 Language conſiſts of words ſignificant of ideas.

5. Man is endowed not only with *ſenſation*, but alſo with the faculty of *reaſoning;* and ſimple inarticulate ſounds are inſufficient for expreſſing all the various modifications of thought, for communicating to others a chain of argumentation, or even for diſtinguiſhing between the different ſenſations either of pain or of pleaſure: a man ſcorched with fire or unexpectedly plunged among ice, might utter the cry naturally indicative of ſudden and violent pain; the cry would be the ſame, or nearly the ſame, but the ſenſations of cold and heat are widely different. *Articulation*, by which thoſe ſimple ſounds are modified, and a particular meaning fixed to each modification, is therefore abſolutely neceſſary to ſuch a being as man, and forms the language which diſtinguiſhes him from all other animals, and enables him to communicate with facility all that diverſity of ideas with which his mind is ſtored, to make known his particular wants, and to diſtinguiſh with accuracy all his various ſenſations. Thoſe ſounds thus modified are called WORDS; and as words have confeſſedly no *natural* relation to the ideas and perceptions of which they are ſignificant, the uſe of them muſt either have been the reſult of human ſagacity, or have been ſuggeſted to the firſt man by the Author of nature.

6. Whether language be of divine or human origin, is a queſtion upon which, though it might perhaps be ſoon reſolved, it is not neceſſary here to enter. Upon either ſuppoſition, the firſt language, compared with thoſe which ſucceeded it, or even with itſelf as afterwards enlarged, muſt have been extremely rude and narrow.

E,

language.

A GRAMMATICAL TABLE,

EXHIBITING A SYSTEMATIC VIEW OF WORDS AS THEY ARE COMMONLY ARRANGED INTO DISTINCT CLASSES, WITH THEIR SUBDIVISIONS.

All LANGUAGE is composed of WORDS; each of which may be defined, A SOUND SIGNIFICANT OF SOME IDEA OR RELATION. These words may be arranged into four general divisions, called

SUBSTANTIVES;

which are all those words that are expreſſive of THINGS WHICH EXIST OR ARE CONCEIVED TO EXIST OF THEMSELVES, AND NOT AS THE ENERGIES OR QUALITIES OF ANY THING ELSE. Theſe may be divided into two orders, *viz.*

NOUNS, properly ſo called, being the NAMES OF ALL THOSE THINGS WHICH EXIST, or are CONCEIVED TO EXIST. Theſe may be divided into three kinds, each of which admits of the ſubdiviſions after mentioned, *viz:*

- **NATURAL**, or thoſe which are uſed as the NAMES OF NATURAL SUBSTANCES; ſuch are
  - GENUS. ANIMAL,
    - SPECIES. MAN,
      - INDIVIDUAL. ALEXANDER, CYRUS, *&c.*
    - SPECIES. DOG,
      - INDIVIDUAL. CERBERUS, ARGUS, *&c.*
  - GENUS. EDIFICE,
    - SPECIES. HOUSE,
      - INDIVIDUAL. THE VATICAN, *&c.*
    - SPECIES. CHURCH,
      - INDIVIDUAL. ST PAUL'S, *&c.*
- **ARTIFICIAL**, or the ſeveral names of ARTIFICIAL OBJECTS; ſuch as,
- **ABSTRACT**, or thoſe which are the names of QUALITIES conſidered as ABSTRACTED FROM THEIR SUBSTANCES; ſuch as,
  - GENUS. MOTION,
    - SPECIES. FLIGHT,
      - INDIVIDUAL. THE FALCON'S FLIGHT, *&c.*
    - SPECIES. COURSE.
      - INDIVIDUAL. THE GRE-HOUND'S COURSE, *&c.*

Nouns of all kinds admit of the following ACCIDENTS, *viz.*

- GENDER, which is a certain affection of nouns denoting the ſex of thoſe ſubſtances of which they are the names. For as in nature every object is either *male* or *female*, or *neither the one nor the other*, grammarians, following this idea, have divided the *names of beings* into three *claſſes*. Thoſe that denote *males*, are ſaid to be of the MASCULINE *gender*; thoſe that denote *females*, of the FEMININE *gender*; and thoſe which denote *neither the one nor the other*, of the NEUTER *gender*. The Engliſh is the only language of which the nouns are, with reſpect to ſex, an exact copy of nature.
- NUMBER. As there is no object in nature ſingle and alone, and as by far the greater part of nouns are the names of whole *claſſes* of objects, it is evident that every *ſuch* noun ought to have ſome variation, to denote whether it is *one individual* of the claſs which is meant, or *more* than one. Accordingly we find, that in every language nouns have ſome method of expreſſing this. If *one* be mentioned, the noun is uſed in that form which is called the SINGULAR *number*; if *more* than one, it is uſed in a different form, which is called the PLURAL *number*.
- CASES. All nouns except *proper names* are *general terms*; but it is often neceſſary to uſe thoſe *general terms* for the purpoſe of expreſſing *particular ideas*. This can be done only by connecting the *general term* with ſome word ſignificant of a *quality* or *circumſtance peculiar* to the individual intended. When that quality or circumſtance is not expreſſed by an *adjective*, it is in Engliſh and moſt modern languages *commonly connected* with the noun by the intervention of a *prepoſition*; but in the Greek and Latin languages the noun has CASES to anſwer the ſame end, and even in Engliſh the noun has, beſides the nominative, *one caſe* to denote poſſeſſion.

And

PRONOUNS, which are a ſpecies of word invented to SUPPLY THE PLACE OF NOUNS IN CERTAIN CIRCUMSTANCES. They are of two kinds, *viz.*

- **PREPOSITIVE**; ſo called becauſe they are capable of LEADING A SENTENCE. Theſe are divided into three orders, called the pronouns of the
  - FIRST PERSON; in Engliſh, *I*. This pronoun denotes the SPEAKER AS CHARACTERIZED BY THE PRESENT ACT OF SPEAKING, in contradiſtinction to *every other character* which he may bear. It is ſaid to be of the FIRST PERSON, becauſe there muſt neceſſarily be a *ſpeaker* before there can be a *hearer*; and the *ſpeaker* and *hearer* are the *only* perſons employed in *diſcourſe*.
  - SECOND PERSON,—THOU. This pronoun denotes, THE PERSON ADDRESSED AS CHARACTERIZED BY THE PRESENT CIRCUMSTANCE OF BEING ADDRESSED, in contradiſtinction, *&c.* It is ſaid to be of the SECOND PERSON, becauſe in diſcourſe there cannot be a *hearer* till there be a *ſpeaker*. The pronouns of the *firſt* and *ſecond perſons* have *number* and *caſes*, for the ſame reaſon that nouns have theſe accidents; but in no language have they any variation denoting *gender*: the reaſon is, that SEX, and all other properties and attributes whatever, except thoſe juſt mentioned as deſcriptive of the nature of theſe pronouns, are foreign from the mind of the ſpeaker when he utters *I* or THOU in diſcourſe.
  - THIRD PERSON,—HE, SHE, IT; which words are employed to denote *any object* which may be the ſubject of diſcourſe *different from the ſpeaker and the hearer*. They are improperly ſaid to be of *any perſon*; for there can be but *two perſons* employed in diſcourſe, *the ſpeaker* and the *party addreſſed*. They are, however, PRONOUNS; ſince they ſtand by themſelves, and are the *ſubſtitutes* of NOUNS. HE is the ſubſtitute of a noun denoting a *male animal*; SHE, of a noun denoting a *female animal*; and IT, of a noun denoting an *object* which has *no ſex*. All theſe, like the pronouns *perſonal*, admit of NUMBER and CASES; but there is this peculiarity attending them, that though in every caſe of the *ſingular* number the diſtinction of gender is carefully preſerved, in the plural it is totally loſt; THEY, THEIRS, and THEM, being the *nominative*, *poſſeſſive*, and *accuſative*, caſes of HE, of SHE, and of IT.

And

- **SUBJUNCTIVE**; ſo called, becauſe it cannot lead a ſentence, but only ſerves to ſubjoin a clauſe to another which was previous. Of this kind are
  - WHICH and WHO. This ſubjunctive pronoun may be ſubſtituted in the place of *any noun whatever*, whether it be expreſſive of a *genus*, a *ſpecies*, or an *individual*; as the *animal* WHICH; the *man* WHO, *Alexander* WHO, *&c.* Nay, it may even become the ſubſtitute of the *perſonal pronouns themſelves*; as when we ſay, *I* WHO *now write*, *you* WHO *now read*, *thou* WHO *readeſt*, *he* WHO *wrote*, *ſhe* WHO *ſpoke*; where it is obſervable, that the *ſubjunctive* WHO adopts the PERSON of that *prepoſitive* pronoun which it repreſents, and affects the *verb* accordingly. WHO and WHICH therefore are *real pronouns*, from ſubſtitution; and they have this peculiarity beſides, that they have not only the power of a *pronoun*, but alſo of a *connective* of the ſame import with that which in Engliſh is expreſſed by the prepoſition OF. The word THAT is now uſed indifferently for WHO or WHICH, as a *ſubjunctive pronoun*; but it was originally uſed only as a *definitive*, and as ſuch it ought ſtill to be conſidered in *philoſophical grammar*.

ATTRIBUTIVES;

which are thoſe words that are expreſſive of ALL SUCH THINGS AS ARE CONCEIVED TO EXIST NOT OF THEMSELVES BUT AS THE ATTRIBUTES OF OTHER THINGS. Theſe are divided into

VERBS, or thoſe words which are expreſſive of an ATTRIBUTE and an ASSERTION; as, I WRITE. They all admit of the variations after mentioned.

The *attributes* expreſſed by VERBS have their eſſence in *motion* or its *privation*; and as *motion* is always accompanied by *time*, therefore verbs are liable to certain variations called TENSES, *viz.*

- THE PRESENT, which repreſents the action of the verb as *going on*, and as *contemporary* with *ſomething elſe*; as, I WRITE, or I AM WRITING, either *juſt now*, or *when you are reading*, &c.
- THE PRÆTER-IMPERFECT, which repreſents the action of the verb as *having been going on* but *not finiſhed* in ſome portion of *paſt time*; as, I WAS WRITING, *no matter when*, *yeſterday*, *laſt week*, or *laſt year*.
- THE AORIST OF THE PAST, which repreſents the action of the verb as *finiſhed* in ſome *indefinite portion of paſt time*; as I WROTE, or DID WRITE, *yeſterday*, *laſt week*, &c.
- THE PRÆTER-PERFECT, which repreſents the action of the verb as juſt NOW *finiſhed*, or as finiſhed in ſome portion of time, within which the *preſent inſtant is comprehended*; as I HAVE WRITTEN *this day* or *this week*.
- THE PLUSQUAM-PERFECT, which repreſents the action of the verb as having been *finiſhed* in ſome portion of time, within which a *determinate paſt inſtant was comprehended*; as, I HAD WRITTEN *laſt week before I ſaw you*.
- THE FIRST FUTURE, which repreſents the action of the verb as *to be going on* at ſome *indefinite future time*; as I SHALL WRITE or BE WRITING *to-morrow*, *next week*, &c.
- THE SECOND FUTURE, which repreſents the action of the verb as *to be completed* at ſome *definite future time*; as, I SHALL HAVE WRITTEN *when you come to-morrow*, *next week*, &c.

AFFIRMATION is the ESSENCE of every verb; inſomuch that *all verbs* may be reſolved into the ſubſtantive verb IS, and another *attributive*. But a man may *affirm* ſomething of the ACTION of the verb *directly*; ſomething of his LIBERTY or CAPACITY to *perform* that action; or ſomething of his WISH that *another* ſhould perform it. To denote theſe ſeveral kinds of affirmation, all verbs have what grammarians call MODES, *viz.*

- THE INDICATIVE, to denote the *firſt* kind of *affirmation*; as, I WRITE.
- THE SUBJUNCTIVE, to denote the *ſecond*; as, I MAY or CAN *write*.
- THE IMPERATIVE, to denote the *third*; as, *write* THOU, or DO THOU *write*.

Beſides theſe, grammarians have given to every verb a MODE, called

- THE INFINITIVE; as, TO WRITE. But this ſeems, on every account, to be improperly ſtyled a MODE. Nay, if *affirmation* be the *eſſence* of verb, the *infinitive* cannot be conſidered as *any part of the verb at all*; for it expreſſes no affirmation. It is indeed nothing more than an *abſtract noun*, denoting the *ſimple energy* of *the verb*, in conjunction with *time*.

VERBS have likewiſe been diſtinguiſhed into the following kinds, according to the nature of the *attribute* of which they are expreſſive.

1*ſt*, ACTIVE-TRANSITIVE, or thoſe which denote an action that *paſſes from the agent to* ſome *external object*; as, *Cæſar* CONQUERED *Pompey*.

2*d*, ACTIVE-INTRANSITIVE, or thoſe which expreſs that kind of action which has *no effect* upon *any thing beyond the agent himſelf*; as *Cæſar* WALKED.

3*d*, PASSIVE, or thoſe which expreſs *not* action but *paſſion*, whether pleaſing or painful; as, *Portia* WAS LOVED, *Pompey* WAS CONQUERED.

4*th*, NEUTER, or thoſe which expreſs an attribute that conſiſts neither in *action* nor in *paſſion*; as, *Cæſar* STOOD.

PARTICIPLES, or thoſe words which are expreſſive of an ATTRIBUTE combined with TIME. In *Engliſh* there are only two participles: the *preſent*, as WRITING, which expreſſes the *action* of the verb TO WRITE, as *going on*; and the *paſt*, as WRITTEN, which expreſſes the action of the ſame verb as *finiſhed*, and therefore *paſt in time*. In *Greek* and *Latin* there is a *future participle*, by which the attribute is repreſented as *to be* in a ſtate of exertion at ſome future time; as, γραψων, *ſcripturus*, "about to write."

ADJECTIVES, or thoſe words which expreſs as *inhering in their ſubſtances* the ſeveral QUALITIES of things, *of which the eſſence conſiſts not in motion or its privation*; as, GOOD, BAD, BLACK, WHITE, LARGE, SMALL, *&c.* As *attributes* are the ſame whether they belong to *males* or *females*, to one *object* or to *many*, *adjectives* ought in ſtrictneſs to admit of no variation reſpecting *ſex* or *number*; and in Engliſh they actually admit of none. Some qualities, however, are of ſuch a nature, that one ſubſtance may have them in a *greater degree* than another; and therefore the *adjectives* denoting theſe qualities admit in moſt languages of a *variation*, which grammarians call the *degrees of compariſon*. Thus *Plato was* WISE, *Socrates was* WISER *than he*, but *Solomon was* THE WISEST *of men*. There is a ſpecies of *adjectives* derived from *nouns*, and even from *pronouns*: for we ſay, THE POMPEIAN *party*, A BRAZEN *trumpet*, and MY *book*; which are phraſes equivalent to *the party of Pompey*, *a trumpet of braſs*, and *the book of me*.

And

ADVERBS, or thoſe words which, as they denote the ATTRIBUTES of ATTRIBUTES, have been called ATTRIBUTIVES OF THE SECOND ORDER; to diſtinguiſh them from VERBS, PARTICIPLES, and ADJECTIVES, which denote the ATTRIBUTES OF SUBSTANCES, and are therefore called ATTRIBUTIVES OF THE FIRST ORDER. ADVERBS are divided into two kinds, *viz.*

I. Thoſe that are common to ALL ATTRIBUTIVES OF THE FIRST ORDER; *i. e.* which coaleſce equally with VERBS, with PARTICIPLES, and with ADJECTIVES. Theſe may be divided into ADVERBS

- Of INTENSION and REMISSION, or of QUANTITY CONTINUOUS; as MODERATELY, VASTLY, EXCEEDINGLY, *&c.* Theſe, like *adjectives* of a ſimilar nature, admit of the different *degrees of compariſon*.
- Of QUANTITY DISCRETE, as, ONCE, TWICE, THRICE, *&c.*
- Of RELATION; as MORE, MOST, LESS, LEAST, EQUALLY, PROPORTIONALLY, *&c.*

These are not, in ſtrictneſs of ſpeech, *adverbs*, being in reality the POSSESSIVE CASES of ONE, TWO, THREE, *&c.*

II. Thoſe that are confined to VERBS properly ſo called, and which are of the following kinds:

- Of TIME; as, THEN, WHEN, AFTERWARD, NOW, *&c.*
- Of PLACE; as HERE, THERE, WHERE, HENCE, WHENCE, *&c.* As alſo *adverbs* derived from *prepoſitions*; as, UPWARD, DOWNWARD, *&c.*
- Of INTENSIONS and REMISSIONS PECULIAR TO MOTION; as, SPEEDILY, HASTILY, SLOWLY, *&c.*—We have given ADVERBS a place among the parts of ſpeech *neceſſary* for the communication of thought; but it may be doubted whether they be entitled to this diſtinction. Engliſh adverbs at leaſt ſeem to be nothing more than corruptions of *nouns*, *adjectives*, and *verbs*. See Chap. V. ſect. 3.

DEFINITIVES;

which are all thoſe words that ſerve to DEFINE AND ASCERTAIN ANY PARTICULAR OBJECT OR OBJECTS AS SEPARATED FROM OTHERS OF THE SAME CLASS. Theſe are commonly called

ARTICLES; which are divided into two kinds, *viz.*

- **INDEFINITE**; as,
  - A or AN, which is prefixed to a *noun* or *general term*, to denote that but ONE INDIVIDUAL is meant of that *genus* or *ſpecies* of which the *noun* is the *common name*. This article, however, leaves the *individual itſelf quite indeterminate*. Thus *man* is the *general name* of the whole human race; A *man* is *one individual*, but that individual is *unknown*.
  - ANY; which is prefixed to a *noun* either in the ſingular or plural number, when it is *indifferent* as to the truth of the propoſition *what individual* or *individuals* be ſuppoſed: Thus, "ANY man will be virtuous when temptation is away."
  - SOME; which is prefixed to *nouns* in the *plural number*, to denote that only PART of the *ſpecies* or *genus* is meant, leaving that part undetermined: Thus, "SOME men are great cowards."

And

- **DEFINITE**; as,
  - THE; which is prefixed to a *noun*, to denote *one individual of the ſpecies* of which ſomething is predicated that diſtinguiſhes it from *every other* individual: Thus, "THE man that hath not muſic in himſelf is fit for treaſon." It is uſed before nouns in both numbers and for the ſame purpoſe; for we may ſay, "THE MEN who have not muſic in themſelves are fit for treaſons."
  - THIS; which prefixed to a *noun* in the *ſingular* number, denotes *an individual* as PRESENT and NEAR AT HAND; as, "THIS man beſide me."
  - THAT; which prefixed to a *noun* in the *ſingular* number, denotes *an individual* as PRESENT but at a LITTLE DISTANCE; as, "THAT man in the corner."

  } These two articles have *plurals*: THESE is the plural of THIS, and THOSE the plural of THAT.

  There are many other articles both *definite* and *indefinite*; for which ſee Chap. II.

And

CONNECTIVES,

or thoſe words which are employed to CONNECT OTHER WORDS, AND OF SEVERAL DISTINCT PARTS TO MAKE ONE COMPLETE WHOLE. Theſe may be divided into two kinds, *viz.*

CONJUNCTIONS; by which name are diſtinguiſhed all thoſe CONNECTIVES WHICH ARE COMMONLY EMPLOYED TO CONJOIN SENTENCES. Theſe have been divided into two kinds, called

- CONJUNCTIVES, or thoſe words which *conjoin ſentences* and their *meanings* alſo; and
- DISJUNCTIVES, or thoſe words which, at the ſame time that they *conjoin ſentences*, *disjoin* their *meanings*. Each of theſe *general diviſions* has been again *ſubdivided*. The *former* into COPULATIVES and CONTINUATIVES, the *latter* into SIMPLE DISJUNCTIVES and ADVERSATIVE DISJUNCTIVES. But the *general diviſion* is abſurd, and the *ſubdiviſions* are uſeleſs. CONJUNCTIONS never *disjoin the meanings of ſentences*, nor have any other effect than to *combine two or more ſimple ſentences into one compound ſentence*. If thoſe ſimple ſentences be of *oppoſite* meanings *before* their combination, they will continue ſo *after* it, whatever conjunction be employed to unite them. In *nature*, DIFFERENT TRUTHS are connected, if they be connected at all, by DIFFERENT RELATIONS; and therefore when the SENTENCES expreſſive of thoſe truths are connected in *language*, it muſt be by words ſignificant of thoſe NATURAL RELATIONS. Thus,

  - ACCIDENTAL ADDITION is expreſſed by the conjunction AND; as when we ſay, "Lyſippus was a ſtatuary AND Priſcian was a grammarian."
  - THE UNEXPECTED JUNCTION OF CONTRARY TRUTHS is expreſſed by BUT; as, "Brutus was a patriot BUT Cæſar was not."
  - THE RELATION OF AN EFFECT TO ITS CAUSE is expreſſed by BECAUSE; as, "Rome was enſlaved BECAUSE Cæſar was ambitious."
  - THE RELATION OF AN EFFECT TO A CAUSE OF WHICH THE EXISTENCE IS DOUBTFUL, by IF; as, "you will live happily IF you live honeſtly."
  - THE RELATION OF A CAUSE TO ITS EFFECT, by THEREFORE; as, "Cæſar was ambitious THEREFORE Rome was enſlaved."
  - THE IDEA OF SIMPLE DIVERSITY is expreſſed by EITHER and OR; as, "EITHER it is day OR it is night."
  - CONTRARIETY BETWEEN TWO AFFIRMATIONS, *which though each may be true by* ITSELF, *cannot* BOTH BE TRUE AT ONCE, is expreſſed by UNLESS; as, "Troy will be taken UNLESS the Palladium be preſerved."
  - COINCIDENCE OF TWO AFFIRMATIONS APPARENTLY CONTRARY TO EACH OTHER is expreſſed by ALTHOUGH; as, "Troy will be taken ALTHOUGH Hector defend it."

And

PREPOSITIONS, or thoſe CONNECTIVES of which the COMMON OFFICE IS TO CONJOIN WORDS WHICH REFUSE TO COALESCE; and this they can do only by SIGNIFYING THOSE RELATIONS BY WHICH THE THINGS EXPRESSED BY THE UNITED WORDS ARE CONNECTED IN NATURE. The *firſt* words of men, like their firſt *ideas*, had an immediate reference to *ſenſible* objects; and therefore there can be no doubt but the *original* uſe of PREPOSITIONS was to denote the various relations of *body*. Afterwards when men began to diſcern with their *intellect*, they took thoſe words which they found already made, PREPOSITIONS as well as others, and transferred them by *metaphor* to *intellectual conceptions*. PREPOSITIONS therefore are either

PROPER, or thoſe which literally denote the relations ſubſiſting among the objects of ſenſe. Such as

- THE ACCIDENTAL JUNCTION OF TWO THINGS BETWEEN WHICH THERE IS NO NECESSARY CONNECTION; as, "a houſe WITH a party-wall."
- THE SEPARATION OF TWO THINGS WHICH WE SHOULD EXPECT TO FIND UNITED; as, "a houſe WITHOUT a roof, a man WITHOUT hands."
- THE RELATION SUBSISTING BETWEEN ANY THING AND THAT WHICH SUPPORTS IT; as, "the ſtatue ſtands UPON a pedeſtal."
- THE RELATIONS OF HIGHER AND LOWER; as, "The ſun is riſen ABOVE the hills:—To ſupport uneaſy ſteps OVER the burning marle:—The ſun is ſet BELOW the horizon:—The ſhepherd reclines UNDER the ſhade of a beech-tree."
- THE RELATION BETWEEN ANY THING IN MOTION AND THAT IN WHICH IT MOVES; as, "the rays of light paſs THROUGH the air."
- THE RELATION BETWEEN ANY THING CONTINUED, WHETHER MOTION OR REST, AND THE POINT OF ITS BEGINNING; as, "The rays of light proceed FROM the ſun:—Theſe figs came FROM Turkey:—That lamp hangs FROM the ceiling."
- THE RELATION BETWEEN ANY THING CONTINUED AND THE POINT TO WHICH IT TENDS; as, "He is going TO Italy:—He ſlept TILL morning."
- THE RELATION BETWEEN AN EFFECT AND ITS CAUSE; as, "I am ſick OF my huſband and FOR my gallant."

Or

METAPHORICAL. For as thoſe who are above others in *place* have generally the advantage over them, the PREPOSITIONS which denote the one kind of *ſuperiority* or *inferiority*, are likewiſe employed to denote the other. Thus we ſay of a king, "he ruled OVER his people;" and of a *ſoldier*, "he ſerved UNDER ſuch a general."

CONJUNCTIONS and PREPOSITIONS are indeed employed only to connect ſentences and words; but it may be doubted whether they be parts of ſpeech diſtinct from *nouns*, *verbs*, and *adjectives*. See Chap. VI.

INTERJECTIONS are a ſpecies of words which are found perhaps in all the languages on earth, but which cannot be included in any of the claſſes above mentioned; for they are not ſubject to the rules or principles of grammar, as they contribute nothing to the *communication of thought*. They may be called a part of that *natural language* with which man is endowed in common with other animals, to expreſs or allay ſome very *ſtrong ſenſation*; ſuch as, AH! when he feels *pain*. In this view the interjection does not owe its *characteriſtical expreſſion* to the arbitrary *form* of *articulation*, but to the *tone* of voice, and the modifications of *countenance* and of *geſture* with which it is uttered; it is therefore univerſally underſtood by all mankind. In *diſcourſe* INTERJECTIONS are employed only when the ſuddenneſs or vehemence of ſome affection *returns men to their natural ſtate*, and makes them for a moment forget the uſe of ſpeech. In *books* they are thrown into ſentences without altering their form either in ſyntax or in ſignification; and in Engliſh this is generally done with a very bad effect, though the writer no doubt employs them with a view to pathos or embelliſhment.

A GRAMMATICAL TABLE

EXHIBITING AT ONE VIEW THE CONCORDIA DISCORS OF DISTINCT CLASSES, WITH THEIR SUBDIVISIONS

Ideas. modifications of thought, for communicating to others a chain of argumentation, or even for diſtinguiſhing be-

thoſe which ſucceeded it, or even with itſelf as afterwards enlarged, muſt have been extremely rude and narrow.

Division of Words.

narrow. If it was of *human* contrivance, this will be readily granted; for what art was ever invented and brought to a ſtate of perfection by illiterate ſavages? If it was taught by GOD, which is at leaſt the more probable ſuppoſition, we cannot imagine that it would be more comprehenſive than the ideas of thoſe for whoſe immediate uſe it was intended; that the firſt men ſhould have been taught to expreſs pains or pleaſures which they never felt, or to utter ſounds that ſhould be afterwards ſignificant of ideas which at the time of utterance had not occurred to the mind of the ſpeaker: man, taught the elements of language, would be able himſelf to improve and enlarge it as his future occaſions ſhould require.

6 Origin of Ideas.

7. As all language is compoſed of ſignificant *words* variouſly combined, a knowledge of them is neceſſary previous to our acquiring an adequate idea of language as conſtructed into ſentences and phraſes. But as it is by words that we expreſs the various *ideas* which occur to the mind, it is neceſſary to examine how ideas themſelves are ſuggeſted, before we can aſcertain the various claſſes into which words may be diſtributed. It is the province of *logic* to trace our ideas from their origin, as well as to teach the art of reaſoning: but it is neceſſary at preſent to obſerve, that our earlieſt ideas are all ideas of ſenſation, excited by the impreſſions that are made upon our organs of ſenſe by the various objects with which we are ſurrounded. Let us therefore ſuppoſe a reaſonable being, devoid of every poſſible prepoſſeſſion, placed upon this globe; and it is obvious, that his attention would in the firſt place be directed to the various objects which he ſaw exiſting around him. Theſe he would naturally endeavour to diſtinguiſh from one another; and if he were either learning or inventing a language, his firſt effort would be to give them *names*, by means of which the ideas of them might be recalled when the objects themſelves ſhould be abſent. This is one copious ſource of words; and forms a natural claſs which muſt be common to *every* language, and which is diſtinguiſhed by the name of NOUNS; and as theſe nouns are the names of the ſeveral ſubſtances which exiſt, they have likewiſe been called SUBSTANTIVES.

7 Of nouns.

8 Of attributives.

8. It would likewiſe be early diſcovered, that every one of theſe ſubſtances was endowed with certain qualities or attributes; to expreſs which another claſs of words would be requiſite, ſince it is only by their qualities that ſubſtances themſelves can attract our attention. Thus, *to be weighty*, is a quality of matter; *to think*, is an attribute of man. Therefore in every language words have been invented to expreſs the known qualities or attributes of the ſeveral objects which exiſt. Theſe may all be comprehended under the general denomination of ATTRIBUTIVES.

Division of Words.

9. NOUNS and ATTRIBUTIVES muſt comprehend all that is *eſſential* to language (A): for every thing which exiſts, or of which we can form an idea, muſt be either a *ſubſtance* or the *attribute* of ſome ſubſtance; and therefore thoſe two claſſes which denominate ſubſtances and attributes, muſt comprehend all the words that are *neceſſary* to communicate to the hearer the ideas which are preſent to the mind of the ſpeaker. If any other words occur, they can only have been invented for the ſake of diſpatch, or introduced for the purpoſes of eaſe and ornament, to avoid tedious circumlocutions or diſagreeable tautologies. There are indeed grammarians of great name, who have conſidered as eſſential to language an order of words, of which the uſe is to connect the nouns and attributives, and which are ſaid to have *no ſignification of themſelves*, but to become *ſignificant by relation*. Hence all words which can poſſibly be invented are by theſe men divided into two general claſſes: thoſe which are SIGNIFICANT OF THEMSELVES and thoſe which are NOT. Words ſignificant of themſelves are either expreſſive of the names of ſubſtances, and therefore called SUBSTANTIVES; or of attributes, and therefore called ATTRIBUTIVES. Words which are not ſignificant of themſelves, muſt *acquire* a meaning either as defining or connecting others; and are therefore arranged under the two claſſes of DEFINITIVES and CONNECTIVES.

9 Of definitives and connectives.

10. That in any language there can be words which of themſelves have *no ſignification*, is a ſuppoſition which a man free from prejudice will not readily admit; for to what purpoſe ſhould they have been invented? as they are ſignificant of no ideas, they cannot facilitate the communication of thought, and muſt therefore be only an incumbrance to the language in which they are found. But in anſwer to this it has been ſaid, that theſe words, though devoid of ſignification themſelves, acquire a ſort of meaning when joined with others, and that they are as neceſſary to the ſtructure of a ſentence as cement is to the ſtructure of an edifice: for as *ſtones* cannot be arranged into a regular building without a *cement* to *bind* and *connect* them, ſo the original words ſignificant of *ſubſtances* and *attributes*, cannot be made to expreſs all the variety of our ideas without being *defined* and *connected* by thoſe words which of themſelves ſignify *nothing*.—It is wonderful, that he who firſt ſuggeſted this ſimile did not perceive that it tends to overthrow the doctrine which it is meant to illuſtrate: for ſurely the *cement* is as much the *matter* of the building as the *ſtones* themſelves; it is equally ſolid and equally extended. By being united

(A) This is the doctrine of many writers on the theory of language, for whoſe judgment we have the higheſt reſpect: yet it is not eaſy to conceive mankind ſo far advanced in the art of abſtraction as to view *attributes* by themſelves independent of particular *ſubstances*, and to give *one general name* to *each attribute* whereſoever it may be found, without having at the ſame time words expreſſive of *affirmation*. We never talk of any *attribute*, a *colour* for inſtance, without *affirming* ſomething concerning it; as, either that it is *bright* or *faint*, or that it is the colour of ſome *ſubstance*. It will be ſeen afterwards, that to denote *affirmation* is the proper office of what is called the ſubſtantive *verb*; as, "Milk *is* white." That *verb* therefore appears to be as neceſſary to the communication of thought as any ſpecies of words whatever; and if we muſt range words under a few general claſſes, we ſhould be inclined to ſay, that *nouns*, *attributives*, and *affirmatives*, comprehend all that is eſſential to language.

Diviſion of Words.

with the ſtones, it neither acquires nor loſes any one of the qualities *eſſential* to *matter;* it neither communicates its own ſoftneſs, nor acquires their hardneſs. By this mode of reaſoning therefore it would appear, that the words called *definitives* and *connectives*, ſo far from having of themſelves *no* ſignification, are equally eſſential to language and equally ſignificant with thoſe which are denominated *ſubſtantives* and *attributives;* and upon inveſtigation it will be found that this is the truth. For whatever is meant by the *definition* or *connection* of the words which *all men* confeſs to be ſignificant, *that meaning* muſt be the ſenſe of the words of which the purpoſe is to define and connect; and as there can be no *meaning* where there are no *ideas*, every one of theſe *definitives* and *connectives* muſt be ſignificant of *ſome idea*, although it may not be always eaſy or even poſſible to expreſs that idea by another word.

11. Theſe different modes of dividing the parts of ſpeech we have juſt mentioned, becauſe they have been largely treated of by grammarians of high fame. But it does not appear to us, that any man can feel himſelf much the wiſer for having learned that all words are either SUBSTANTIVES or ATTRIBUTIVES, DEFINITIVES or CONNECTIVES. The diviſion of words into thoſe which are SIGNIFICANT OF THEMSELVES, and thoſe which are SIGNIFICANT BY RELATION, is abſolute nonſenſe, and has been productive of much error and much myſtery in ſome of the moſt celebrated treatiſes on grammar. It is indeed probable, that any attempt to eſtabliſh a different claſſification of the parts of ſpeech from that which is commonly received, will be found of little utility either in *practice* or in *ſpeculation*. As far as the *former* is concerned, the vulgar diviſion ſeems ſufficiently commodious; for every man who knows any thing, knows when he uſes a *noun* and when a *verb*. With reſpect to the *latter*, not to mention that all the grammarians from ARISTOTLE to HORNE TOOKE, have differed on the ſubject, it ſhould ſeem to be of more importance, after having aſcertained with preciſion the nature of each ſpecies of words, to determine in what circumſtances they *differ* than in what they *agree*.

10 The common diviſion of the parts of ſpeech the moſt proper.

12. In moſt languages, probably in all cultivated languages, grammarians diſtinguiſh the following parts of ſpeech: *Noun*, *pronoun*, *verb*, *participle*, *adverb*, *preposition*, *conjunction*. The *Latin* and *Engliſh* grammarians admit the *interjection* among the parts of ſpeech, although it is confeſſedly not neceſſary to the conſtruction of the ſentence, being only thrown in to expreſs the affection of the ſpeaker: and in the *Greek* and *Engliſh* tongues there is the *article* prefixed to nouns, when they ſignify the common names of *things*, to point them out, and to ſhow how far their ſignification extends. In the method of arrangement commonly followed in grammars, *adjectives* are claſſed with *ſubſtantives*, and both are denominated *nouns;* but it is certain that, when examined philoſophically, an eſſential difference is diſcovered between the *ſubſtantive* and the *adjective;* and therefore ſome writers of eminence, when treating of this ſubject, have lately given the following claſſification of words, which we ſhall adopt: The ARTICLE, NOUN, PRONOUN, VERB, PARTICIPLE, ADJECTIVE, ADVERB, PREPOSITION, CONJUNCTION, INTERJECTION. All theſe words are to be found in the *Engliſh* language; and therefore we ſhall examine each claſs, endeavour to aſcertain its preciſe import, and ſhow in what reſpects it differs from every other claſs. It is impoſſible to inveſtigate the principles of grammar without confining the inveſtigation in a great meaſure to ſome particular language from which the illuſtrations muſt be produced; and that we ſhould prefer the *Engliſh* language for this purpoſe can excite no wonder, as it is a preference which to every tongue is due from thoſe by whom it is ſpoken. We truſt, however, that the principles which we ſhall eſtabliſh will be found to apply *univerſally;* and that our inquiry, though *principally* illuſtrated from the *Engliſh* language, will be an inquiry into *philoſophical* or *univerſal* grammar.

Noun.

CHAP. I. *Of the Noun or Subſtantive.*

11 The noun defined.

13. NOUNS *are all thoſe words by which objects or ſubſtances are denominated, and which diſtinguiſh them from one another, without marking either quantity, quality, action, or relation.* The *ſubſtantive* or *noun* is the *name* of the thing ſpoken of, and in Greek and Latin is called *name;* for it is ονομα in the one, and *nomen* in the other; and if in Engliſh we had called it the *name* rather than the *noun*, the appellation would perhaps have been more proper, as this laſt word, being uſed only in *grammar*, is more liable to be miſunderſtood than the other, which is in *constant* and *familiar* uſe. That *nouns* or the names of things muſt make a part of every language, and that they muſt have been the words firſt ſuggeſted to the human mind, will not be diſputed. Men could not ſpeak of themſelves or of any thing elſe, without having names for themſelves and the various objects with which they are ſurrounded. Now, as all the objects which exiſt muſt be either in the ſame ſtate in which they were produced by *nature*, or changed from their original ſtate by *art*, or *abſtracted* from ſubſtances by the powers of imagination, and conceived by the mind as having at leaſt the capacity of being characterized by qualities; this naturally ſuggeſts a diviſion of nouns into NATURAL, as *man*, *vegetable*, *tree*, &c. ARTIFICIAL, as *houſe*, *ſhip*, *watch*, &c. and ABSTRACT, as *whiteneſs*, *motion*, *temperance*, &c.

12 Different kinds of nouns.

14. But the diverſity of objects is ſo great, that had *each individual* a *diſtinct* and *proper* name, it would be impoſſible for the moſt tenacious memory, during the courſe of the longeſt life, to retain even the *nouns* of the narroweſt language. It has therefore been found expedient, when a number of things reſemble each other in ſome important particulars, to arrange them all under one *ſpecies;* to which is given a name that belongs equally to the *whole ſpecies*, and to each *individual* comprehended under it. Thus the word *man* denotes a *ſpecies* of animals, and is equally applicable to *every human being:* The word *horſe* denotes another ſpecies of animals, and is equally applicable to every individual of that ſpecies of *quadrupeds;* but it cannot be applied to the ſpecies of *men*, or to any *individual* comprehended under that ſpecies. We find, however, that there are ſome qualities in which *ſeveral* ſpecies reſemble each other; and therefore we refer them to a *higher* order called a *genus*, to which we give a name that is equally applicable to every *ſpecies* and every *individual* comprehended under it. Thus, *men* and *horſes* and all *living things* on earth reſemble each other in this reſpect, that they have *life*. We refer them

13 Nouns general terms.

Noun.

them therefore to the *genus* called *animal;* and this world belongs to every *ſpecies* of animals, and to each *individual animal.* The ſame claſſification is made both of *artificial* and *abſtract* ſubſtances; of each of which there are *genera*, *ſpecies*, and *individuals*. Thus in *natural* ſubſtances, *animal*, *vegetable*, and *foſſil*, denote GENERA; *man*, *horſe*, *tree*, *metal*, a SPECIES; and *Alexander*, *Bucephalus*, *oak*, *gold*, are INDIVIDUALS. In *artificial* ſubſtances, *edifice* is a GENUS; *houſe*, *church*, *tower*, are SPECIES; and the *Vatican*, *St Paul's*, and the *Tower of London*, are INDIVIDUALS. In *abſtract* ſubſtances, *motion* and *virtue* are GENERA; *flight* and *temperance* are SPECIES; the *flight of Mahomet* and *temperance in wine* are INDIVIDUALS. By arranging ſubſtances in this manner, and giving a name to each *genus* and *ſpecies*, the *nouns* neceſſary to any language are comparatively few and eaſily acquired: and when we meet with an object unknown to us, we have only to examine it with attention; and comparing it with other objects, to refer it to the *genus* or *ſpecies* which it moſt nearly reſembles. By this contrivance we ſupply the want of a proper name for the *individual;* and ſo far as the reſemblance is complete between it and the *ſpecies* to which it is referred, and of which we have given it the name, we may converſe and reaſon about it without danger of error: Whereas had each *individual* in nature a *diſtinct* and *proper* name, words would be innumerable and incomprehenſible; and to employ our labours in language, would be as idle as that ſtudy of numberleſs written ſymbols which has been attributed to the *Chineſe*.

14 The origin of the ſingular and plural numbers.

15. Although *nouns* are thus adapted to expreſs not the *individuals* but the *genera* or *ſpecies* into which ſubſtances are claſſed; yet, in ſpeaking of theſe ſubſtances, whether *natural*, *artificial*, or *abſtract*, all men muſt have occaſion to mention ſometimes *one* of a kind, and ſometimes *more* than one. In every language, therefore, nouns muſt admit of ſome variation in their form, to denote *unity* and *plurality;* and this variation is called *number*. Thus in the Engliſh language, when we ſpeak of a ſingle place of habitation, we call it a *houſe;* but if of more, we call them *houſes*. In the firſt of theſe caſes the noun is ſaid to be in the *ſingular*, in the laſt caſe it is in the *plural*, number. Greek nouns have alſo a *dual* number to expreſs *two* individuals, as have likewiſe ſome Hebrew nouns: but this variation is evidently not eſſential to language; and it is perhaps doubtful whether it ought to be conſidered as an elegance or a deformity.

16. But although number be a natural accident of nouns, it can only be conſidered as *eſſential* to thoſe which denote genera or ſpecies. Thus we may have occaſion to ſpeak of *one animal* or of *many animals*, of *one man*, or of *many men;* and therefore the nouns *animal* and *man* muſt be capable of expreſſing *plurality* as well as *unity*. But this is not the caſe with reſpect to the *proper* names of *individuals:* for we can only ſay *Xenophon*, *Ariſtotle*, *Plato*, &c. in the *ſingular;* as, were any one of theſe names to aſſume a *plural* form, it would ceaſe to be the *proper* name of an *individual*, and become the *common* name of a *ſpecies*. Of this, indeed, we have ſome examples in every language. When a proper name is conſidered as a general appellative under which many others are arranged, it is then no longer the name of an *individual* but of a *ſpecies*, and as *ſuch* admits of a *plural;* as the *Cæſars*, the *Howards*, the *Pelhems*, the *Montagues*, &c.: but *Socrates* can never become *plural;* ſo long as we know of *no more* than *one* man of that name. The reaſon of all this will be obvious, if we conſider, that every *genus* may be found whole and entire in each of its *ſpecies;* for *man*, *horſe*, and *dog*, are each of them an entire and complete *animal:* and every *ſpecies* may be found whole and entire in each of its *individuals:* for *Socrates*, *Plato*, and *Xenophon*, are each of them completely and entirely a *man*. Hence it is, that every *genus*, though ONE, is multiplied into MANY; and every *ſpecies*, though ONE, is alſo multiplied into MANY; *by reference to thoſe beings which are their ſubordinates:* But as *no individual has any ſuch ſubordinates*, it can never in ſtrictneſs be conſidered as MANY; and ſo, as well in *nature* as in *name*, is truly an INDIVIDUAL which cannot admit of *number*.

Noun.

15 Of gender.

17. Beſides *number*, another characteriſtic, viſible in ſubſtances, is that of SEX. Every ſubſtance is either *male* or *female;* or *both male and female;* or *neither one nor the other*. So that with reſpect to *ſexes* and their *negation*, *all ſubſtances conceivable* are comprehended under this *fourfold* conſideration, which language would be very imperfect if it could not expreſs. Now the exiſtence of *hermaphrodites* being rare, if not doubtful, and language being framed to anſwer the ordinary occaſions of life, no proviſion is made, in any of the tongues with which we are acquainted, for expreſſing, otherwiſe than by a name made on purpoſe, or by a periphraſis, *duplicity* of *ſex*. With regard to this great natural characteriſtic, grammarians have made only a threefold diſtinction of nouns: thoſe which denote *males* are ſaid to be of the *maſculine gender;* thoſe which denote *females*, of the *feminine;* and thoſe which denote ſubſtances that admit not of *ſex*, are ſaid to be *neuter* or of *neither gender*. All *animals* have ſex; and therefore the *names* of all animals ſhould have *gender*. But the ſex of all is not equally obvious, nor equally worthy of attention. In thoſe ſpecies that are moſt common, or of which the *male* and the *female* are, by their *ſize*, *form*, *colour*, or other outward circumſtances, *eminently diſtinguiſhed*, the *male* is ſometimes called by *one* name, which is *maſculine;* and the *female* by a *different* name, which is *feminine*. Thus in Engliſh we ſay, *huſband*, *wife;* *king*, *queen;* *father*, *mother;* *ſon*, *daughter*, &c. In others of ſimilar diſtinction, the name of the *male* is applied to the *female* only by prefixing a ſyllable or by altering the termination; as *man*, *woman;* *lion*, *lioneſs;* *emperor*, *empreſs*, anciently *empereſs;* *maſter*, *miſtreſs*, anciently *maſtereſs*, &c. When the *ſex* of any animal is not obvious, or not material to be known, the ſame name, in ſome languages, is applied, without variation, to *all* the *ſpecies*, and that name is ſaid to be of the *common gender*. Thus in Latin *bos albus* is a white ox, and *bos alba* a white cow. Diminutive inſects, though they are doubtleſs male and female, ſeem to be conſidered in the Engliſh language as if they were really creeping *things*. No man, ſpeaking of a *worm*, would ſay *he* creeps, but *it* creeps, upon the ground. But although the origin of *genders* is thus clear and obvious; yet the Engliſh is the only language, with which we are acquainted, that deviates not, except in a very few inſtances, from the order of nature. *Greek* and *Latin*, and many of the modern tongues, have nouns,

Noun. some maſculine, ſome feminine, which denote ſubſtances where ſex never had exiſtence. Nay, ſome languages are ſo particularly defective in this reſpect, as to claſs every object, inanimate as well as animate, under either the *maſculine* or the *feminine gender*, as they have no *neuter gender* for thoſe which are of neither ſex. This is the caſe with the *Hebrew*, *French*, *Italian*, and *Spaniſh*. But the *Engliſh*, ſtrickly following the order of nature, puts every noun which denotes a *male* animal, and no other, in the *maſculine* gender; every name of a *female* animal, in the *feminine;* and every animal whoſe ſex is not *obvious*, or *known*, as well as every *inanimate* object whatever, in the neuter gender. And this gives our language an advantage above moſt others in the poetical and rhetorical ſtyle: for when nouns naturally neuter are converted into maſculine and feminine, the *perſonification* is more diſtinctly and more forcibly marked. (See PERSONIFICATION.) Some very learned and ingenious men have endeavoured, by what they call a more ſubtle kind of reaſoning, to diſcern even *in things without ſex* a diſtant analogy to that NATURAL DISTINCTION, and to account for the names of inanimate ſubſtances being, in Greek and Latin, *maſculine* and *feminine*. But ſuch ſpeculations are wholly fanciful; and the principles upon which they proceed are overturned by an appeal to facts. Many of the ſubſtances that, in one language, have *maſculine names*, have in others names that are *feminine;* which could not be the caſe were this matter regulated by *reaſon* or *nature*. Indeed for this, as well as many other anomalies in language, no other reaſon can be aſſigned than that *custom*——

Quem penes arbitrium eſt, et jus, et norma, loquendi.

16 Origin of caſes.

18. It has been already obſerved that moſt *nouns* are the names, not of *individuals*, but of whole claſſes of objects termed *genera* and *ſpecies* (B). In claſſing a *number* of *individuals* under *one ſpecies*, we contemplate only thoſe qualities which appear to be important, and in which the ſeveral individuals are found to agree, abſtracting the mind from the conſideration of all thoſe which appear to be leſs eſſential, and which in one individual may be ſuch as have nothing exactly ſimilar in any other individual upon earth. Thus, in claſſing the *individuals* which are comprehended under the *ſpecies* denominated *horſe*, we pay no regard to their *colour* or the *ſize;* becauſe experience teaches us, that no *particular* colour or ſize is eſſential to that individual living creature, and that there are not perhaps upon earth *two* horſes whoſe colour and ſize are *exactly alike*. But the qualities which in this proceſs we take into view, are the *general ſhape*, the *ſymmetry*, and *proportion* of the *parts;* and in ſhort every thing which appears evidently *eſſential* to the *life* of the *individual* and the *propagation* of the *race*. All theſe qualities are ſtrikingly ſimilar in all the individuals which we call *horſes*, and as ſtrikingly diſſimilar from the correſponding qualities of every *other* individual animal. The colour of a *horſe* is often the ſame with that of an *ox;* but the ſhape of the one animal, the ſymmetry and proportion of his parts, are totally different from thoſe of the other; nor could any man be led to claſs the *two individuals* under the *ſame ſpecies*. It is by a ſimilar proceſs that we aſcend from one *ſpecies* to another, and through *all* the ſpecies to the higheſt *genus*. In each ſpecies or genus in the aſcending ſeries *fewer particular* qualities are attended to than were conſidered as *eſſential* to the *genus* or *ſpecies* immediately *below it;* and our *conceptions* become more and more *general* as the particular qualities, which are the objects of them, become *fewer* in *number*. The uſe of a *general term*, therefore, can recal to the mind only the *common* qualities of the *claſs*, the genus or ſpecies which it repreſents. But we have frequent occaſion to ſpeak of *individual* objects. In doing this, we annex to the *general term* certain words ſignificant of *particular qualities*, which diſcriminate the object of which we ſpeak, from every other individual of the claſs to which it belongs, and of which the *general term* is the *common name*. For inſtance, in adverting a *thief*, we are obliged to mention his *height*, *complexion*, *gait*, and whatever may ſerve to diſtinguiſh him from *all other men*.

Noun.

The proceſs of the mind in rendering her conceptions *particular*, is indeed exactly the reverſe of that by which ſhe *generalizes* them. For as in the proceſs of *generalization*, ſhe *abſtracts from* her ideas of any number of *ſpecies* certain qualities in which they *differ* from each other, and of the *remaining* qualities in which they *agree*, conſtitutes the firſt *genus* in the *aſcending* ſeries; ſo when ſhe wiſhes to make her conceptions more *particular*, ſhe *annexes* to her idea of any *genus* thoſe qualities or circumſtances which were before abſtracted from it; and the *genus*, with this *annexation*, conſtitutes the firſt *ſpecies* in the *deſcending* ſeries. In like manner, when ſhe wiſhes to deſcend from any *ſpecies* to an *individual*, ſhe has only to *annex* to the idea of the *ſpecies* thoſe *particular* qualities which diſcriminate the *individual intended* from the *other* individuals of the ſame kind.

This *particularizing* operation of the mind points out the manner of applying the *general terms* of language for the purpoſe of expreſſing *particular ideas*. For as the *mind*, to *limit a general idea*, connects that *idea* with the *idea* of ſome *particular circumſtance;* ſo *language*, as we have already obſerved, in order to limit a general *term*, connects that *term* with the *word* denoting the particular circumſtance. Thus, in order to particularize the *idea* of horſe, the *mind* connects that *general idea* with the *circumſtance*, ſuppoſe, of *whiteneſs;* and in order to particularize the *word* horſe, *language* connects that *word* with the *term white:* and ſo in other inſtances.—*Annexation*, therefore, or the connecting of general words or terms in language, fits it for expreſſing particular conceptions; and this muſt hold alike good in *all languages*. But the methods of *denoting* this *annexations* are various in various tongues. In *Engliſh* and moſt modern languages we commonly uſe for this purpoſe

(B) It is almoſt needleſs to obſerve, that the words *genus* and *ſpecies*, and the phraſes *higher genus* and *lower ſpecies*, are taken here in the *logical* ſenſe; and not as the words *genus*, *ſpecies*, *order*, *claſs*, are often employed by naturaliſts. For a farther account of the mental proceſs of generalization, ſee LOGIC and METAPHYSICS.

Noun.

pose little words, which we have chosen to style *particles*; and in the *Greek* and *Latin* languages, the *cases of nouns* answer the same end.

19. *Cases*, therefore, though they are *accidents* of *nouns* not *absolutely necessary*, have been often considered as such; and they are certainly worthy of our examination, since there is perhaps no language in which *some* cases are not to be found, as indeed without *them* or their various *powers* no language could *readily* answer the purposes of life.

17 Cases, the marks of annexation.

All the *oblique* cases of nouns (if we except the vocative) are merely marks of *annexation*; but as the *connections* or *relations* subsisting among *objects* are very various, *some* cases denote *one* kind of relation, and *some another*. We shall endeavour to investigate the connection which *each* case denotes, beginning with the *genitive*.—This is the *most general* of *all* the cases, and gives notice that *some* connection indeed subsists between *two* objects, but does not point out the *particular kind* of connection. *That* we must infer, not from our *nature* or termination of the *genitive itself*, but from our *previous knowledge* of the *objects connected*. That the *genitive* denotes merely *relation in general*, might be proved by adducing innumerable examples, in which the *relations* expressed by this case are *different*; but we shall content ourselves with one observation, from which the truth of our opinion will appear beyond dispute. If an expression be used in which are, connected by the *genitive* case, two words significant of objects between which a *twofold* relation *may* subsist, it will be found impossible, *from the expression*, to determine *which* of these two relations is the *true* one, which must be gathered wholly from the context. Thus, for example, from the phrase *injuria regis*, no man can know whether the *injury* mentioned be an injury *suffered* or an injury *inflicted* by the king: but if the genitive case notified any *particular* relation, no such ambiguity could exist. This case therefore gives notice, that two objects are, *somehow or other* (C), connected, but it marks not the *particular sort* of connection. Hence it may be translated by our particle *of*, which will be seen afterwards to be of a signification equally general.

18 The import of the genitive case.

19 Of the dative and accusative cases.

The *dative* and *accusative cases* appear to have nearly the same meaning: each of them denoting *apposition*, or the junction of *one object with another*. Thus when any one says, *Comparo Virgilium Homero*, *Homer* and *Virgil* are conceived to be placed *beside* one another, in order to their being compared; and *this sort* of connection is denoted by the *dative case*. In like manner, when it is said *latus humeros*, *breadth* is conceived as joined *to* or connected *in apposition with* shoulders; and the expression may be translated "broad *at* the shoulders."

This *apposition* of two objects may happen either *without* previous *motion*, or in *consequence of it*. In the foregoing instances *no* motion is *presupposed*; but if one say, *Misit aliquos subsidio eorum*, the *apposition* is there in consequence of motion. In like manner, when it is said, *Profectus est Romam*, his *apposition* with *Rome* is conceived as the *effect* of his *motion* thither.

Noun.

From this idea of the *accusative*, the reason is obvious why the object *after* the active verb is often put in that case; it is because the action is supposed to proceed *from* the agent *to* the patient. But the same thing happens with respect to the *dative case*, and for the *same reason*. Thus, *Antonius læsit Ciceronem*, and *Antonius nocuit Ciceroni*, are expressions of the same import, and in each the action of *hurting* is conceived as proceeding *from* Antony *to* Cicero; which is finely illustrated by the passive form of such expressions, where the procedure above mentioned is expressly marked by the preposition *ab*: *Cicero nocetur*, *Cicero læditur* AB *Antonio*. It is therefore not true, that "the *accusative* is *that case*, at least the *only* case, which to an efficient nominative and a verb of action subjoins either the effect or the passive subject; nor is the *dative* the only case which is formed to express relations tending to itself." The only thing *essential* to these two cases is to denote the *apposition* or *junction of one object with another*; and this they do *nearly*, if not altogether, in the *same manner*, although from the *custom* of language they may not be indifferently subjoined to the same verb.

20 Of the ablative case.

The Greek language has no *ablative* case: but in the Latin, where it is used, it denotes *concomitancy*, or that *one thing accompanies another*. From this *concomitancy* we sometimes draw an *inference*, and sometimes *not*. For example, when it is said, *Templum clamore petebant*, *clamour* is represented as *concomitant* with their going to the temple; and *here* no inference is drawn: but from the phrase *palleo metu*, although nothing more is *expressed* than that paleness is a *concomitant* of the fear, yet we instantly *infer* that it is also the *effect* of it. In most instances where the *ablative* is used, an *inference* is drawn, of which the foundation is some *natural* connection observed to subsist between the *objects* thus connected in *language*. When this inference is *not* meant to be drawn, the *preposition* is commonly added; as, *interfectus est* CUM *gladio*, "he was slain with a sword *about* him;" *interfectus est gladio*, "he was slain with a sword as the *instrument* of his death."

21 Of the nominative and vocative cases.

The remaining cases, which have not been noticed, are the *nominative* and the *vocative*. These are in most instances alike in termination, which makes it probable that they were originally *one* and the *same* case. The foundation of this conjecture will appear from considering the *use* to which each of these cases is applied. The *nominative* is employed to call up the idea of *any object* in the mind of the hearer. But when a man hears his *own name* mentioned, his attention is instantly roused, and he is naturally led to *listen to what is to be said*. Hence, when a man meant particularly to *solicit* one's attention, he would naturally pronounce that person's *name*; and thus the *nominative* case would pass into a *vocative*, of which the use is *always* to *solicit attention* (D).

20. The

(C) The Greek grammarians seem to have been aware of the nature of this case when they called it πτωσις γενικη, or *the general case*: of which name the Latin grammarians evidently mistook the meaning when they translated it *casus genitivus*, or the *generative case*; a name totally foreign from its nature.

(D) The chief objection to this conjecture, that the *nominative* and *vocative* were originally the *same case*, is taken from the Latin tongue, in which the nouns of the second declension ending in *us* terminate their vocative

Noun.

20. The *Greek* and *Latin* among the *ancient*, and the *German* among the *modern* languages, expreſs different connections or relations of one thing with another by *caſes*. In *Engliſh* this is done for the moſt part by prepoſitions; but the Engliſh, being derived from the ſame origin as the German, that is, from the *Teutonic*, has at leaſt *one* variation of the ſubſtantive to anſwer the ſame purpoſe. For inſtance, the relation of *poſſeſſion*, or *belonging*, is often expreſſed by a different ending of the ſubſtantive, which may be well called a *caſe*. This caſe anſwers nearly to the *genitive caſe* in Latin; but as *that* is not a denomination ſignificant of the *nature* of the caſe in any language, it may perhaps in Engliſh be more properly called the *poſſeſſive caſe*. Thus, *God's grace*, anciently *Godis grace*, is the grace *belonging to* or in the *poſſeſſion of* God: and may be likewiſe expreſſed by means of the prepoſition; thus,—*the grace of God.*

22 Import of the Greek and Latin caſes.

23 One caſe in Engliſh to denote poſſeſſion.

Although the word *Godis* is as evidently an inflexion of the noun *God* as the word *Dei* is an inflexion of *Deus*, there are grammarians who have denied that in *Engliſh* there is *any* true inflexion of the original noun, and who have ſaid that the noun with the addition of that ſyllable, which we conſider as the *ſign of a caſe*, *ceaſes* to be a *noun*, and becomes a *definitive;* a word which with them is devoid of ſignification. Thus, in the expreſſion *Alexander's houſe*, the word *Alexander's* ſtands not as a *noun*, but as an *article* or *definitive*, ſerving to aſcertain and point out the *individuality* of the houſe. But this is a palpable miſtake: the word *Alexander's* ſerves *not* to point out the *individuality* of the houſe, but to ſhow to whom the houſe *belongs;* and is therefore beyond diſpute, not an *article*, but a *noun* in the *poſſeſſive caſe*. Again, when we ſay *St Peter's* at Rome and *St Paul's* at London, the words *St Peter's* and *St Paul's* are neither *articles*, nor, as has been abſurdly imagined, the proper names of edifices, like the *Rotundo* or the *Circus;* but they are in the *poſſeſſive caſe*, the names of the two apoſtles to whom the churches were *dedicated*, and to whom they are ſuppoſed to *belong*.

But that this, which we have called the *poſſeſſive caſe*, is really *not* ſo, muſt be evident, it is ſaid, becauſe there are certain circumſtances in which it cannot be ſubſtituted for the noun with the prepoſition prefixed. Thus, though a man may ſay, I ſpeak OF *Alexander*, I write OF *Cæſar*, I think OF *Pompey;* he cannot ſay, I ſpeak *Alexander's*, I write *Cæſar's*, or I think *Pompey's*. This is indeed true, but it is nothing to the purpoſe: for though I may ſay, *Loquor* DE *Alexandro*, *Scribo* DE *Cæſare*, *Cogito* DE *Pompeio;* I cannot ſay, *Loquor Alexandri*, *Scribo Cæſaris*, *or Cogito Pompeii:* and therefore all that can be inferred from this argument is, that as the *Latin genitive* is not always of the ſame import with the prepoſition *de*, ſo the Engliſh *poſſeſſive* is not *always* of the ſame import with the prepoſition *of*. Upon the whole, then, we may conclude, that Engliſh nouns admit of one inflexion; and that though *caſes* are not ſo eſſential to nouns as gender and number, no language can be wholly without them or their various powers.

Article.

CHAP. II. *Of Articles or Definitives.*

21. The intention of language is to communicate thought, or to expreſs thoſe ideas which are ſuggeſted to us by our ſenſes external and internal. The ideas *firſt* ſuggeſted to us are thoſe of pain and pleaſure, and of the objects with which we are ſurrounded; and therefore the words *firſt* learned muſt be *nouns*, or the names of objects natural, artificial, and abſtract. Every object about which the human mind can be converſant is ſtrictly and properly ſpeaking *particular;* for all things in nature differ from one another in numberleſs reſpects, which, not to mention the idea of ſeparate exiſtence, ſo circumſtance and *individuate* them, that no one thing can be ſaid to be another. Now the uſe of language being to expreſs our ideas or conceptions of theſe objects, it might naturally be expected that every object ſhould be diſtinguiſhed by a *proper name*. This would indeed be agreeable to the truth of things, but we have already ſeen that it is altogether impracticable. Objects have therefore been claſſed into *genera* and *ſpecies;* and names given, *not* to each *individual*, but to each *genus* and *ſpecies*. By this contrivance of language, we are enabled to aſcertain in ſome meaſure any *individual* that may occur, and of which we know not the proper name, only by referring it to the *genus* or *ſpecies* to which it belongs, and calling it by the *general* or *ſpecific* name; but as there is frequent occaſion to diſtinguiſh individuals of the ſame ſpecies from one another, it became neceſſary to fall upon ſome expedient to mark this diſtinction. In many languages *general* and *ſpecific* terms are modified and reſtricted by three orders of words; the ARTICLE, the ADJECTIVE, and the OBLIQUE CASES of NOUNS. The *caſes* of *nouns* we have already conſidered: the *adjective* will employ our attention afterwards: at preſent our obſervations are confined to the ARTICLE; a word ſo very neceſſary, that without it or ſome equivalent invention men could not employ *nouns* to any of the purpoſes of life, or indeed communicate their thoughts at all. As the buſineſs of *articles* is to enable us, upon occaſion, to employ *general terms* to denote *particular objects*, they muſt be conſidered, in *combination* with the general terms, as merely *ſubſtitutes* for proper names. They have, however, been commonly called *definitives;* becauſe they ſerve to *define and aſcertain any particular object, ſo as to diſtinguiſh it from the other objects of the general claſs to which it belongs, and*, of courſe *to denote its individuality*. Of words framed for this purpoſe, whether they have by grammarians been termed *articles* or not, we know of no language that is wholly deſtitute. The nature of them may be explained as follows.

24 The neceſſity and uſe of the article.

22. An object occurs with which, as an *individual*, we are totally unacquainted; it has a head and limbs, and

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tive in *e*. But this is eaſily accounted for. The *s* in ſuch words was often dropt, as appears from the ſcanning of old Latin poetry; and when this was done, the *u* being ſhort, would naturally in pronunciation paſs into *e*, a like ſhort vowel; and thus, in the *vocative* caſe, *e* would in time be written inſtead of *u*.

Article. and appears to poſſeſs the powers of ſelf-motion and ſenſation: we therefore refer it to its proper *ſpecies*, and call it *a dog*, *a horſe*, *a lion*, or the like. If it belongs to none of the ſpecies with which we are acquainted, it cannot be called by any of their names; we then refer it to the *genus*, and call it *an animal*.

25 Two articles.

But this is not enough. The object at which we are looking, and which we want to diſtinguiſh, is not a *ſpecies* or a *genus*, but an *individual*. Of what kind? *Known* or *unknown?* Seen now *for the firſt time*, or *ſeen before* and now remembered? This is one of the inſtances in which we ſhall diſcover the uſe of the two articles A and THE: for, in the caſe ſuppoſed, the article A reſpects our *primary* perception, and denotes an individual as *unknown;* whereas THE reſpects our *ſecondary* perception, and denotes individuals as *known*. To explain this by an example: I ſee an object paſs by which I never ſaw till now: What do I ſay? *There goes A beggar with a long beard.* The man departs, and returns a week after: What do I then ſay? *There goes THE beggar with THE long beard.* Here the article only is changed, the reſt remains unaltered. Yet mark the force of this apparently minute change. The individual *once vague* is now recogniſed as *ſomething known;* and that merely by the efficacy of this latter article, which tacitly inſinuates a kind of *previous* acquaintance, by referring a preſent perception to a like perception already paſt.

This is the explanation of the articles A and THE as given by the learned Mr Harris, and thus far what he ſays on the ſubject is certainly juſt; but it is not true that the article THE *always* inſinuates a *previous* acquaintance, or refers a preſent perception to a like perception already paſt.—I am in a room crowded with company, of which the greater part is to me totally unknown. I feel it difficult to breathe from the groſſneſs of the incloſed atmoſphere; and looking towards the window, I ſee in it a perſon whom I never ſaw before. I inſtantly ſend my compliments to *THE gentleman in the window*, and requeſt, that, if it be not inconvenient, he will have the goodneſs to let into the room a little freſh air. Of this gentleman I have no *previous acquaintance;* my preſent perception of him is my *primary* perception, and yet it would have been extremely improper to ſend my compliments, &c. to *A gentleman in the window*.—Again, there would be no impropriety in ſaying—"*A man* whom I ſaw yeſterday exhibiting a ſhow to the rabble, was this morning committed to jail charged with the crime of houſebreaking." Notwithſtanding the authority, therefore, of *Mr Harris* and his maſter *Apollonius*, we may venture to affirm, that it is not *eſſential* to the article A to reſpect a *primary perception*, or to the article THE to indicate a *preeſtabliſhed acquaintance*. Such may indeed be the manner in which theſe words are moſt frequently uſed; but we ſee that there are inſtances in which they may be uſed differently. What then, it may be aſked, is the import of each article, and in what reſpects do they differ?

23. We anſwer, that the articles A and THE are both of them *definitives*, as by being prefixed to the names of *genera* and *ſpecies* they ſo circumſcribe the latitude of thoſe names as to make them for the moſt part denote *individuals*. A *noun* or *ſubſtantive*, without *any article* to limit it, is taken in its wideſt ſenſe. Thus, Article. the word *man* means all mankind;

"The proper ſtudy of mankind is man:"

where *mankind* and *man* may change places without making any alteration in the ſenſe. But let *either* of the articles of which we are treating be prefixed to the word *man*, and that word is immediately reduced from the name of a *whole genus* to denote only a *ſingle individual;* and inſtead of the noble truth which this line aſſerts, the poet will be made to ſay, that the proper ſtudy of mankind is not the common nature which is diffuſed through the whole human race, but the manners and caprice of *one individual*. Thus far therefore the two articles agree: but they differ in this, that though they *both* limit the ſpecific name to *ſome* individual, the article A leaves the *individual itſelf unaſcertained;* whereas the article THE *aſcertains the individual* 26 *alſo*, and can be prefixed to the ſpecific name only The indefinite and when an individual is intended, of which ſomething may the definite. be predicated that diſtinguiſhes it from the other individuals of the ſpecies. Thus, if I ſay—*A man is fit for treaſons*, my aſſertion may appear ſtrange and vague; but the ſentence is complete, and wants nothing to make it intelligible: but if I ſay—*THE man is fit for treaſons*, I ſpeak nonſenſe; for as the article THE ſhows that I mean *ſome particular* man, it will be impoſſible to diſcover my meaning till I complete the ſentence, and predicate ſomething of the individual intended to diſtinguiſh him from other individuals.

"THE man *that hath not muſic in himſelf*, &c.
"Is fit for treaſons."———

A man, therefore, means ſome one or other of the human race *indefinitely;* *THE man* means, *definitely*, that *particular* man who is ſpoken of: the former is called the *indefinite*, the latter the *definite*, article.

27 The two articles differ likewiſe in this reſpect, that The difas the article A ſerves only to ſeparate *one individual* ob- ference beject from the general claſs to which it belongs, it cannot tween theſe be applied to *plurals*. It has indeed the ſame ſignifi- two. cation nearly with the numerical word *one;* and in French and Italian, the ſame word that denotes unity is alſo the article of which we now treat. But the eſſence of the article THE being to define objects, by pointing them out as thoſe of which ſomething is affirmed or denied which is not affirmed or denied of the other objects of the ſame claſs, it is equally applicable to *both* numbers; for things may be predicated of one *SET of men*, as well as of a *ſingle man*, which cannot be predicated of *other* men. The uſe and import of each article will appear from the following example: "*Man* was made for Society, and ought to extend his goodwill to *all men;* but *a man* will naturally entertain a more particular regard for *the men* with whom he has the moſt frequent intercourſe, and enter into a ſtill cloſer union with *the man* whoſe temper and diſpoſition ſuit beſt with his own."

We have ſaid, that the article A cannot be applied to plurals, becauſe it denotes unity: but to this rule there is apparently a remarkable exception in the uſe of the adjectives *few* and *many* (the latter chiefly with the word *great* before it), which, though joined with *plural ſubſtantives*, yet admit of the *ſingular article* A:

as,

Article. as, *a few men, a great many men.* The reaſon of this is manifeſt from the effect which the article has in theſe phraſes: it means a ſmall or a great number *collectively* taken, to which it gives the idea of a *whole*, that is, of *unity*. Thus likewiſe *a hundred, a thouſand*, is *one whole number*, an aggregate of many collectively taken, and therefore ſtill retains the article A though joined as an adjective to a plural ſubſtantive; as, *a hundred years*. The exception therefore is only apparent; and we may affirm, that the article A *univerſally* denotes *unity*.

24. The indefinite article is much leſs uſeful than the other; and therefore the Greek and Hebrew languages have it not, though they both have a definite article. In languages of which the *nouns*, *adjectives*, and *verbs*, have inflexion, no miſtake can ariſe from the want of the *indefinite* article; becauſe it can always be known by the *terminations* of the *noun* and the *verb*, and by the circumſtances predicated of the noun, whether a *whole ſpecies* or *one individual* be intended. But this is not the caſe in Engliſh. In that language, the adjectives having no variation with reſpect to gender or number, and the tenſes of the verbs being for the moſt part the ſame in both numbers, it might be often doubtful, had we not the indefinite article, whether the *ſpecific name* was intended to expreſs the *whole ſpecies* or only *one individual*. Thus, if we ſay in Engliſh, "*Man was born ſent from God*," we muſt be underſtood to mean that the birth of *every* man is from God, becauſe to the ſpecific term the indefinite article is not prefixed. Yet the words Εγενετο ἀνθρωπος ἀπεσταλμενος παρα Θεου convey no ſuch meaning to any perſon acquainted with the Greek language; as the word ἀνθρωπος, without any article, is reſtricted to an individual by its concord with the verb and the participle; and the ſenſe of the paſſage is, A *man was born (or exiſted) ſent from God*. But though the *Greeks* have no article correſpondent to the article A, yet nothing can be more nearly related than their Ο' to our THE, Ο' βασιλευς—THE *king*; Το δωρον—THE *gift*. In one reſpect, indeed, the Greek and Engliſh articles differ. The former is varied according to the gender and number of the noun with which it is aſſociated, being ὁ—*maſculine*, ἡ—*feminine*, το—*neuter*; and οἱ, αἱ, τα, in the *plural number*: whereas the Engliſh article ſuffers no change, being invariably THE before nouns of every gender and in both numbers. There are, however, ſome modern languages which, in imitation of the Greek, admit of a variation of their article which relates to gender; but this cannot be conſidered as *eſſential* to this ſpecies of words, and it may be queſtioned whether it be any improvement to the language. In tongues of which the nouns have no inflexion, it can only ſerve to perplex and confuſe, as it always preſents a particular idea of *ſex* where in many caſes it is not neceſſary.

27 A greater number of articles in the Engliſh language than is commonly ſuppoſed.

25. The articles already mentioned are allowed to be ſtrictly and properly ſuch by every grammarian; but there are ſome words, ſuch as *this*, *that*, *any*, *ſome*, *all*, *other*, &c. which are generally ſaid to be ſometimes *articles* and ſometimes *pronouns*, according to the different modes of uſing them. That words ſhould change their *nature* in this manner, ſo as to belong ſometimes to *one* part of ſpeech, and ſometimes to *another*, muſt to every unprejudiced perſon appear very extraordinary; and if it were a fact, language would be a thing ſo equivocal, that all inquiries into its nature upon principles of ſcience and reaſon would be vain. But we cannot perceive any ſuch fluctuation in any word whatever; though we know it to be a general charge brought againſt words of almoſt every denomination, of which we have already ſeen *one* inſtance in the *poſſeſſive caſe of nouns*, and ſhall now ſee *another* in thoſe words which are commonly called *pronominal articles*.

Article.

If it be true, as we acknowledge it to be, that the genuine PRONOUN *always ſtands* by *itſelf*, aſſuming the *power* of a *noun*, and ſupplying *its place*, then is it certain that the words *this*, *that*, *any*, *ſome*, &c. can *never* be PRONOUNS. We are indeed told, that when we ſay THIS *is virtue*, *give me* THAT, the words *this* and *that* are *pronouns*; but that when we ſay, THIS HABIT *is virtue*, THAT MAN *defrauded me*, then are they *articles* or *definitives*.. This, however, is evidently a miſtake occaſioned by overlooking thoſe abbreviations in conſtruction which are frequent in every language, and which, on account of that very frequency, have perhaps eſcaped the attention of grammarians whoſe ſagacity has been ſucceſsfully employed on matters leſs obvious.—When we ſay THIS *is virtue*, it is evident that we communicate no intelligence till we add a *ſubſtantive* to the word *this*, and declare *what* is virtue. The word *this* can therefore in no inſtance aſſume the power of a noun, ſince the noun to which it relates, though for the ſake of diſpatch it may be omitted in writing or converſation, muſt always be ſupplied by the mind of the reader or hearer, to make the ſentence intelligible, or *this* itſelf of any importance.—"When we have viewed ſpeech analyſed, we may then conſider it as compounded. And here, in the firſt place, we may contemplate that *ſyntheſis*, which by combining ſimple terms produces a truth; then by combining two truths produces a third; and thus others and others in continued demonſtration, till we are led, as by a road to the regions of ſcience. Now THIS is that ſuperior and moſt excellent ſyntheſis which alone applies itſelf to our intellect or reaſon, and which to conduct according to rule conſtitutes the *art of logic*. After THIS we may turn to thoſe inferior compoſitions which are productive of the pathetic," &c.—Here, if any where, the word THIS may be thought to *ſtand by itſelf*, and to aſſume the *power of a noun*; but let any man complete the conſtruction of each ſentence, and he will perceive that THIS is no more than a *definite article*. Thus,—"we may contemplate that ſyntheſis which by combining ſimple terms produces a truth; then by combining two truths produces a third *truth*; and thus other *truths* and other *truths* in continued demonſtration, till we are led, as by a road into the regions of ſcience. Now THIS *combination of truths* is that ſuperior and moſt excellent ſyntheſis which alone applies itſelf to our intellect or reaſon, and which to conduct according to rule conſtitutes the *art of logic*. After *we have contemplated* THIS *art*, we may turn," &c.

The word THAT is generally conſidered as ſtill more equivocal than *this*; for it is ſaid to be ſometimes an *article*, ſometimes a *pronoun*, and ſometimes a *conjunction*. In the following extract it appears in all theſe capacities; and yet, upon reſolving the paſſage into parts and completing the conſtruction, it will be found to be invariably a *definite article*.—"It is neceſſary to *that* perfection,

Articles. fection, of which our preſent ſtate is capable, *that* the mind and body ſhould both be kept in action; *that* neither the faculties of the one nor of the other be ſuffered to grow lax or torpid for want of uſe: but neither ſhould health be purchaſed by voluntary ſubmiſſion to ignorance, nor ſhould knowledge be cultivated at the expence of health; for *that* muſt enable it either to give pleaſure to its poſſeſſor, or aſſiſtance to others." If this long ſentence be reſolved into its conſtituent parts, and the words be ſupplied which complete the conſtruction, we ſhall ſee the import of the word THAT to be preciſely the ſame in each clauſe. "The mind and body ſhould both be kept in action; THAT action is neceſſary to THAT perfection of which our preſent ſtate is capable: neither the faculties of the one nor of the other ſhould be ſuffered to grow lax or torpid for want of uſe; *the degree of action proper to prevent* THAT *laxneſs* is neceſſary: but neither ſhould health be purchaſed by voluntary ſubmiſſion to ignorance, nor ſhould knowledge be cultivated at the expence of health; for THAT *health* muſt enable it either to give pleaſure to its poſſeſſor, or aſſiſtance to others." Again:

"He that's unſkilful will not toſs a ball:"

"A man unſkilful (he is *that*) will not toſs a ball." Here the word THAT, though ſubſtituted for what is called the *relative* pronoun (E), ſtill preſerves unchanged its definitive import; and in every inſtance, except where it may be uſed very improperly, it will be found to be neither more nor leſs than a *definite article*.

26. It appears then, that if the *eſſence* of an *article* be *to define* and *aſcertain*, the words *this* and *that* as well as *any*, *ſome*, *all*, &c. which are commonly called *pronominal articles*, are much more properly *articles* than any thing elſe, and as ſuch ſhould be conſidered in univerſal grammar. Thus, when we ſay, THIS *picture I approve*, but THAT *I diſlike;* what do we perform by the help of the words THIS and THAT, but bring down the common appellative to denote two individuals; the one as *the more near*, the other as *the more diſtant?* So when we ſay, SOME *men are virtuous*, *but* ALL *men are mortal;* what is the natural effect of this ALL and SOME, but to define that *univerſality* and *particularity* which would remain indefinite were we to take them away? The ſame is evident in ſuch ſentences as, SOME *ſubſtances have ſenſation*, OTHERS *want it; Chooſe* ANY *way of acting*, *and* SOME *men will find fault*, &c.: for here SOME, OTHER, and ANY, ſerve all of them to *define* different parts of a given whole; SOME, to denote any *indeterminate part;* ANY, to denote an *indefinite mode of acting*, *no matter what;* and OTHER, to denote the *remaining* part, when a part has been aſſumed already.

27. We have ſaid that the *article* is a part of ſpeech ſo very neceſſary, that without it, or ſome equivalent invention (F), mankind could not communicate their thoughts; and that of words falling under this deſcription, we know of no language which is wholly deſtitute.

28 Articles in the Latin language. We are aware that theſe poſitions may be controverted; and that the *Latin* may be inſtanced as a language which, without *articles*, is not only capable of communicating the ordinary thoughts of the ſpeaker to the mind of the hearer, but which, in the hands of *Cicero*, *Virgil*, and *Lucretius*, was made to ſerve all the purpoſes of the moſt profound philoſopher, the moſt impaſſioned orator, and the ſublimeſt poet. That the Latin has been made to ſerve all theſe purpoſes cannot be denied, although *Lucretius* and *Cicero* both complain, that on the ſubject of *philoſophy*, where the uſe of articles is moſt conſpicuous, it is a deficient language. But ſhould we grant what cannot be demanded, that thoſe two great men were unacquainted with the powers of their native tongue, our poſitions would ſtill remain unſhaken; for we deny that the *Latin* is wholly without articles. It has indeed no word of preciſely the ſame import with our THE or the *Greek* ὁ; but the place of the indefinite article A might be always ſupplied, if neceſſary, with the numerical word *unus*. It may be ſo even in Engliſh; for we believe there is not a ſingle inſtance where the words *one man*, *one horſe*, *one virtue*, might not be ſubſtituted for the words *a man*, *a horſe*, *a virtue*, &c. without in the ſlighteſt degree altering the ſenſe of the paſſage where ſuch words occur. This ſubſtitution, however, can be but very ſeldom if ever neceſſary in the *Latin* tongue, of which the preciſion is much greater than that of the *Engliſh* would be without articles; becauſe the oblique caſes of the Latin nouns, and the inflexion of its verbs, will almoſt always enable the reader to determine whether an appellative repreſents a whole ſpecies or a ſingle individual.—The want of the definite article THE ſeems to be a greater defect; yet there are few inſtances in which its place might not be ſupplied by THIS or by THAT without obſcuring the ſenſe; and the Latin tongue is by no means deficient of articles correſponding to theſe two. Let us ſubſtitute the words ONE and THAT for A and THE in ſome of the foregoing examples, and we ſhall find, though the ſound may be uncouth, the ſenſe will remain. Thus,

"THAT man who hath not muſic in himſelf, &c.
"Is fit for treaſons,"——

conveys to the mind of the reader the very ſame ſentiment which the poet expreſſes by the words "THE man that hath not muſic," &c. Again, "*Man* was made for ſociety, and ought to extend his good-will to *all men;* but *one* man will naturally entertain a more particular regard for *thoſe men* with whom he has the moſt frequent intercourſe, and enter into a ſtill cloſer union with *that man* whoſe temper and diſpoſition ſuit beſt with his own." Now the words HIC and ILLE being exactly of the ſame import with the words THIS and THAT; it follows, that wherever the place of the article THE may in *Engliſh* be ſupplied by THIS or by THAT, it may in *Latin* be ſupplied by HIC or by ILLE. This is the caſe with reſpect to NATHAN's reproof of DAVID, where the definite article is indeed moſt emphatical. The original words might have been tranſlated into Engliſh, "thou art *that* man," as well as "thou art

(E) See more of this afterwards.

(F) As in the Perſian and other eaſtern languages, in which the place of our indefinite article is ſupplied by a termination to thoſe nouns which are meant to be particularized.

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art *the* man;" and in *Latin* they may with the utmoſt propriety be rendered, "Tu es *ille* homo." Indeed the words HIC and ILLE, and we might inſtance many more, though they are commonly called *pronouns*, are in truth nothing but *definite articles:* HIC is evidently ὁκε; and ILLE is moſt probably derived from the Hebrew word *al*, in the plural *ale;* which may be tranſlated indifferently, either THE or THAT. But what proves beyond diſpute that theſe two words are not *pronouns* but *articles*, is, that in no ſingle inſtance will they be found to ſtand by themſelves and aſſume the power of *nouns*. For the ſake of diſpatch, or to avoid diſagreeable repetitions, the *noun* may indeed be often omitted; but it is *always ſupplied* by the *reader or hearer*, when HIC and ILLE appear in their proper place, and are ſeen to be invariably *definite articles*. We ſhall give an example of the uſe of each word, and diſmiſs the ſubject.

In the firſt oration againſt Catiline, Cicero begins with addreſſing himſelf in a very impaſſioned ſtyle to the traitor, who was preſent in the ſenate-houſe. He then exclaims pathetically againſt the manners of the age, and proceeds in theſe words: *Senatus hæc intelligit, conſul videt:* HIC *tamen vivit. Vivit? immo vere etiam in ſenatum venit: fit publici conſilii particeps.* In this paſſage HIC cannot be a pronoun; for from the beginning of the oration there occurs not a ſingle *noun* of which it can poſſibly ſupply the place. When the orator uttered it, he was probably *pointing with his finger* at Catiline, and every one of his audience would ſupply the *noun* in his own mind, as we do when we tranſlate it, "Yet *this traitor lives*." When Virgil ſays,

28 *Hic* and *Ille* articles.

> ILLE *ego, qui quondam gracili modulatus avena*
> *Carmen*,

it is obvious that he means, *I am* THAT MAN, or THAT POET, *who ſung*, &c.; and though we may tranſlate the words "I am *he* who tuned his ſong," &c. yet when we conſtrue the paſſage, we are under the neceſſity of ſupplying either *vates* or *vir*, which ſhows that ILLE is nothing more than a definite article ſignifying THAT or THE. It appears then, that the *Latin* tongue is not wholly deſtitute of articles, as few caſes can occur where the Greek ὁ and our THE may not be ſupplied by the words HIC and ILLE; which have in our opinion been very improperly termed *pronouns*. If there be *any* ſuch caſes, we can only confeſs that the Latin language is defective; whereas, had it *no* articles, it is not eaſy to conceive how it could anſwer, to a cultivated people, the ordinary purpoſes of ſpeech.

28. The articles THIS and THAT, unlike A and THE, are varied according as the noun, with which they are aſſociated, is in the ſingular or in the plural number. Thus we ſay—*this* and *that man* in the ſingular, and *theſe* and *thoſe men* in the plural. The Latin articles *hic* and *ille*, for ſuch we will call them, are varied like the Greek ὁ, not only with the number, but alſo with the gender of their nouns. In languages, where the ſtructure of a ſentence may be ſo changed from the order of nature, as it commonly is in Greek and Latin, and where the reader is guided, not by the *poſition* but by the *terminations* of the words, to thoſe which are in concord and thoſe which are not, theſe variations of the article have their uſe; but in Engliſh they are of no importance. Were it not that the cuſtom of the language—the *forma loquendi*, as Horace calls it—has determined otherwiſe, there would be no more impropriety in ſaying *this*, or *that men*, than in ſaying *ſome men*, or *the men*.

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29 With what words articles cannot be united.

29. As articles are by their nature definitives, it follows of courſe, that they cannot be united with ſuch words as are in their own nature *as definite as they may be;* nor with ſuch words as, *being undefinable, cannot properly be made otherwiſe;* but only with thoſe words *which, though indefinite, are yet capable through the article of becoming definite*. Hence the reaſon why it is abſurd to ſay, THE I, or THE THOU; becauſe nothing, as will be ſeen afterwards, can make theſe pronouns more *definite* than they are of themſelves; and the ſame may be ſaid of proper names. Neither can we ſay, THE BOTH, becauſe the word BOTH is *in its own nature* perfectly defined. Thus if it be ſaid—"I have read both poets,"—this plainly indicates *a definite pair*, of whom ſome mention has been made already. On the contrary, if it be ſaid, "I have read two poets," this may mean *any pair* out of all that ever exiſted. And hence this numeral being in this ſenſe indefinite (as indeed are all others as well as itſelf), is forced to *aſſume the article* whenever it would become *definite*. Hence alſo it is, that as TWO, when taken alone, has reference to ſome *primary* and *indefinite* perception, while the article THE has reference to ſome perception *ſecondary* and *definite*, it is bad language to ſay, TWO THE MEN, as this would be *blending of incompatibles*, that is, it would be repreſenting two men as *defined* and *undefined* at the *ſame time*. On the contrary, to ſay BOTH THE MEN, is good language; becauſe the ſubſtantive cannot poſſibly be leſs apt, by being defined, to coaleſce with a numeral adjective which is defined as well as itſelf. So likewiſe it is correct to ſay, THE TWO MEN, THESE TWO MEN, or THOSE TWO MEN; becauſe here the article, being placed at the beginning, *extends its power*, as well through the numeral adjective as the ſubſtantive, and tends equally to *define* them both.

30. As ſome of the above words admit of no article, *becauſe they are by nature as definite as may be;* ſo there are others which admit it not, *becauſe they are not to be defined at all*. Of this ſort are all INTERROGATIVES. If we queſtion about *ſubſtances*, we cannot ſay, THE WHO IS THIS, but WHO IS THIS? And the ſame as to *qualities* and both *quantities:* for we ſay, without an article, WHAT SORT OF, HOW MANY, HOW GREAT? The reaſon is, the article THE reſpects beings of which we can *predicate ſomething:* but interrogatives reſpect beings about which we are *ignorant*, and of which we can therefore *predicate nothing;* for as to what we know, interrogation is ſuperfluous. In a word, the *natural aſſociators with articles* are ALL THOSE COMMON APPELLATIVES WHICH DENOTE THE SEVERAL GENERA AND SPECIES OF BEINGS: and it may be queſtioned whether, in ſtrictneſs of ſpeech, they are ever aſſociated with any other words.

30 With what words they naturally aſſociate.

31. We have ſaid that proper names admit not of the article, being, in their *own nature*, definite. This is true, whilſt each name is confined to *one individual;* but as different perſons often go by the ſame name, it is neceſſary to diſtinguiſh theſe from one another, to prevent the ambiguity which this identity of name would otherwiſe occaſion. For this purpoſe we are obliged

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obliged to have recourſe to *adjectives* or *epithets*. For example, there were two *Grecian chiefs* who bore the name of *Ajax;* and it was not without reaſon that *Mneſtheus* uſed *epithets* when his intention was to diſtinguiſh the one from the other: "If both *Ajaxes* cannot be ſpared (ſaid he), at leaſt let mighty *Telamonian Ajax* come." But as epithets are diffuſed through various ſubjects, in as much as the ſame adjective may be referred to many ſubſtantives, it has been ſaid to be neceſſary, in order to render both parts of ſpeech equally definite, that the adjective itſelf aſſume an article before it, which may indicate *a reference to ſome ſingle perſon only*. It is thus we ſay—*Trypho* THE *Grammarian; Apollodorus* THE *Cyrenian*, &c. This is the doctrine of *Mr Harris;* from which, though we have the higheſt reſpect for the learning of the author, we feel ourſelves obliged to diſſent. In the examples given, the article THE is certainly not aſſociated with the words *Grammarian* and *Cyrenian*, in the ſame manner in which it is aſſociated with the word *man* in the ſentence—"The man that hath not muſic in himſelf," &c. When we ſay *Apollodorus the Cyrenian*, we may, without folly or impertinence, be aſked—the *Cyrenian* WHAT (G)? And the moment this queſtion is anſwered, it will be ſeen that the article defines, *not* an *adjective*, but a *ſubſtantive*. If the anſwer be, the *Cyrenian philoſopher*, the article THE is aſſociated with the word *philoſopher*, and the phraſe *Apollodorus* THE *Cyrenian*, is an abbreviation of *Apollodorus* THE *philoſopher of Cyrene*. In like manner, *Trypho* THE *grammarian*, is *Trypho* THE *grammarian writer*, or *Trypho* THE *writer of grammar*. Such abbreviations are very common. We familiarly ſay THE SPEAKER, and are underſtood to mean a high officer in the Britiſh parliament; yet, as *ſpeaker* is a name common to many men, we may, without impropriety, be aſked, *what* ſpeaker we mean? and if ſo, we muſt reply, *the ſpeaker of the houſe of commons*. But that which is eminent is ſuppoſed to be generally known; and therefore, in common language, THE SPEAKER is deemed a ſufficient deſignation of him who preſides over the lower houſe of parliament. Hence, by an eaſy tranſition, the definite article, from denoting *reference*, comes to denote *eminence* alſo: that is to ſay, from implying an *ordinary* pre-acquaintance, to preſume a kind of *general* and *univerſal notoriety*. Thus A KING is any king; but THE KING is that perſon whom we acknowledge for our ſovereign, the *king of Great Britain*. In Greek too, as in Engliſh, the article is often a mark of eminence; for THE POET meant *Homer*, and THE STAGYRITE meant *Ariſtotle;* not but that there were many *poets* beſides *Homer*, and many *Stagyrites* beſides *Ariſtotle*, but none equally illuſtrious.

31 The great utility of this ſpecies of words.

32. Before we diſmiſs the ARTICLE, we ſhall produce one example to ſhow the utility of this ſpecies of words; which, although they may *ſeem* to be of ſmall importance, yet, when properly applied, ſerve to make a few general terms ſufficient for expreſſing, with accuracy, all the various objects about which mankind can have occaſion to converſe. Let MAN be the general term, which I have occaſion to employ for the purpoſe of denoting ſome particular. Let it be required to expreſs this particular as *unknown;* I ſay *A man*:—*Known;* I ſay THE *man*:—*Definite;* A CERTAIN *man*:—*Indefinite;* ANY *man*:—*Preſent, and near;* THIS *man*:—*Preſent, and at ſome diſtance;* THAT *man*:—*Like to ſome other;* SUCH *a man*:—*Different from ſome other;* ANOTHER *man*:—*An indefinite multitude;* MANY *men*:—*A definite multitude;* A THOUSAND *men*:—*The ones of a multitude, taken throughout;* EVERY *man*:—*The ſame ones taken with diſtinction;* EACH *man*:—*Taken in order;* FIRST *man*, SECOND *man*, &c.:—*The whole multitude of particulars taken collectively;* ALL *men*:—*The negation of that multitude;* NO *man*:—*A number of particulars preſent and near;* THESE *men*:—*At ſome diſtance, or oppoſed to others;* THOSE *men*:—*A number of individuals ſeparated from another number;* OTHER *men*:—*A ſmall indefinite number;* FEW *men*:—*A proportionally greater number;* MORE *men*:—*A ſmaller number;* FEWER *men*:—And ſo on we might go almoſt to infinitude. But not to dwell longer upon this ſubject, we ſhall only remark, "that minute changes in PRINCIPLES lead to mighty changes in effects; ſo that PRINCIPLES are well entitled to regard, however trivial they may appear."

Pronouns.

CHAP. III. *Of Pronouns, or Subſtantives of the ſecond order.*

33. To men who are neither intoxicated with their own abilities, nor ambitious of the honour of building new ſyſtems, little pleaſure can accrue from differing upon points of ſcience from writers of great and deſerved reputation. In ſuch circumſtances a man of modeſty, although he will not upon the authority of a celebrated name adopt an opinion of which he perceives not the truth, muſt always advance his own notions with ſome degree of diffidence, as being conſcious that the truth which he cannot perceive, may be viſible to a keener and more perſpicacious eye. In theſe circumſtances we feel ourſelves with regard to ſome of the moſt celebrated writers on grammar, from whom, concerning one or two points, comparatively indeed of but little importance, we have already been compelled reluctantly to differ. In treating of pronouns we are likely to deviate ſtill farther from the beaten track; but that we may not be accuſed of acting the part of dogmatiſts in literature, and of claiming from others that implicit confidence which we refuſe to give, we ſhall ſtate with fairneſs the commonly received opinions, point out in what reſpects we think them erroneous, aſſign our reaſons for calling them in queſtion, and leave our readers to judge for themſelves. The moſt celebrated writer in Engliſh who has treated of pronouns, and whom, ſince the publication of his *Hermes*, moſt other writers have implicitly followed, is Mr HARRIS, who, after a ſhort introduction, proceeds thus:

32 The commonly ſuppoſed import of the perſonal pronouns.

34. "All converſation paſſes between *individuals* who will often happen to be till that inſtant *unacquainted with each other*. What then is to be done? How ſhall the ſpeaker addreſs the other, when he knows not his name? or how explain himſelf by his own name, of which the other is wholly ignorant? Nouns, as they

(G) Man or child, philoſopher, orator, poet, or ſoldier, &c.?

Pronouns. have been described, cannot answer this purpose. The first expedient upon this occasion seems to have been *pointing*, or *indicating by the finger or hand;* some traces of which are still to be observed, as a part of that action which naturally attends our speaking. But the authors of language were not content with this: they invented a race of *words to supply this pointing;* which words, *as they always stood for substantives or nouns*, were characterized by the name of PRONOUNS. These also they distinguished into three several sorts, calling them *pronouns* of the *first*, the *second*, and the *third person*, with a view to certain distinctions, which may be explained as follows.

"Suppose the parties conversing to be wholly unacquainted, neither name nor countenance on either side known, and the subject of the conversation to be *the speaker himself*. Here to supply the place of pointing, by a word of *equal* power, the inventors of language furnished the speaker with the *pronoun* I; I *write*, I *say*, I *desire*, &c.: and as the speaker is always principal with respect to his own discourse, this they called, for that reason, the *pronoun of the first person*.

"Again, suppose the subject of the conversation to be *the party addressed*. Here, for similar reasons, they invented the *pronoun* THOU; THOU *writest*, THOU *walkest*, &c.: and as the party addressed is next in dignity to the speaker, or at least comes next with reference to the discourse, this pronoun they therefore called *the pronoun of the second person*.

"Lastly, suppose the subject of conversation neither the speaker nor the party addressed, but *some third object different from both*. Here they provided another pronoun, HE, SHE, or IT; which, in distinction to the two former, was called *the pronoun of the third person:* And thus it was that *pronouns* came to be distinguished by their respective PERSONS."

36. The description of the different PERSONS here given is taken, we are told, from PRISCIAN, who took it from APOLLONIUS. But whatever be the deference due to these *ancient masters*, their learned pupil, though guided by them, seems not to have hit upon the *true* and *distinguishing* characteristic of the *personal pronouns*. He supposes, that when the names of two persons conversing together are known to each other, they may, by the use of these names, express all that the personal pronouns express: but this is certainly not true. To us, at least, there appears to be a very material difference between saying, "*George* did this." and "I did this;" nor do we think that the power of the *pronoun* would be completely supplied by the *name*, even with the additional aid of *indication by the hand*. So when one man says to another, with whom he is conversing, "*James* did so and so;" it is surely not equivalent to his saying, "you did so and so." If such were the case, one might pertinently ask, when both persons are known to each other, Why do they use the personal *pronouns?* Mr Harris tells us, that "when the subject of conversation is the *speaker himself*, he uses I; and when it is *the party addressed*, he uses THOU." But in fact the *nature of the personal pronouns* has no sort of connection with the *subject of conversation*, whether that conversation relate to *the speaker*, *the party addressed*, or a *Greek book*. In this sentence, "I *say* that the three angles of every triangle are equal to two right angles," the *speaker* is surely not the *subject* of the discourse; nor is *the party addressed*, but the *truth of his assertion*, the *subject* of discourse in the *following* sentence;—"*You say*, that *Horne Tooke's Diversions of Purley* is the most masterly treatise on grammar, so far as it goes, that you have ever seen." *Mr Harris* uses the phrase, *becoming the subject of conversation*, in no other sense than that when *the speaker* has occasion to *mention* HIMSELF, he uses *I;* when *the party addressed*, THOU; and when some *other person* or *thing*, HE, SHE, or IT: but we know that he may use other words, by *no means equivalent* to the *two first* of these *pronouns*, which will sufficiently mark *himself*, and *the party addressed;* and that he may use indifferently, and without the smallest injury to the sense, either the *third pronoun*, or the word for which it is merely a *substitute*. A man who bears various characters, may design HIMSELF by any one of them. Thus MR PITT may speak of himself as *first lord of the treasury*, *chancellor of the exchequer*, or *member for the university of Cambridge;* and in each case he would be what Mr Harris calls the *subject of conversation:* yet every one feels that none of these designations is equivalent to *I*. What then is the force of the personal pronouns? Pronouns.

37. It appears to be simply this: The *first* denotes the *speaker*, AS CHARACTERIZED BY THE PRESENT act OF SPEAKING, in *contradistinction* to *every other character* which he may bear. The *second* denotes *the party addressed*, as CHARACTERIZED BY THE PRESENT CIRCUMSTANCE OF BEING ADDRESSED, in *contradistinction* to *every other character*, &c.: And what is called the *pronoun* of the *third* person is merely a NEGATION OF THE OTHER TWO, as the *neuter gender* is a negation of the *masculine* and *feminine*. If this account of the personal pronouns be true, and we flatter ourselves that its truth will be obvious to every body, there is but one way of expressing by other words the force of the pronouns of the *first* and *second* person. Thus, "The person who now speaks to you did so and so," is equivalent to "*I* did so and so;" and "The person to whom I now address myself did so and so," is equivalent to "*You* did so and so." 33 The real import of them.

Hence we see why it is improper to say *the* I or *the* THOU; for each of these pronouns has of *itself* the force of a *noun with the definite article prefixed, and denotes a person of whom something is predicated, which distinguishes him from all other persons*. I is *the* person *who now speaks*, THOU is *the* person *who is now addressed by the speaker*. Hence too we see the reason why the pronoun *I* is said to be of the *first*, and the pronoun THOU of the *second* person. These pronouns can have place only in conversation, or when a man, in the character of a public speaker, addresses himself to an audience; but it is obvious, that there *must* be a *speaker* before there *can* be *a hearer;* and therefore, that the *pronouns* may follow the order of nature, *I*, which denotes the person of the *speaker*, must take place of THOU, which denotes the person of the *hearer*. Now the *speaker* and the *hearer* being the only persons engaged in conversation or declamation, *I* is with great propriety called the pronoun of the *first*, and THOU the pronoun of the *second* person. We have said, that, with respect to pronouns, the *third person*, as it is called, is merely a *negation of the other two*. This is evident from the slightest attention to the import of those words which are called *pronouns of the third person*. HE, SHE, or IT, denotes not the person either of the *speaker* or of the *hearer;*

and

Pronouns. and, as we have juſt obſerved, no other perſon can have a ſhare in converſation or declamation. An abſent perſon or an abſent thing may be the *ſubject* of converſation, but cannot be the *ſpeaker* or the *perſon addreſſed*. HE, SHE, and IT, however, as they *ſtand by themſelves*, and aſſume the *power of nouns*, are very properly denominated *pronouns;* but they are not *perſonal* pronouns in any other ſenſe than as the *negation of ſex* is the *neuter gender*.

38. We have already ſeen that nouns admit of number; *pronouns*, which are their ſubſtitutes, likewiſe admit of number. There may be MANY ſpeakers at once of the *ſame* ſentiment, as well as *one*, who, including himſelf, ſpeaks the ſentiment of MANY; ſpeech may likewiſe be addreſſed to MANY at a time, as well as to ONE; and the ſubject of the diſcourſe may likewiſe be MANY. The pronoun, therefore, of every one of the *perſons* muſt admit of number to expreſs this *ſingularity* or *plurality*. Hence the pronoun of the firſt perſon *I*, has the plural WE; that of the ſecond perſon THOU, has the plural YE or YOU; and that of the third perſon HE, SHE, or IT, has the plural THEY, which is equally applied to all the three genders.

The Greeks and Romans, when addreſſing *one* perſon, uſed the pronoun in the ſingular number THOU; whereas, in the polite and even in the familiar ſtyle, we, and many other modern nations, uſe the plural YOU. Although in this caſe we apply YOU to a *ſingle* perſon, yet the *verb* muſt agree with it in the *plural number;* it muſt neceſſarily be, *you have*, not *you haſt*. YOU WAS—the *ſecond perſon plural* of the *pronoun* placed in agreement with the *firſt* or *third perſon ſingular* of the *verb*, is an enormous, though common, ſoleciſm, which ought to be carefully avoided. In very ſolemn ſtyle, as when we addreſs the Supreme Being, we uſe THOU—perhaps to indicate that *he is God alone, and that there is none like unto him;* and we ſometimes uſe the ſame form of the pronoun in contemptuous or very familiar language, to intimate that the perſon to whom we ſpeak is the *meaneſt* of human beings, or the *deareſt* and *moſt familiar* of our friends. A king, exerting his authority on a ſolemn occaſion, adopts the *plural* of the firſt perſon, "WE ſtrictly command and charge;" meaning, that he acts by the advice of counſellors, or rather as the repreſentative of a whole people. But in *all caſes* in which the *uſe of the pronoun* deviates from the *nature of things*, the *verb* in *concord* deviates *with it;* for, as will be ſeen afterwards, theſe two words univerſally agree in number and perſon.

34 The ſecond perſonal pronoun uſed in the plural number when only one perſon is addreſſed.

35 The pronouns of the firſt and ſecond perſons have no variations to denote ſex, and why.

39. But though all theſe pronouns have *number*, neither in *Greek*, *Latin*, or any modern language, do thoſe of the *firſt* and *ſecond* perſon carry the diſtinctions of ſex. The reaſon is obvious (H), namely, that *ſex* and all other properties and attributes whatever, except thoſe mentioned above as *deſcriptive* of the *nature* of theſe pronouns, are foreign from the intention of the ſpeaker, who, when he uſes the pronoun *I*, means THE PERSON WHO NOW SPEAKS—no matter whether man or woman: and when the pronoun THOU—THE PERSON—no matter whether man or woman—TO WHOM HE NOW ADDRESSES HIMSELF—and nothing more. But the pronoun of the third perſon denoting neither the *ſpeaker* nor the *hearer*, but the *ſubject* of the diſcourſe, and being merely the ſubſtitute of a *noun* which may be either *maſculine*, *feminine*, or *neuter*, muſt of neceſſity agree with the noun which it repreſents, and admit of a triple diſtinction ſignificant of gender. In Engliſh, which allows its adjectives no genders, this pronoun is HE in the *maſculine*, SHE in the *feminine*, and IT in the *neuter;* the utility of which diſtinction may be better found in ſuppoſing it away. Suppoſe, for example, that we ſhould in hiſtory read theſe words: *He cauſed him to deſtroy him*—and were informed that the pronoun, which is here thrice repeated, ſtood each time for ſomething different; that is to ſay, for a man, for a woman, and for a city, whoſe names were *Alexander*, *Thais*, and *Perſepolis*. Taking the pronoun in this manner—diveſted of its gender—how would it appear which was deſtroyed, which the deſtroyer, and which the cauſe that moved to the deſtruction? But there is no ambiguity when we hear the genders diſtinguiſhed: when we are told, with the proper diſtinctions, that SHE *cauſed* HIM *to deſtroy* IT, we know with certainty, that the *prompter* was the *woman;* that her *inſtrument* was the *hero;* and that the *ſubject* of their cruelty was the *unfortunate city*.—From this example we would be ſurpriſed how the *Italians*, *French*, and *Spaniards*, could expreſs themſelves with preciſion or elegance with no more than two variations of this pronoun.

Pronouns.

36 In this reſpect the pronoun of the third perſon differs from the firſt and ſecond.

37 The caſes of pronouns.

40. Although in every language with which we are acquainted, there is but but one pronoun for each of the firſt and ſecond perſons; and although it is obvious from the nature and import of thoſe words, that no more can be neceſſary; yet the mere *Engliſh* reader may perhaps be puzzled with finding three diſtinct words applied to each; I, MINE, and ME, for the *firſt* perſon; THOU, THINE, and THEE, for the *ſecond*. The learned reader will ſee at once that the words MINE and ME, THINE and THEE, are equivalent to the *genitive* and *accuſative caſes* of the Latin pronouns of the firſt and ſecond perſons. That MINE is a pronoun in the poſſeſſive caſe, is obvious; for if I were aſked "whoſe book is that before me?" I ſhould reply—"It is MINE (I);" meaning that it belongs to *me*. That

(H) The reaſon aſſigned by Mr Harris and his followers is, that "the ſpeaker and hearer being generally preſent to each other, it would have been ſuperfluous to have marked a diſtinction by art, which from nature and even dreſs was commonly apparent on both ſides." This is perhaps the beſt reaſon which their deſcription of the perſonal pronouns admits, but it is not ſatisfactory; for the ſpeaker and hearer may meet in the dark, when different dreſſes cannot be diſtinguiſhed.

(I) If we miſtake not, Dr Johnſon has ſomewhere affected to ridicule Biſhop Lowth for conſidering the word MINE as the *poſſeſſive caſe* of the *pronoun* of the firſt perſon. According to the doctor, MINE is the ſame word with the pronominal adjective MY; and was anciently uſed before a vowel, as MY was before a conſonant. This is not ſaid with the great Lexicographer's uſual preciſion. That MINE was anciently uſed before a vowel is certain; but it does not therefore follow, that it is the ſame word with MY. If it were, we might on every occaſion:

Pronouns. That the word ME is the *ſame* pronoun in the *caſe* which the Latin grammarians call the *accuſative*, is evident from the import of that word in the ſentence HE ADMIRES ME, where the *admiration* is ſuppoſed to proceed *from* (K) the *perſon ſpoken of* to the *perſon who ſpeaks*. It appears therefore, that though Engliſh *nouns* have only *two caſes*, the *nominative* and *poſſeſſive*, the *pronouns* of that language have three, *as I*, MINE, ME; THOU, THINE, THEE; HE, HIS, HIM, &c. That theſe are caſes, can be queſtioned by no man who admits that *mei*, *mihi*, *me*, are caſes of the Latin pronoun EGO. Both pronouns, the *Latin* and the *Engliſh*, are irregularly inflected: and perhaps thoſe words which are called the oblique caſes of each may have originally been derived from nominatives different from EGO and I; but theſe nominatives are now loſt, and *mei* and *mine* have, beyond all diſpute, the effect of the genitives of the *Latin* and *Engliſh pronouns* of the firſt perſon. Theſe variations, however, cannot be looked upon as an eſſential part of language, but only as a particular refinement invented to prevent the diſagreeable repetition of the pronoun, which muſt frequently have happened without ſuch a contrivance. This ſeems to have been the only reaſon why *pronouns* have been endowed with a greater variety of caſes than *nouns*. *Nouns* are in themſelves greatly diverſified: Every *genus* and every *ſpecies* of objects has a diſtinct *name*, and therefore the ſameneſs of ſound does not ſo often occur among them as it would among the *pronouns*, without *caſes*, where the ſame I, THOU, HE, SHE, or IT, anſwers for every object which occurs in nature: but by this diverſity in the form of the words, the *cacophonia*, which would be otherwiſe diſguſting, is in a great meaſure avoided. It is, probably, for the ſame reaſon, that the *plural* of each of theſe pronouns is ſo very different from the *ſingular*. Thus from I, MINE, ME, in the ſingular, is formed, in the plural, WE, OURS, US; from THOU, THINE, and THEE, YE or YOU, YOURS, YOU; and from HE, SHE, IT, HIS, HERS, ITS, HIM, HER, IT, in the ſingular, THEY, THEIRS, THEM, in the plural. In all of which there is not the leaſt reſemblance between the ſingular and plural of any one word: and except in HE, HIS, HIM; IT, ITS; THEY, THEIRS, THEM; there is not any ſimilarity between the different caſes of the ſame word in the ſame number.

38 The firſt and ſecond perſonal pronouns coaleſce with the third.

41. From the account here given of the perſonal pronouns, it appears that the firſt or ſecond will, either of them, coaleſce with the third, but not with each other. For example, it is good ſenſe, as well as good grammar, to ſay in any language, I AM HE—THOU ART HE—WE WERE THEY—YOU WERE THEY; but we cannot ſay—I AM THOU—nor THOU ART I—nor WE ARE YOU, &c. The reaſon is, there is no abſurdity for the *ſpeaker* to be the *ſubject* alſo of the diſcourſe, as when it is ſaid—*I am he;* or for the *perſon addreſſed*, as when we ſay, *thou art he*. But for the ſame perſon, in the ſame circumſtances, to be at once the ſpeaker and the party addreſſed, is impoſſible; for which reaſon the coaleſcence of the pronouns of the firſt and ſecond perſons is likewiſe impoſſible. Pronouns.

39 Pronominal adjectives.

42. I, THOU, HE, SHE, and IT, are all that are uſually called *perſonal* pronouns. There is another claſs of words, which are called ſometimes *pronominal adjectives*, ſometimes *adjective pronouns*, ſometimes *poſſeſſive pronouns*; and by one writer of grammar they have been moſt abſurdly termed *pronominal articles*. It is not worth while to diſpute about a name; but the words in queſtion are MY, THY, HER, OUR, YOUR, THEIR. Theſe words are evidently in the *form* of *adjectives*: for, like other Engliſh adjectives, they have no variation to indicate either *gender*, *number*, or *caſe*; and yet they are put in *concord* with *nouns* of *every* gender and *both* numbers, as MY WIFE, MY SON, MY BOOK—HER HUSBAND, HER SONS, HER DAUGHTERS, &c. But, though in the *form* of *adjectives*, they have the *power* of the *perſonal pronouns* in the *poſſeſſive caſe*: MY BOOK is *the book of* ME, or the *book of* HIM WHO NOW SPEAKS; OUR HOUSE is *the houſe of* US, or the *houſe occupied by the* PERSONS WHO NOW SPEAK; HER HUSBAND, is *the huſband* of *a woman* who can be *known only from ſomething preceding in the diſcourſe;* and THEIR PROPERTY is *the property of them*—of *any perſons*, whether *men* or *women*, or *both*, who have been previouſly mentioned. Words which have the *form* of *adjectives*, with the *power* of *pronouns*, may, without impropriety, be called *pronominal adjectives;* and ſuch is the name by which we ſhall henceforth diſtinguiſh them. To theſe pronominal adjectives as well as to the perſonal pronouns, are ſubjoined the words *own* and *ſelf*—in the plural *ſelves:* in which caſe they are emphatical, and imply a ſilent contrariety or oppoſition. Thus, *I live in my own houſe;* that is, *not in a hired houſe. This I did with my own hand;* that is, *not by proxy. This was done by myſelf;* that is, *not by another*. The word *ſelf* ſubjoined to a perſonal pronoun forms alſo the reciprocal pronoun; as *we hurt ourſelves by vain rage; he blamed himſelf for his misfortune. Himſelf*, *itſelf*, *themſelves*, are ſuppoſed by *Wallis* to be put, by corruption, for *his ſelf*, *its ſelf*, *their ſelves;* ſo that *ſelf* is always a *ſubſtantive* or *noun*, and not a pronoun. This ſeems to be a juſt obſervation; for we ſay, *the man came himſelf; they went themſelves;* where the words *himſelf* and *themſelves* cannot be accuſatives but nominatives, and were anciently written *his ſelf*, *their ſelves*.

40 The reciprocal pronoun.

There are other words which are uſually ranked under the claſs of *pronouns;* as *who*, *which*, *what*. Theſe, when employed in aſking queſtions, are called *interrogative pronouns;* though a name more characteriſtic might ſurely be found for them. Their import, however, will be more eaſily aſcertained after we have conſidered another ſpecies of pronouns, which have been denominated *relatives*, and with which they are intimately connected.

41 The relative pronoun.

43. The pronouns already mentioned may be called *prepoſitive*, as may indeed all ſubſtantives, becauſe they are capable of introducing or leading a ſentence: but

occaſion ſubſtitute either of theſe for the other, without offending againſt *grammar*, however we might injure the ſound; but we apprehend that this is not the caſe. "That book is MINE," is good Engliſh; but "that book is *my*" would be a groſs ſoleciſm: the reaſon is, that MINE is a *genuine pronoun*, and ſtands by *itſelf* with the *power* of a *noun;* but MY, being an adjective, cannot ſtand by itſelf.

(K) See Chap. I. 18, 19. on the Caſes of Nouns.

Pronouns. but there is another pronoun which has a character peculiar to itself; and which, as it is never employed but to *connect* sentences, and must therefore have always a reference to something preceding, is called the *subjunctive* or *relative* pronoun. This pronoun is in Greek, ὅς, ἥ, ὅ; in *Latin*, QUI, QUÆ, QUOD; and in *English*, WHO, WHICH, WHAT.

42 Represents any noun, or prepositive pronoun;

44. In order to determine with precision the nature and import of the *relative pronoun*, it will be necessary to ascertain the powers which it contains, or the parts of speech into which it is capable of being resolved. Now, it is obvious, that there is not a single noun, or *prepositive pronoun*, which the *relative* is not capable of representing: for we say, I, WHO *saw him yesterday cannot be mistaken;* YOU, WHO *did not see him, may have been misinformed;* THEY, WHO *neither saw nor heard, can know nothing of the matter;* THE THINGS, WHICH *he exhibited, were wonderful.* From these examples it is apparent, in the first place, that the *relative* contains in itself the force of any other pronoun; but it contains something more.

45. If from any sentence in which there is a *relative*, that relative be taken away, and the *prepositive* pronoun, which it represents, be substituted in its stead, the sentence will lose its bond of union, and stand quite loose and unconnected. Thus, if instead of saying *the man is wise* WHO *speaks little*, we should say *the man is wise* HE *speaks little*, the sentence would be resolved into two; and what is affirmed of the man's *wisdom*, would have no connection with the circumstance of his *speaking little*. Hence it is evident, in the second place, that the *relative* contains the force of a *connective* as well as of the prepositive pronoun. What kind of connection it denotes, is next to be ascertained.

43 And contains besides the force of a connective.

46. It may be laid down as a general principle, "that, by means of the *relative pronoun*, a *clause of a sentence*, in which there is a verb, is converted into the *nature of an adjective*, and made to denote some *attribute* of a *substance*, or some *property* or *circumstance* belonging to the *antecedent noun*." Thus, when it is said, *homo qui prudentia præditus est*, the relative clause—*qui prudentia præditus est*, expresses nothing more than the *quality* of prudence in *concrete* with the *subject homo*, which might have been equally well expressed by the adjective *prudens*. In like manner, when we say, *vir sapit qui pauca loquitur*, the relative clause expresses the property of *speaking little* as belonging to the man, and as being that quality which constitutes, or from which we infer, his *wisdom;* but if there were such a word as *pauciloquens*, that quality might very properly be expressed by it, and the phrase *vir sapit pauciloquens* would express the same assertion with *vir sapit qui pauca loquitur*. Pronouns.

Now if a relative clause expresses that which might be expressed by an adjective, the presumption is, that it may be resolved into the same constituent parts. But every adjective contains the powers of an *abstract substantive*, together with an expression of connection; and may be resolved into the *genitive case* of that substantive, or into the *nominative* with the particle *of* prefixed, which, in English, corresponds to the termination of the genitive in the ancient languages. That the member of a sentence, in which there is a relative, may, in every instance, be analysed in the same manner, will be apparent from the following examples. *Vir qui sapit*, *vir sapiens*, and *vir sapientiæ;* "a man who is wise, a wise man, and a man of wisdom;" are certainly phrases of the same import. Again, *homo, cui ingratus est animus, malus fit amicus*, may be translated into Greek, ἀνθρωπος ἀχαριστιας κακος γινεται φιλος; and into English, "the man of ingratitude is a bad friend."

44 Of the same import with the English preposition *of*.

47. Thus then it appears, that the *relative pronoun* contains in itself the force of the *prepositive* pronoun, together with that *connection* implied in English by the preposition *of*, and in the ancient languages by the *genitive case*. When one says *vir sapit qui pauca loquitur*, the relative clause *qui pauca loquitur* expresses that attribute of the man from which his wisdom is inferred: it is conceived by the mind, as stript of its propositional form, and standing in the place of a substantive noun governed in the genitive case by *vir*. The whole sentence might be thus translated, "the man *of little speaking* is wise;" or, did the use of the English language admit of it, "the man *of he speaks little* is wise." In like manner, when it is said, "Man who is born of a woman is of few days and full of trouble;"—the relative clause is equivalent to an *abstract noun* in the genitive case, and the whole might be expressed in the following manner, "man *of he is born of a woman* is of few days and full of trouble."

We are sensible, that these expressions into which, in the instances adduced, we have resolved the relative clauses, will appear extremely uncouth and offensive; but we mean not to recommend them as common modes of phraseology. Against their being employed as such, present use loudly remonstrates (L). They are introduced only with a view to show the true import of the *relative*

(L) It is worthy of observation, however, that, repugnant as such expressions are to the present idiom of the English language, there is nothing in the *nature of the thing* that could render the use of them improper. All *prepositions*, as will be seen afterwards, are expressive of relations subsisting between those objects of which they connect the signs in discourse. Those objects may be denoted, either by *single words*, and then the *preposition* will govern a *noun;* or by *assertions*, and then it will govern *a nominative and a verb*. Thus, when it is said, "I came after his departure;" the preposition *after* expresses the relation between two events—*my coming* and *his departure*, and governs a substantive noun: but if it be said, "I came after he departed," the preposition in this case (for, as shall be shown afterwards, it is absurd to call it, in the one instance, a preposition, and in the other a conjunction) expresses the same relation as before, but governs a nominative and a verb.

This last expression is exactly similar to those employed above. When one says, for example, "the man *of he speaks little* is wise;"—however uncouth the expression may appear from its not being supported by the authority of custom, the preposition *of* is used precisely in the same manner, and serves the very same purpose, as when it is said, "the man *of little speaking* is wise." In both cases it denotes the relation between the two objects

Pronouns. *relative pronoun;* and for that purpose they are well adapted. That pronoun seems to be of use only when there is a deficiency of *adjectives* or *substantives* to denote some *complex attribute* by which we want to *limit* a *general term* or *expression*. Where such adjectives or substantives exist in language, we may indeed use the *relative* or not at pleasure. Thus we may say, *homo qui grandia loquitur*, or *homo grandiloquus;* because the *adjective* and *the relative clause* are precisely of the same meaning. But if the Latins were called upon to translate ανθρωπος αυλοδιδαχλος, we believe they must have made use of the *relative pronoun*, as we know not any correspondent adjective in their language.

45 Mr Harris's mistake on this subject.

48. The learned and ingenious Mr Harris has, in his Treatise on Universal Grammar, given an analysis of the relative pronoun very different from that which has been given by us. The result of his inquiry is, that the *relative* is equivalent to another pronoun, together with an expression of connection of that kind which is denoted by the particle *and*. This analysis he exemplifies, and endeavours to confirm by the following sentence: "Light is a body which moves with great celerity." Now, says he, instead of *which* substitute the words *and it*, and in their united powers you see the force and character of the pronoun here treated. But let any one attentively consider these two expressions,—"Light is a body *which* moves with great celerity,"—and "Light is a body *and it* moves with great celerity;" and he will find that they are not precisely equivalent. For to speak in the language of logic, there is in the *first* but one proposition, of which the *subject* is *light*, and the *predicate* a complex term expressed by the words—*body which moves with great celerity*. In the *second* there are two propositions, or *two predications* concerning light:—first, *that it is a body;* and secondly, *that it moves with great celerity*. The relative clause, in the first case, expresses a *property* of the antecedent *body*, which with that property is predicated of the subject light; in the second case, this property is removed from the *predicate* of which it was an essential part, and is improperly converted into a new *predication* of the *subject*. The sentence may be resolved upon our principles, and its precise import preserved; as—"Light is a body *of it moves with great celerity;*" the clause—"it moves with great celerity," is conceived by the mind as having the force of an *abstract substantive*, and is connected with the antecedent body by the preposition *of*, answering to the termination of the genitive case. This abstract substantive thus connected expresses a *quality* of the *body* light. But by this example Mr Harris's doctrine is not exhibited in all its absurdity: let us try it by another. Pronouns.

Suppose the following assertion to be true; "Charles XII. was the only monarch who conquered kingdoms to bestow them on his friends." Here it is evident there is but one proposition, of which the predicate is expressed by the words—"only monarch who conquered kingdoms to bestow them on his friends;" so that the *relative* clause is a *necessary part* of the predicate, and has, like an *abstract noun* in the genitive case, the effect of modifying the general term *monarch*. Resolve this sentence on Mr Harris's principles, and you have two propositions of which the first is a notorious falsehood:—"Charles XII. was the *only monarch; and he* conquered kingdoms to bestow them on his friends." But instead of *and* substitute *of*—saying, "Charles XII. was the only monarch *of he conquered kingdoms to bestow them on his friends*," and you preserve the true import of the expression (M).

49. Are there no cases, then, in which the relative may be resolved into the connective *and* with a prepositive pronoun? Undoubtedly there are, and we shall now endeavour to ascertain them.

46 In some cases Mr Harris's analysis of the relative may be admitted.

Adjectives in language have two different effects upon the substantives to which they belong, according to the nature of the attribute which they express. If the attribute expressed by the adjective be competent to all the species of which the substantive is the specific name, it is plain that the adjective does not *modify* or *limit* the substantive, for this obvious reason, that nothing can modify which is not discriminative. Thus, when

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objects—*man* and *little speaking;* only in the one it is prefixed to a noun, in the other to an assertory clause of a sentence, the import of which is to be taken as a noun. Custom hath indeed determined that prepositions shall more frequently govern a noun than a nominative and a verb; but they are, in their own nature, equally well adapted to answer both purposes.

But, as the *pronoun* of the third person is merely the substitute of some *noun*, an objector may ask, What noun is here represented by *he?* "The man *of he speaks little* is wise!" Who is meant by the pronoun *he?* We answer, *the man* who is declared to be *wise*. The objection proceeds from inattention to the radical signification of the word *of*, which a late ingenious writer has shown to be the fragment of a Gothic or Anglo-Saxon word, signifying *consequence* or *offspring*. If this be admitted, and, after the proofs which he has given, we think it cannot be denied, the uncouth phrase, "The man *of he speaks little* is wise," may be thus resolved, "The man, *a consequence* (of his mind is) *he speaks little*, is wise;" or, in other words, "The man, *in consequence* of his speaking little, is wise." The same acute writer, *Mr Horne Tooke*, has shown that *of* and *for*, though of different radical meanings, may often be substituted the one for the other without injury to the sense. Let this substitution be made in the present instance, and the propriety of the phrase will be apparent: "The man is wise *for* he speaks little." It must be remembered, however, that such a substitution cannot be made in every instance, because *for* signifies *cause*, and *of* signifies *consequence*.

(M) Mr Harris was probably led into his opinion, from considering the Latin *qui* or *quis* as compounded of *que* and *is* (see *Hermes*, page 81, 82. edit. 3d.) But the notion of *Perizonius* is perhaps better founded, who in his notes *ad Sanct. Minerv.* considers it as immediately taken from the Greek τις, which in the Doric made κις, and in the Latin *quis*. For it seems highly probable, as some ingenious writers have endeavoured to show, that the Latin is a dialect of the Greek. Of this at least we are certain, that many words in the former are immediately adopted from the latter.

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The clause of a sentence, in which there is a *relative*, as it is in every other respect, so is it in this, equivalent to an *adjective;* it either *modifies*, or does *not modify*, the *antecedent*, according as the *attribute* which it expresses is or is not characteristic of the *species* to which the antecedent belongs. Thus, when it is said, "Man, who is born of a woman, is of few days and full of trouble," the relative clause—*who is born of a woman*, expresses an attribute common to *all men*, and therefore cannot modify. In like manner when we say —"Socrates, who taught moral philosophy, was virtuous,"—the clause, *who taught moral philosophy*, does not modify. In both these instances the relative clause might be omitted; and it might be said with equal truth, "Man is of few days and full of trouble," —and "Socrates was virtuous."

But if it be said, *vir sapit qui pauca loquitur*, the relative clause—*qui pauca loquitur*, *modifies* the antecedent *vir;* for it is not affirmed of *every man*, that he is wise, but only of *such men as speak little*. So—"Charles XII. was the only monarch who conquered kingdoms to bestow then on his friends;" and, "the man that endureth to the end shall be saved;" with many more examples that will occur to every reader.

47 What these cases are. Now it will be found, that it is only when the relative clause expresses such a property or circumstance of the antecedent as does *not* limit its signification, that *the relative pronoun* can be resolved into a *prepositive pronoun* with the conjunction *and*, and that in these cases the relative *clause* itself is of very little importance. Thus in the assertion,—"Charles XII. was the only monarch who conquered kingdoms to bestow them on his friends,"—where the relative clause is *restrictive*, the *who* cannot be resolved into *and he* consistently with truth or common sense. But in the expression, "Man, who is born of a woman, is of few days and full of trouble," the relative *who* may be so resolved, at least without violating truth;—"Man is of few days and full of trouble, and he is born of a woman." The only difference between the sentence with the relative *who*, and the same sentence *thus resolved*,—is—that, in the former case, it contains but *one predication;* in the latter *two*, and these but loosely connected.

50. Thus then it appears that the general analysis of the *relative pronoun* is into the particle *of*, and a prepositive pronoun; but that there are also occasions on which it may be resolved into a prepositive pronoun and the particle *and*, without materially altering the sense. Now what is the reason of this distinction?

If the relative clause be equivalent to an *adjective*, or to an *abstract substantive* in the genitive case, it is easy to see that the relative itself may, in *every* instance, be resolved into another pronoun and the particle *of*; but it will not perhaps be quite so evident how it should in *any instance* be resolved by *and*. This last analysis has its foundation in the nature of the particles *of* and *and;* or, to speak more properly, in the nature of the attribute which the relative clause expresses. Both the particles *of* and *and* are used to link or join conceptions together; but with this difference, that *of* has the effect of making the conceptions it connects figure in the mind as *one object;* whereas the conceptions connected by *and* are still conceived *separately as before*. To explain ourselves by an example: suppose we take two words, *man* and *virtue*, which denote two distinct ideas or conceptions, and join them together by the particle *of*, saying *man of virtue;* the mind no longer views them separately as significant of *two* conceptions, but of *one*. Take the same words, and join them together by the particle *and*, saying *man and virtue:* the conceptions denoted by *man* and *virtue* are still viewed separately as *two;* notice is only given that they are *collaterally connected*.

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This being the case, it follows, that when the relative modifies the antecedent, or, in other words, when the *relative clause* and the *antecedent* denote but *one conception*, the relative must then be resolved by *of*, in order to preserve this *unity of conception*. But when the relative does *not* modify the antecedent; that is, when its clause does not express any *necessary* part of a complex conception, then the conceptions or ideas denoted by the *relative clause* and the *antecedent* may be viewed separately as *two;* and therefore the relative *may* be resolved into the corresponding prepositive pronoun and the particle *and*.

To state this reasoning in a light somewhat different. As every relative clause, which expresses an attribute that is *not* applicable to a *whole* genus or species, must necessarily *modify* some *general term*, that is, *restrict* its signification; and as that general term must belong either to the *subject* or to the *predicate* of a proposition; it is evident, that every *such* relative clause is a *necessary part* of that *subject* or *predicate* in which its *antecedent* stands. If therefore a relative clause, which *modifies*, be taken *away* either from the *subject* or the *predicate* of a proposition; or if that *connection*, in *consequence of which* it modifies, be *dissolved* (which is always done when the relative is resolved by *and*); the proposition itself will not hold true. The reason is, that the *subject* or the *predicate* becomes then too general: for, in the *one* case, something is predicated of a *whole genus* or *species*, which can be predicated only of some *individuals* of that genus or species; and in the *other*, a *general* predication is made where only a *particular* one can be applied. Thus, if it be said, "All men who transgress the laws are deserving of punishment;" the *subject* of the proposition is expressed by the words, "all men who transgress the laws." Take the clause of the relative "who transgress the laws"—away, and say, "all men are deserving of punishment;" and you have a proposition which is not true, because that is affirmed of the *whole species* which can be affirmed only of *some individuals*. Retaining now the clause of the relative, but resolving it by *and*, you have the same proposition as before; and together with it, in this instance, *another* which is equally false:—"All men, *and they* transgress the laws, are deserving of punishment;" that is, "*all men* are deserving of punishment, and *all men* transgress the laws."

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But when the attribute expreſſed by the clauſe of the relative is characteriſtic of the *genus* or *ſpecies* of the antecedent, and conſequently applicable to *every individual* which that genus or ſpecies comprehends, the relative clauſe may be entirely omitted without affecting the truth of the propoſition, which is already as general as it can be. As in this caſe the import of the relative clauſe is *not reſtrictive* of the ſignification of the antecedent, it is of little conſequence whether the attribute be repreſented by the connective part of the relative, as *of* the antecedent, or be affirmed to belong to the antecedent in a *ſeparate aſſertion*. Thus it matters not much, whether we ſay, "Man, who is ſubject to death, ought not to be too much elated;" that is, according to our analyſis,—"Man *of he is ſubject to death*, ought not to be too much elated;" or, forming the relative clauſe into a ſeparate aſſertion, and connecting the two by the particle *and*, we ſay, "Man, and he is ſubject to death, ought not to be too much elated." In the one ſentence, indeed, the *reaſon* is implied *why* man ſhould not be too much elated, viz. *his being ſubject to death:* in the other, *no reaſon* is aſſigned for this; we only affirm that man is ſubject to death, and *likewiſe* that he ſhould not be too much elated: but as both affirmations are equally true and evident, it is of little conſequence, in ſuch a caſe as this, whether the reaſon upon which either is founded be implied or not.

48 Concluſion reſpecting the relative pronoun.

51. From the whole of this tedious inveſtigation, we flatter ourſelves that the following concluſions are deduced and ſufficiently eſtabliſhed: 1ſt, That the *relative pronoun* contains in itſelf the united powers of a *connective* and *another pronoun*. 2dly That *of* is the connective of which, together with another *pronoun*, it contains the powers, as in every poſſible inſtance it may be reſolved into theſe conſtituent parts, and the *import* of the *ſentence* in which it has place *remain unaltered*. 3dly, That the relative *clauſe of a ſentence* has the import of an *abſtract ſubſtantive*, in the ancient languages, in the *genitive caſe;* in Engliſh, with the particle *of* prefixed. 4thly, That the relative *pronoun* is of *neceſſary uſe* only where there is a deficiency of *adjectives* or *ſubſtantives* to denote ſome *complex attribute*, by which we want to *limit* a *general term* or *expreſſion;* but that where ſuch adjectives or ſubſtantives exiſt in language, we may uſe the *relative* or not at pleaſure. And, 5thly, That though, in caſes where the relative *clauſe* does not *limit* a *general term*, the relative *pronoun* may, without *violating truth*, be analyſed by *and;* yet ſuch analyſis is never proper, as it gives *two predicates* to the ſame *ſubject*, which, in the original propoſition, had but *one predicate*.

52. If the clauſe of the relative be equivalent to an adjective, as in every inſtance it ſeems to be, it will naturally occur, that in the ancient languages, the relative ſhould agree with its antecedent in *gender*, *number*, and *caſe*. They do agree for the moſt part in *gender* and *number;* in *caſe* they cannot often, becauſe the very intention of introducing a *relative* into language is to repreſent the antecedent in a *different caſe*. Whenever we have occaſion to uſe a *ſubſtantive* or *noun* in a clauſe of a ſentence, and afterwards to expreſs by *another clauſe*, in which there is a verb, an *attribute* of the *object* denoted by that *ſubſtantive*, we then employ the *relative pronoun*. Now it ſeldom happens that the two clauſes *admit* of the ſame *regimen;* and hence the *caſe* of the *relative* is often *neceſſarily different* from that of the antecedent, as the caſe of each muſt be accommodated to the clauſe in which it is found. Thus we cannot ſay, "Deus *qui* colimus bonus eſt;" but, "Deus *quem* colimus bonus eſt;" becauſe the *regimen* of the verb *colo* is always the *accuſative*.

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49 Why the relative is more uſeful in the learned languages than in the Engliſh.

This ſhows the neceſſity of introducing a relative into thoſe languages which give inflexions to their nouns. Were all the nouns of a language indeclinable, there would be little occaſion for a relative; and accordingly in Engliſh it is often omitted. Examples are frequent in our beſt authors. Suffice it to quote the following.

"For I have *buſineſs would employ* an age."
Jane Shore.

"I had ſeveral *men died* in my ſhip of calentures."
SWIFT.

"They who affect to gueſs at the *object they* cannot ſee."
BOLINBROKE.

We are not ignorant that our moſt eminent grammarians conſider ſuch expreſſions as chargeable with impropriety; and we are far from recommending them in any dignified or ſolemn compoſition. But in the inſtances adduced there is not the ſmalleſt degree of *obſcurity;* at leaſt there is none occaſioned by the *omiſſion of the relative*. The reaſon ſeems to be, that the mind can eaſily, by an effort of its own, make the *antecedent* unite, firſt with the one clauſe, and then with the other. Thus when it is ſaid—"I have *buſineſs would* employ an age:" the mind can, without any difficulty, as the word buſineſs has no inflexions, conſider it firſt as the objective caſe after *have*, and then as the nominative to *would employ;* but this cannot be ſo eaſily done in the ancient languages, where the termination of the noun is changed by the variation of its caſes.

53. Both in the learned and in the living languages the relative has different *forms*, correſponding to the different *genders of nouns;* and by theſe it gives notice whether it is applied to *perſons*, or to *things without life*. Thus in the Engliſh language we ſay, *The man* or *the woman* WHO *went to Rome; The* TREE WHICH *ſtands on yonder plain.* It admits likewiſe, when applied to males or females, a variation of caſes ſimilar to that of the *perſonal pronouns*. Thus we ſay, *The man* WHOSE *book is now before me; The man or woman* WHOM *I ſaw yeſterday:* but the neuter admits of no ſuch diſtinction (N); as we ſay *the tree* WHICH *I ſaw*, as well as *the tree* WHICH *ſtands on yonder plain*. In modern languages the relative admits not of any diſtinction to denote *number;* for we ſay, *The* MAN *or the* MEN *who came yeſterday; The* MAN *or the* MEN *of whom I ſpeak.*

50 The word *that* often ſupplies the place of this pronoun.

54. In Engliſh, the word THAT, which by ſome has been called a *demonſtrative pronoun*, by others a *pronominal article*, and by us a *definite article*, is often uſed inſtead of the *relative*, as in the following examples: "He is the ſame man *that* I ſaw yeſterday:—He was the

(N) "*Whoſe* is by ſome authors made the poſſeſſive caſe of *which*, and applied to things as well as perſons; I think, improperly." *Lowth.*

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the ableſt prince *that* ever filled a throne." With regard to the principle upon which this acceptation of the word *that* depends, we offer the following conjecture.

51 And why it does ſo.

In Engliſh, from the cool and phlegmatic arrangement of the language, occaſioned by the want of inflexions and conjugations, the place of every part of a ſentence is almoſt uniformly determined, and very little variety is allowed in the collocation of the words. The *adjective* is almoſt always placed in appoſition with its *ſubſtantive*, and the *nominative* with its *verb*. In conſequence of this uniformity in the collocation of the words, the mind acquires a habit of connecting in idea any kind of *word* with the *place* in which it is *uſed* to *ſtand;* and is naturally led to conſider *every word* that ſtands in *ſuch a place* as belonging to *ſuch a claſs*. Hence it is, we imagine, that the definitive *that* paſſes into the nature of the *relative pronoun;* as in thoſe inſtances in which it occupies the *place* of the relative, it was natural to conſider it as having the ſame *import*. Yet the word *that* has undoubtedly in itſelf no more the force of the relative pronoun than *the* or *this*, or any other definitive whatever. In ſuch expreſſions as the foregoing, it is not improbable that originally the clauſe of the definitive *that*, which we now call the *relative* clauſe, was thrown in as a kind of modifying circumſtance in the following manner: "The book (I read that) is elegant;" where the ſpeaker, finding the word *book* too general for his purpoſe, throws in a clauſe to qualify and reſtrict it, or to confine his affirmation to that particular book which he is then reading. We can eaſily ſuppoſe, that through time the definitive *that* in ſuch an expreſſion might be tranſpoſed or removed from its own place to that of the *relative:* ſo that the expreſſion would run thus, "The book *that* I read is elegant;" which would be conſidered as preciſely equivalent to "The book *which* I read is elegant." This opinion is not a little confirmed by a ſimilar uſe of the article in Greek, which, though undoubtedly a definitive like the Engliſh *the*, is often uſed inſtead of the relative pronoun. Numberleſs examples may be found in *Homer* and *Herodotus*, eſpecially in the latter, who ſeldom uſes what is properly called the relative. We ſhall produce one inſtance from each.

Εισιαι Ατρειδην Αγαμεμνονα ΤΟΝ περι παντων
Ζευς εστηκε πονοισι διαμπερες. *Iliad* x. 88.

Οκκοισοι γαρ μεγαλοισι κακ̃ειχονΓο (Αθηναιοι *ſcil.*) δικα
ειλια κρησσεσθαι νομοισι ΤΟΙΣ αν σφισι Σολων θηται,
HEROD. *Clio.*

52 Interrogative pronouns

55. We have ſaid that the *interrogative* pronouns, as they are called, *who*, *which*, *what*, are intimately connected with *relatives;* we now affirm, that the *two firſt* of theſe words are *nothing* but relatives, and that the *laſt* contains in itſelf the united powers of a *relative* and *definitive*. With reſpect to *caſes*, *number*, and *gender*, the words *who* and *which*, when employed as *interrogatives*, differ not from the ſame words when employed as *relatives;* and we hold it as a maxim, without which ſcience could not be applied to the ſubject of language, that the *ſame word* has always the ſame *radical import* in whatever different ſituations it may be placed. To underſtand this, it is neceſſary to obſerve, that all men have a natural propenſity to communicate their thoughts in the feweſt words poſſible: hence it follows, that words are often omitted which are neceſſary to complete the conſtruction of the ſentence; and this nowhere happens more frequently than in the uſe of *who* and *which*. In ſentences where theſe words are confeſſedly *relatives*, we often find them without an antecedent; as,

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"*Who* ſteals my purſe ſteals traſh." SHAKESPEARE.

"Which *who* would learn, as ſoon may tell the ſands." DRYDEN.

"Qui *Bavium non odit, amet tua carmina, Mævi.* VIRG.

"That is, "*He* who ſteals my purſe, &c.;" "Which *he* who would learn, as ſoon, &c.;" and "Ille *qui Bavium non odit*, &c. Such abbreviations occaſion no obſcurity, becauſe from previous circumſtances the hearer knows the mind of the ſpeaker and the perſons to whom he refers. But it is not with reſpect to the *relative* and *antecedent* only that ſuch abbreviations have place: in ſentences of a different form, whole clauſes are ſometimes omitted, while the meaning of the ſpeaker is made ſufficiently plain. Thus when King Richard III. having loſt his horſe in battle, exclaims,

"A horſe! a horſe! my kingdom for a horſe!

there is no complete thought *expreſſed;* but the circumſtances in which the king then was, enabled thoſe about him to underſtand that he *wanted a horſe*. Accordingly Cateſby anſwers him,

"Withdraw, my lord, I'll help you to a horſe."

In like manner, when a perſon aſks a queſtion, his expreſſion is frequently incomplete; but the tone of his voice, or ſome other circumſtance, enables us to aſcertain his meaning, and to ſupply, if we pleaſe, the words that are omitted. Thus when it is ſaid, *An feciſti?* nothing more is *expreſſed* than, *If you did it* (the Latin *an* being nothing elſe but the Greek *αι, ſi*); but ſome circumſtance enables the perſon who hears it to know that the meaning is, "Say if you did it." Let us apply theſe obſervations to the words *who* and *which*. If theſe words be *relatives*, and if our analyſis of the relative be juſt, it is obvious, that no *complete* meaning can be contained in the clauſe, "Who is your principal friend?" for that clauſe contains nothing more than the circumſtance of *being your principal friend* predicated *of* ſome *unknown* perſon; "of he is your principal friend." That this is indeed the caſe, every man may be convinced, by aſking himſelf what he means by the interrogative *who* in ſuch a ſentence; for he will find it impoſſible to affix to it *any* meaning without ſupplying an *antecedent clauſe*, by which that which is *called* an *interrogative* will be immediately converted into the *relative pronoun*. The cuſtom, however, of language, and the tone of voice with which the *relative clauſe* is uttered, intimates, without the help of the *antecedent*, the wiſh of the ſpeaker to be informed by the perſon addreſſed of the name and deſignation of his principal friend; and we know that the ſentence when completed is, "*Tell me the name and deſignation of the perſon* who is your principal friend." Again, when the prophet ſays, "who is this that cometh from Edom, with dyed garments from Bozrah?" he utters but *part* of a ſentence, which when completed will run thus: "*Deſcribe the perſon* who cometh from Edom (this is that *perſon*), with dyed garments from Bozrah." He *ſees* a perſon coming from Edom, of whoſe name and deſignation he is ignorant;

53 are merely relative; and

Verbs.

norant; he calls upon ſome one for information concerning theſe particulars; and that there may be no miſtake, he deſcribes the unknown perſon as having *dyed garments from Bozrah;* but leſt even that deſcription ſhould not be ſufficiently accurate, he throws in the definitive clauſe, *this is that perſon*, pointing at him, we may ſuppoſe, with his finger.—*Which*, uſed as an interrogative, indicates a wiſh of knowing a particular perſon or thing out of more than one mentioned; as, "Which of the two did it?" that is, "*Tell me the one* of the two which did it?" for in old Engliſh *which* as a *relative* is often uſed, where in modern Engliſh we ſhould ſay *who;* and that mode of ſpeech is ſtill retained when the antecedent is omitted, and the relative clauſe employed to indicate ſuch a wiſh as that before us. *What* includes in itſelf the ſignification of a *definitive* and a *relative pronoun;* as, "from *what* has gone before, *what* follows may eaſily be gueſſed;" where the word *what* is equivalent to *that which*. When therefore we ſay, "What rude fellow is that?" our meaning is, "*Deſcribe* that *perſon* who is that rude fellow." Upon the whole, then, it is evident, that the words called *interrogatives* are merely *relative pronouns;* and that interrogative *ſentences* are *relative clauſes* uttered in ſuch circumſtances as to enable the hearer to ſupply the antecedents neceſſary to complete the meaning.

54 Interrogative ſentences relative clauſes.

56. To conclude: We have ſeen that SUBSTANTIVES are either *primary* or *ſecondary;* or, in other words, NOUNS or PRONOUNS. NOUNS denote *ſubſtances*, and thoſe either *natural*, *artificial*, or *abſtract*. They moreover denote things either *general*, or *ſpecial*, or *particular;* and a *general* or *ſpecific* name is made to denote an *individual* by means of words called *articles* or *definitives*. PRONOUNS are the ſubſtitutes of NOUNS, and are either *prepoſitive* or *ſubjunctive*. The PREPOSITIVE is diſtinguiſhed into *three* orders, called the *firſt*, the *ſecond*, and the *third* perſon. The SUBJUNCTIVE, otherwiſe called the RELATIVE, includes the powers of all thoſe three, having *ſuperadded* as of its own the peculiar force of a *connective*.

CHAP. IV. *Of Verbs.*

57. THE words which we have hitherto conſidered are commonly called *ſubſtantives* primary or ſecondary, and *definitives;* becauſe *nouns* are ſignificant of *ſubſtances;* *pronouns* are the ſubſtitutes of *nouns;* and the *article* ſerves to aſcertain the *extent* of the *noun*, and to determine whether on any occaſion it be ſignificant of a whole *claſs* of ſubſtances, or only of *one individual*. But ſubſtances are of importance to mankind only on account of their various *qualities* or *attributes;* for their internal texture is a thing of which we are profoundly ignorant, and with which we have no manner of concern. Thus, experience teaches us, that certain vegetables are pleaſant to the taſte, and wholeſome food; whilſt others are unpleaſant and poiſonous. The former kinds are valuable only for their *qualities* or *attributes;* and they are the *qualities* or *attributes* of the latter that make them worthleſs or hurtful. A horſe is ſtrong, and ſwift, and docile; and may be trained to carry a man on a journey, or to drag a plough. It is for his *ſtrength*, *ſwiftneſs*, and *docility*, that he is the moſt valuable of all quadrupeds. One man is brave, another learned, and another eloquent; and by poſſeſſing theſe different *qualities*, or *attributes*, each is fitted for a different ſtation in ſociety. It is plain, therefore, that in contemplating ſubſtances, our attention muſt be principally beſtowed upon their *qualities*, and that the words which ſerve to denote theſe qualities muſt be an eſſential part of language. Such words are in general called *attributives;* and are of three ſorts, *Verbs*, *Participles*, and *Adjectives*.

55 Subſtances of importance only for their qualities or attributes.

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56 There is a claſs of words called attributives: Theſe are *verbs*, *participles*, and *adjectives*.

58. Of all the conſtituent parts of ſpeech none has given the grammarians greater trouble than the VERB. The vaſt variety of circumſtances which it blends together in one word, throws very conſiderable difficulties in the way of him who attempts to analyſe it and aſcertain its nature; at the ſame time, that by its eminent uſe in language, it is intitled to all the attention which can be beſtowed upon it. To the diſcuſſion of the verb, Mr Harris, whoſe notions of this as of the other parts of ſpeech have been generally adopted by the ſubſequent writers on grammar, has dedicated a large proportion of his book, in which he has thrown out many excellent obſervations, mixed, as it appears to us, with ſeveral errors. We have already obſerved, that no man is ignorant when he uſes what is called a *verb* and when a *noun*. Every ſchoolboy knows, that the words IS, LOVETH, WALKETH, STANDETH, in *Engliſh;* and EST, AMAT, AMATUR, AMBULAT, STAT, in *Latin*, are VERBS: he knows likewiſe that they are of different *kinds;* that ſome of them are ſaid to be *active*, ſome *paſſive*, and ſome *neuter*. But it ſhould ſeem that the firſt object of our inveſtigation ought to be the *characteriſtic* of the verb, or that which all theſe words have in *common*, and which conſtitutes them VERBS, diſtinguiſhing them from *every other ſpecies of words*. Now it is obvious to the ſlighteſt attention, that every verb, whether *active*, *paſſive*, or *neuter*, may be reſolved into the ſubſtantive verb IS, and another *attributive:* for LOVETH is of the ſame import with IS *loving;* WALKETH, with IS *walking;* and AMAT, with AMANS EST. But *loving*, *walking*, and AMANS, are not verbs: whence it follows, that the *characteriſtic* of the *verb*, *that which conſtitutes it what it is*, and cannot be expreſſed by other words, muſt be that which is ſignified by the word IS; and to us that appears to be neither more nor leſs than *aſſertion*.

57 The difficulty of aſcertaining the nature of the verb.

58 The characteriſtic of the verb.

ASSERTION therefore, or PREDICATION, is certainly the very ESSENCE of the *verb*, as being that part of its office, and *that part only*, which cannot be diſcharged by other kinds of words. Every other circumſtance which the verb includes, ſuch as *attribute*, *mode*, *time*, &c. it may be poſſible to expreſs by *adjectives*, *participles*, and *adverbs;* but without a *verb* it is impoſſible to *predicate*, to affirm or deny, any one thing of any other thing. The office of the VERB, then, when ſtript of all *accidental* circumſtances, ſeems to be merely this, "To join together the ſubject and predicate of a propoſition:" its powers are analogous to thoſe of the ſign + in *Algebra*, which does not affect the ſeparate *value* of the quantities between which it is placed, but only indicates their *union* or *coaleſcence*. To explain by an example: When we ſay, *Cicero eloquens*, *Cicero wiſe;* theſe are imperfect ſentences, though they denote a ſubſtance and an attribute. The reaſon is, that they want an *aſſertion*, to ſhow that ſuch an attribute appertains to ſuch a ſubſtance. But when we inſert the word *was*,

we

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we join the substance and attribute together; we give notice that the *wisdom* and *eloquence* are applied to *Cicero*, and we do nothing more: we neither increase the wisdom nor diminish it, we neither make it real nor imaginary; for it was supposed in all its extent when the words *Cicero* and *wise* stood independent of each other. We may indeed use the *verb* in a form which implies not an *assertion only*, but likewise an *attribute;* as when we say *George writeth*, or *George walketh:* But as *whiteness* or any other particular colour is not of the *essence* of a *horse*, an animal which is found of *all* colours; so in the phrases quoted, the *attribute*, though implied, is not of the *essence* of the verb; for it may be equally well expressed by other words: *George* IS *writing*, and *George* IS *walking*, are phrases of the very same import with *George writeth* and *George walketh*.

59. In resolving every verb, whether active, passive, or neuter, into the substantive-verb IS and another attributive, we have the honour to agree with all the grammarians; but to the word IS itself the learned author of *Hermes* has given a meaning which, as a verb, it does not admit. He observes, that before any thing can be the subject of a proposition, it must *exist*: that all existence is either *absolute* or *qualified*, *mutable* or *immutable:* that the verb IS can by itself express *absolute existence*, but never the *qualified*, without subjoining the particular form; and that it signifies both *mutable* and *immutable* existence, having in these cases different meanings; although the sentences which he gives as examples are evidently constructed in the same manner and consist of the same parts of speech. His examples are: of *absolute* existence, B IS; of *qualified*, B IS *an animal;* of *mutable*, *This orange* IS *ripe;* of *immutable*, *The diagonal of the square* IS *incommensurable with its sides*. But if *predication* be the essence of verb, all this is nothing to the purpose, and part of it is not true. It is not true that the verb IS ever varies its signification; for it hath as *verb* no connection with existence of any kind. All such circumstances are superadded to its verbal nature; or, to speak more accurately, we infer such circumstances from our previous knowledge of the objects concerning which the predication is made. When we say, "*this* orange IS ripe," we do indeed mean, as Mr Harris observes, that it *is so now at this present* in opposition to *past* and *future* time: but it is not the verb IS, but the definitive THIS, which fixes the *time* of *maturity*, as well as the *place* of the orange; for had we said, *oranges* ARE *ripe*, we might have been properly asked, *When* and *where* are they ripe? although the same verb is used in both sentences. Even in the sentence "B IS," *absolute* existence (the most simple of all) is *inferred*, and not *expressed*, by the *verb;* and the inference is made from this obvious principle, "That when one utters a mark of *predication*, we naturally conclude that he means to predicate *something* of the subject." If he adds no *specific* predication, as B IS ROUND, we apply to B the most general that we can; and what other species is so general as *existence?*

That the idea of existence, considered as *mutable* or *immutable*, is not contained in the verb IS itself, but is derived from our knowledge of the objects concerning which the predication is made, appears manifestly from this: That if a person be supposed ignorant of the meaning of the words GOD and MAN, whilst he knows that of IS; the uttering of the two propositions *God is happy*, and *this man is happy*, will give him no notice of existence considered as *mutable* or *immutable*, *temporary* or *eternal* (o). His conclusion with respect to these modes of existence, if any such conclusion be drawn at all, must be derived entirely from his previous knowledge of the nature of *God* and the nature of *man*.

Some of our readers may possibly think this notion of *verb* too abstract and metaphysical; yet what other circumstance than *mere predication* is essential to that species of words? We say *essential;* for we are here inquiring, not what is expressed by each *individual verb*, but what it is which is equally expressed by *all verbs*, and which distinguishes them from the *other parts of speech*. And if it be true, that every thing which the verb implies, *predication alone excepted*, may be expressed by other parts of speech, and that *no other parts of speech* can *predicate;* then we think ourselves warranted to affirm, that *simple predication* is the *essential characteristic* of VERB, that *every word* which predicates is a VERB, and that *nothing* is so which does *not predicate*.

59 An objection to our theory,

It must not, however, be concealed, that a doctrine very different from this has been lately maintained by a writer of distinguished abilities. "We have *energy* expressed," says Dr Gregory (p), "and of course a verb constituted *without affirmation*, when we wish or command; without *command*, when we affirm or wish; without *wish*, when we command or affirm: yet in all these cases we have equally and indisputably a verb."

That in all these cases we have a *verb*, is indeed indisputable; but we hold it to be equally indisputable, that in all these cases we have *affirmation*. The ingenious author has given no direct example of a *wish* or *command uttered without affirmation;* and a feeling or sentiment which is *not uttered* has nothing to do with language: but he has given a sentence in which there are three verbs, that in his opinion denote *no affirmation*, but a very plain *supposition*. If a *supposition* can be expressed without affirmation, we shall very readily allow that a *wish* or *command* may be so expressed likewise. The Doctor's supposition is thus expressed: "*Had* any punishment ever overtaken you for your broken vows; *were* but one of your teeth growing black, or even *were* but one of your nails growing less beautiful, I should believe you." It is almost superfluous to observe, that to every *verb* not in the infinitive mode there must be a *nominative*, and to every *active* verb an *object*, whatever be the arrangement of the sentence in which such verbs are found. These

are

(o) The truth of this observation may be proved by experiment, by uttering to a man of good common sense these two propositions, taking care to express the words *God* and *man* in a language which he does not understand. Thus, *Deus* is *happy*, and *hic homo* is *happy*, uttered to a man *totally* unacquainted with the Latin tongue, will convey no notice of existence considered as *mutable* or *immutable*, &c.

(p) *Theory of the Moods of Verbs*, published in Vol. II. of the *Transactions of the Royal Society of Edinburgh*.

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are truths known to every ſchoolboy; the reaſons of them ſhall be given afterwards. It is likewiſe undeniable, that in the ſentence before us, the nominative to *had* is *any puniſhment;* to the firſt *were*, *one of your teeth;* and to the ſecond, *one of your nails*. But the ſentence arranged in grammatical order, with the ſeveral nominatives before their reſpective verbs, is evidently *elliptical;* and the conjunction *if* muſt be ſupplied as well to complete the conſtruction as to make ſenſe of the paſſage. *If* any puniſhment had ever overtaken you; *if* but one of your teeth were growing black, or even *if* but one of your nails were growing leſs beautiful, I ſhould believe you." Now it has lately been proved, by ſuch evidence as leaves no room for doubt, that *if*, though called a *conjunction*, is in fact a *verb* in the imperative mode, of the ſame import with *give;* ſo that we may ſubſtitute the one for the other without in the ſmalleſt degree altering the ſenſe. The ſentence will then run thus: "*Give* any puniſhment had ever overtaken you; *give* but one of your teeth were growing black, &c. I ſhould believe you." It is therefore ſo far from being true, that *had* and *were*, when the ſentence is completed, expreſs *no* affirmation; that it is only upon *granting* the *truth* of the *affirmation* which *they denote*, that the ſpeaker ſays, "I ſhould believe you." "Any puniſhment had ever overtaken you," is plainly an affirmation; *if*, *give* that affirmation, *admit its truth*, "I ſhould believe you." But it cannot be ſuppoſed that *had* and *were* change their ſignifications by a mere change of place, or that by being removed from the *middle* to the *beginning* of a clauſe, they *loſe* their *original import*, and come to denote ſomething *entirely different*. Were this the caſe, every attempt to aſcertain and fix the general principles of grammar would be as ridiculous as an attempt to arreſt the courſe of time. For what purpoſe then, it may be aſked, if the verb *always* denotes *affirmation*, is it removed from the middle to the beginning of the clauſe, when *ſuppoſition* is implied as in the preſent inſtance? We anſwer, that ſuppoſition is neither more nor leſs than *conditional affirmation;* that when *ſuch* affirmation is *completely* expreſſed, the verb is *not* removed to the beginning of the clauſe; and that ſuch removal takes place *only* when the clauſe is *elliptical*, being merely an artificial contrivance in language, to ſhow the reader or hearer that ſome ſuch word, as *if*, demanding the truth of the affirmation, is *omitted* for the ſake of diſpatch. This is evident; for when the word requiring the affirmation to be granted is *ſupplied*, the verb muſt be reſtored to its place in the middle of the clauſe. Such abbreviations, and ſuch contrivances to mark them, are frequent in all languages, as will be ſeen more clearly when we come to treat of modes.

60 anſwered.

Upon the whole, notwithſtanding the deference which we willingly pay to this very maſterly writer, we are compelled reluctantly to differ from him, and ſtill to think that *ſimple predication* is the *eſſence of the* VERB. Verbs.

Should we be required to exemplify our theory by language, and to produce inſtances of this ſimplified verb in practice, we might anſwer, that the not being able to produce ſuch inſtances would be no good argument againſt the truth of our principles. It is the nature of language to expreſs many circumſtances by the ſame word, all of which however are not *eſſential* to diſtinguiſh the *ſpecies* to which that word belongs from the *other ſpecies* of words; and it is the nature of man to *infer* from diſcourſe many things which are not *actually expreſſed*. Perhaps, however, ſomething nearly approaching to an exemplification of our idea of a *ſimple verb* will be found in the following propoſition: "The three angles of every plane triangle *are* equal to two right angles." What other office the verb *are* here performs than ſimply to join the *ſubject* and *predicate*, it is difficult to perceive. It does not give notice of *time;* or ſuch notice, if given, is an imperfection; for the truth of the propoſition is independent on time. Neither ought it to imply *exiſtence;* for the propoſition would be true, were there neither a triangle nor a right angle in nature.

61 The theory itſelf exemplified.

This idea of *verb*, when it is well conſidered, we hope will be found juſt; but ſhould any of our readers ſuſpect it of novelty, and on that account be diſpoſed to condemn it, we have only to requeſt that he will reſtrain his cenſure till he has examined the writings of others, and nicely obſerved the ſeveral poſtures of his own mind in diſcourſe; for meditation may perhaps ſhow him that our theory is not falſe, and inquiry will ſatisfy him that it is not novel (Q).

62 The greater part of verbs denote an attribute combined with an aſſertion.

60. But although it is certain that *aſſertion*, and aſſertion *only*, is *eſſential* to the *verb*, yet the greater part of that ſpecies of words which grammarians call *verbs* are uſed to denote an *attribute* as well as an *aſſertion;* or, in the language of *logic*, they expreſs both the *copula* and the *predicate* of a propoſition: thus, *he liveth*, *he writeth*, *he walketh*, are phraſes equivalent in all reſpects to—*he is living*, *he is writing*, *he is walking*. Now, of attributes *ſome* have their eſſence in *motion*, as *walking;* *ſome* in the *privation of motion*, as *reſting;* and *others* have *nothing to do with either motion or its privation*, as *white* and *black*. But *all motion* and all *privation of motion* imply *time* as their *concomitant;* and a *ſubſtance* may have an *attribute* to-*day* which it had *not yeſterday*, and will not have to-*morrow*. This is ſelf-evident; for a man may be at reſt to-*day* who *yeſterday* was *walking*, and to-*morrow* will be on *horſeback;* and a ſheet of paper may have been *white* yeſterday, which to-day is *black*,

(Q) "Beſides words, which are names of ideas in the mind, there are a great many others that are made uſe of, to ſignify the *connection* that the mind gives to ideas or propoſitions one with another. The mind in communicating its thoughts to others, does not only need *ſigns* of the *ideas* it has then before it, but *others* alſo to ſhow or intimate ſome particular *action* of its *own* at that time *relating* to thoſe ideas. This it does ſeveral ways; as IS and IS NOT are the general *marks* of the mind *affirming* or *denying*." *Locke on Human Underſtanding.*

"Verbum eſt pars orationis variabilis, aliquid de re aliqua dici ſeu affirmari ſignificans. Vulgaris verbi definitio eſt, quod, ſit pars orationis, quæ agere, pati, aut eſſe ſignificat. Sed noſtra accuratior, magiſque ex ipſa verbi cujuſvis natura petita videtur. Cæterum το *affirmari* laxiore hic ſenſu accipimus, pro eo quod prædicari Dialectici appellent, quo non modo affirmationes ſtrictius ſic dictæ, ſed negationes etiam interrogationeſque includuntur." *Ruddimanni Grammaticæ Inſtitutiones.* See alſo *Dr Beattie's Theory of Language.*

black, and at ſome future time will be of a different colour. As, therefore, all *motions* and their *privation* imply *time:* and as a *propoſition* may be *true*, at *one time*, which is *not* true at *another;* all VERBS, as well thoſe which denote both an *attribute* and an *aſſertion*, as thoſe which denote an *aſſertion* only, come to denote TIME alſo: Hence the origin and uſe of *tenſes*, which are ſo many different forms aſſigned to each verb, to ſhow, without altering its *principal* ſignification, the various TIMES in which the *aſſertion* expreſſed by it may be true. Whether theſe various forms of the verb be *eſſential* to *language*, it is vain to diſpute. They have place in every language with which we are acquainted; and as the uſe of the verb is to affirm one thing of another, it is abſolutely neceſſary that the *time*, when ſuch or ſuch an affirmation is *true*, be marked by *tenſes*, or ſome *other* contrivance. Concerning tenſes, therefore, we ſhall throw together ſome obſervations equally applicable to every language, after premiſing a general remark or two which ſeem neceſſary in order to proceed with preciſion.

63 All verbs denote time: hence the origin of tenſes.

61. Time, although its eſſence conſiſts in ſucceſſion continued and unbroken, may yet be conſidered by the mind as divided into an infinite number of parts. There is, however, one grand diviſion which neceſſarily occurs, and to which the different *tenſes* of *verbs* are in all languages adapted.—Computing from ſome portion conceived to be *preſent*, *all time* is either *paſt* or to *come*. Hence the *tenſes* of verbs are threefold; ſome denoting *time preſent*, ſome *time paſt*, and others *time future*.

64 All time paſt, preſent, or future; hence the tenſes of verbs are threefold.

Again, from the very *nature* of time, it muſt be obvious, that *all its parts* are *relative;* i. e. that no portion of it can be aſcertained by any thing *inherent in itſelf*, but only by referring it to ſome *other* portion, with reſpect to which it is *paſt*, *preſent*, or *to come*. In this reſpect *time* is perfectly analogous to *ſpace:* for as the *ſpace* in which any object exiſts, cannot be deſcribed but by ſtating its relation to ſome *other ſpace;* ſo neither can the *time* of any attribute or action be determined, but by ſtating its relation to ſome *other time*. When, therefore, we would mark the *time* of any action or event, we muſt previouſly fix upon *ſome point* to which we may refer it. If this point be known, the time referred to it will be known alſo; but if the *former* be not known, neither will the *latter*.

Laſtly, in contemplating an *action*, we may have occaſion to conſider it as *going on*, or as *finiſhed*. This diſtinction is likewiſe denoted by the different *tenſes* of verbs. In treating, therefore, of the tenſes, there are two things to which attention ought principally to be turned;—the *relation* which the ſeveral tenſes have to one another in reſpect of *time;* and the *notice* which they give of an action's being *completed* or *not completed*.

62. Having premiſed theſe remarks, we proceed now to the *tenſes* themſelves; of which Mr HARRIS has enumerated no fewer than *twelve*. Of this enumeration we can by no means approve; for, without entering into a minute examination of it, nothing can be more obvious, than that his INCEPTIVE PRESENT—*I am going to write*—is a FUTURE TENSE; and his COMPLETIVE PRESENT—*I have written*—a PAST *tenſe*. But, as was before obſerved of the *claſſification of words*, we cannot help being of opinion, that, to take the *tenſes* as they are commonly received, and endeavour to aſcertain their *nature* and their *differences*, is a much more uſeful exerciſe, as well as more proper for a work of

65 Different grammarians have enumerated different numbers of tenſes.

this kind, than to raiſe, as might eaſily be done, new and hypothetical theories on the ſubject.

It has been already obſerved, that *all the tenſes* muſt neceſſarily mark *relative time*. In one ſenſe, this is extremely obvious. The *preſent* tenſe is uſed in contradiſtinction to both the *paſt* and *future*, and marks an attribute or action as exiſting in neither. The *paſt* and the *future* are in like manner uſed in contradiſtinction to the preſent; and mark an attribute or action which exiſts *not now*, but which in the one caſe *has exiſted formerly*, in the other *will exiſt* at ſome *time coming*. But beſides this relation of *contradiſtinction* ſubſiſting among the tenſes, there is another of *co-exiſtence*, as we may call it, to which it is of great conſequence to attend —eſpecially in examining the nature of the *preſent*.

66 Of the preſent tenſe.

63. The PRESENT TENSE refers not only to ſomething which is *paſt* or *future*, but alſo to ſomething with which the attribute or action of the verb is *contemporary*. This reference is neceſſarily implied in its very *name;* for we cannot ſay of any thing that it is *preſent*, without implying at the ſame time that there is ſomething elſe *with which* it is preſent. Hence it appears with how little reaſon Mr *Harris* and others have given us an *aoriſt* of the *preſent*, as marking preſent time *indefinitely* in contradiſtinction to OTHER *preſents*, which have been called *inceptive*, *extended*, and *completive preſents*. For from what has been ſaid it follows, that the preſent tenſe is *neceſſarily* and from its very nature perfectly *indefinite*, and can of itſelf give notice of no *preciſe* or *determinate portion* or *point* of time whatever. A thing may have been *preſent fifty years ago*, may be preſent *now*, or at any *future period*. This tenſe implies the relation of *co-exiſtence* between two or more things; but, without ſome auxiliary circumſtance, it cannot in any language mark the *particular portion of time* in which thoſe things *exiſt*. The *indefinite nature* of this tenſe is indeed moſt clearly ſeen in that uſe of it in which Mr *Harris* has ſtyled it the *aoriſt* of the preſent; that is, in caſes where it is employed to denote *the repetition of an action which the agent is accuſtomed frequently to perform*, or to expreſs *propoſitions of which the truth is evinced by general experience;* as in the following examples:

"Hypocriſy——the only evil that *walks*
"Inviſible, except to God alone."
"*Ad pœnitendum* properat *qui cito judicat*," &c.

In theſe inſtances it is plain there is no *particular* time pointed out: the propoſitions are *true*, or *apprehended* as true, *at all times*. Although the actions, therefore, of *walking* and *haſtening* are expreſſed as *preſent*, it is impoſſible from the *expreſſions* to determine any preciſe *point of time when* they are preſent.

But if the *preſent tenſe* be thus indefinite, how, it may be aſked, are we to aſcertain the *particular time* which is intended? We anſwer, it is to be aſcertained, either *by ſtating the action of the verb as exiſting in ſome time already known*, or *by inference*. If, for example, we ſay,—"Millions of ſpiritual creatures *walk* the earth unſeen,"—the propoſition is *general*, and the *time* of *walking undetermined*. But if we add—"both *when* we *wake* and *when* we *ſleep*,"—the *time* is by this addition aſcertained and ſpecified; for if the *time* when men *wake* and *ſleep* be known, the *time* when theſe ſpirits *walk* the earth is known alſo.—When no ſpecifying clauſe is given by which to determine the *time* of the preſent tenſe, it is very commonly determined by *inference*.

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ference. Thus, if one uſe ſuch an expreſſion as—" He *ſleeps* while I am *ſpeaking to him*,"—the time of his *ſleeping* is aſcertained by the ſubſequent clauſe of the ſentence; but if it be ſaid ſimply—" he ſleeps"—without aſſigning any *data* from which it may be concluded *when* his ſleeping is *preſent*, we very naturally infer that it is at the *inſtant* we *receive* the *information* of his ſleeping. Such inferences as this are common in language. The mind is deſirous to obtain *complete* information on every ſubject; and therefore frequently *ſupplies to itſelf* what is *not expreſſed* in the ſpeech of others.

Both theſe ways of aſcertaining the *preciſe time* of the *preſent* tenſe, are excellently illuſtrated by the uſe of the word *preſent* as applied to *ſpace*. Take a familiar example:—" His brother and he were *preſent* when I read the letter." It is at firſt ſight evident that this expreſſion is perfectly *indefinite*. But if it be ſaid—" His brother and he were *preſent at your houſe* when I read the letter,"—the place of action is then *determined* by being referred to a *portion* of *ſpace* which is *known*. If no ſuch reference be made, the perſon who hears the ſpeech uttered muſt either remain ignorant of the *place* intended, or he muſt aſcertain it to himſelf by *inference*; and he will probably *infer* it to be *that* in which the ſpeaker *is* at the *time* of his uttering the indefinite ſentence. This leads us to obſerve, that ſuch inferences are not often made without ſufficient foundation. Various circumſtances may aſſiſt the reader or hearer in making them, and prevent all danger of miſtake. He may have the evidence of ſenſe, or of ſomething preceding in the diſcourſe, and a number of other particulars, to juſtify and warrant his concluſion. Thus, if when ſitting by a large fire, one pronounce the words —" I am too warm;" thoſe to whom he addreſſes his ſpeech are authoriſed to conclude, that he is too warm at the *time* of *ſpeaking*, unleſs he expreſsly prevent the drawing of that concluſion by adding ſome ſuch clauſe as—" When I wear a great coat."

It is ſtrictly demonſtrable, and hath by Mr Harris been in fact demonſtrated, that there is no ſuch thing as *preſent time*. Yet do we not only conceive time as *preſent* and *exiſting*, but frequently as *extended* to a very great degree. We ſpeak not only of the *preſent inſtant*, or the *preſent day*, but alſo of the *preſent year*, and even of the *preſent century*. This manner of conceiving time is indeed looſe and unphiloſophical; but it is ſufficient for the ordinary purpoſes of language. To expreſs time as it really is, we ought to ſay, the *paſſing day*, the *paſſing year*, and the *paſſing century*; but in common diſcourſe we denominate any portion of time *preſent*, in which the preſent *now* or *inſtant* is included, although it is obvious that *part* of that portion is *paſt*, and the *remainder* of it *future*. From the very nature of time thus conceived to be *preſent*, the tenſe now under conſideration muſt repreſent the action of the verb as commenced, and not *finiſhed*: for as time is in continued ſucceſſion, and accompanies every action; when any action is *not commenced*, it exiſts not in *any time*, though it *may* exiſt hereafter in time which is *now future*; and when it is *finiſhed*, it exiſts no longer in *time preſent*, but in *time paſt*. Hence the abſurdity of introducing into a theory of the *tenſes* an *inceptive preſent* and a *completive preſent*; for theſe terms imply each a direct contradiction.

64. After having ſaid ſo much of the *preſent tenſe*, we ſhall have but little to ſay of the PRÆTER-IMPERFECT. It ſtates an action in reſpect of *time* as *paſt*; and in reſpect of *progreſs*, as *unfiniſhed*. *Legebam*—I was reading *at ſome paſt time*, but my reading was then *incomplete*; I had not finiſhed the *book* or the *letter*. We muſt here obſerve, however, as we did with reſpect to the *preſent tenſe*, that although the *præter-imperfect* repreſents the action as *paſt*, it does not inform us in what *preciſe portion* of *paſt time* the unfiniſhed action was *going on*: this circumſtance muſt either be given in *ſeparate words*, or be *inferred* by the hearer. If one ſay ſimply—*Legebam*, the perſon to whom he addreſſes his ſpeech will conclude, that the *time* of his *reading* is *paſt* with reſpect to the *preſent time* of his *ſpeaking*. But if he ſay,—*Legebam antequam veniſti*, he expreſsly ſtates the action of *reading* as *paſt* with reſpect to the *time* in which his *hearer came* to the *place* where *they both are at the time of ſpeaking*. The *time* of the *præter-imperfect* is always *paſt* with reſpect to the *preſent inſtant* when the *imperfect is uſed*, and of this the *tenſe itſelf* gives notice; but it may alſo be paſt with reſpect to ſome *other time*, and of this it conveys no information.

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67 The præter-imperfect.

If we join two *præter-imperfects* together, the expreſſion will ſtate the co-exiſtence of two progreſſive actions, both of which were going on at a time *paſt* in reſpect of ſome *determinate time given or ſuppoſed*. " Cum tu ſcribebas ego legebam;" " when you were writing I was reading." Hence the præter-imperfect has by ſome grammarians been called *the relative preſent*; a name which, however, is by no means *excluſively* applicable to this tenſe. When the *præter-imperfect* is by the conjunction *and* joined in the ſame ſentence with a *pluſquam-perfect*, the two tenſes expreſs two actions, *both prior* to the time of *ſpeaking*; but the *one* as having *continued* after the *other* was *finiſhed*. Thus, *Eneas* ſpeaking of the deſtruction of Troy, ſays, that after having eſcaped with his father and followers, he returned to the city in queſt of his wife, and went directly to his own houſe; but there, continues he, " *irruerant* Danai, et tectum omne *tenebant*:"—" the Greeks *had ruſhed in*," that action *was over* and completed *before his arrival*; but the act of " poſſeſſing the whole houſe," *tenebant*, was *not over*, but *ſtill continuing*.

68 The aoriſt and præter-perfect.

65. But it is neceſſary that the *verb* denote actions which were *complete* or *perfect* in *paſt time*, as well as thoſe which were *incomplete* or *imperfect*. For this purpoſe, *Greek* and *Engliſh verbs* have an *aoriſt*, a *præter-perfect*, and a *pluſquam-perfect*. Of theſe the Latin has only the two laſt. The *præter-perfect* in that *language* ſuſtains a twofold character: it performs the office of the *Greek* and *Engliſh aoriſt*, as well as of the *præter-perfect* properly ſo called; that is, it denotes a finiſhed action at ſome *indefinite paſt time*, as well as at ſome time which is both *paſt* and *definite*.

In attempting to analyſe the ſignification of *complex terms*, by which we here mean words that include in their ſignification a *variety of particulars*, it is of great advantage to have theſe particulars *ſeparately* expreſſed by *different words* in another language. Now the Engliſh has reſolved the *tenſes*, which in the Greek and Latin languages are denominated the *aoriſt* and the *præter-perfect*, by means of what are commonly called *auxiliary verbs*, expreſſing the *former* by the verb *did*, and the *latter* by the verb *have*. In examining therefore

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fore the *aoriſt* and *præter perfect*, it will be of uſe to inquire into the import of *theſe verbs*.

Did is evidently the *aoriſt* of the verb *to do*; a verb of the moſt general ſignification, as it denotes *action* of *every kind*. It expreſſes the *finiſhed performance* of *ſome action*, the completion of which muſt of courſe have taken place in ſome portion of *paſt time*. "*I* DID *write*, or *I wrote* (theſe expreſſions being equivalent) yeſterday, a month, a year ago," &c. But the import of *did* being ſo very general, it can convey no *determinate* meaning without being limited by the addition of ſome *particular action*; and this *addition*, however expreſſed, is to be conſidered in the ſame light as an *accuſative caſe*, governed by the active verb *did*; for it produces exactly the ſame *effect*. Ἐγραψα, *ſcripſi*, I *did* WRITE; that is, "at *ſome paſt* time I performed the *action* of *writing*, and *finiſhed it*."

The verb *have*, which is included in the *præter-perfect*, is plainly a verb of the *preſent tenſe* denoting *poſſeſſion*. But a man may poſſeſs *one* thing as well as *another*; and therefore *have* requires *limitation*, for the very ſame reaſon that *did* requires it, namely, becauſe its ſignification is *perfectly general*. Now this *limitation*, whatever it is, muſt be conceived as the *thing poſſeſſed*; and in inſtances where *have* is limited by a *noun*, this is obvious, and univerſally acknowledged: "I *have* a gold watch," is, "I *poſſeſs* a gold watch." But to annex the ſame meaning to the word *have*, when uſed as an *auxiliary* verb, is an idea we believe not common, and which may perhaps be thought whimſical; yet what other meaning *can* be affixed to it? To ſuppoſe that words have not each a *radical* and *determinate* ſignification, is to ſuppoſe language a ſubject incapable of philoſophical inveſtigation; and to ſuppoſe, with Mr *Harris*, that there are words entirely *devoid* of ſignification, is at once to render all inquiries after the principles of grammar nugatory and ridiculous. We conceive, then, that each of the phraſes, γεγραφα επιστολην, *ſcripſi epiſtolam*, *I* HAVE *written a letter*, is equivalent to the phraſe, "I *poſſeſs* at preſent the *finiſhed action* of writing a letter." Such an expreſſion may ſound *harſh* to the *ear*, becauſe it is *not in uſe*: but we often employ expreſſions, to the *preciſe* and *proper* meaning of which we do not attend; and if the above be attentively conſidered, however awkward it may at firſt appear, nothing will be found in it either improper or abſurd.

The *aoriſt*, then, we conceive to ſtate an action as *performed* and *finiſhed* in ſome *paſt portion of time*; whilſt the *præter-perfect* repreſents the *paſt performance* and *completion* of that action as *now* poſſeſſed. And here we may hazard a conjecture why *have*, when uſed as an auxiliary verb, is always joined with a *paſt* participle; whereas *did* is joined to a word expreſſing the *ſimple action* of the verb, or, as it is called, *preſent infinitive*. Of the expreſſion, "I *have* WRITTEN a letter," as *one* part, viz. the verb *have*, denotes *preſent time*; the the other part, viz. WRITTEN, muſt denote *paſt* time, to give notice that the action is *performed* and *finiſhed*. *Did*, on the other hand, implying *paſt* time, has no occaſion for the *paſt part* of another verb to give notice of this circumſtance; for "I *did* WRITE a letter," is equivalent to, "at ſome paſt time I *performed* and finiſhed the *ſimple action of writing* a letter."

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69 The principal diſtinction between theſe tenſes.

The principal diſtinction in practice between the *aoriſt* and *præter-perfect* (for the difference ſeems little in their real import) conſiſts in the *time* by which the performance of the action admits of being *particularly* ſpecified. The *præter-perfect* is always joined with a portion of time which includes the *preſent now* or *inſtant*; for otherwiſe it could not ſignify, as it always does, the *preſent poſſeſſion* of the *finiſhing* of an action. But the *aoriſt*, which ſignifies *no ſuch poſſeſſion*, is as conſtantly joined with a portion of *paſt* time which excludes the preſent *now* or *inſtant*. Thus we ſay, "I *have written* a letter *this* day, *this* week," &c; but, "I *wrote* a letter *yeſterday*, laſt week," &c.; and to *interchange* theſe expreſſions of time in *Greek* and *Engliſh*, where the *aoriſt* and *præter-perfect* have different forms, would be improper. In *Latin*, indeed, where they have but one form, the impropriety does not appear.

70 The pluſquam-perfect.

66. Beſides the tenſes already examined, which are expreſſive of *paſt time*, in moſt languages the verb has another tenſe called the *pluſquam-perfect*, in which, however, no difficulty occurs to detain our attention. What the *preter-imperfect* is to the *preſent tenſe*, that the *pluſquam-perfect* is to the *præter-perfect*. The verb *had*, by which it is reſolved in Engliſh, being evidently the paſt time of *have*, ſufficiently explains its meaning and relation to the other tenſes: "I *had* written a letter," is equivalent to the phraſe, "I *poſſeſſed* at ſome *paſt time*, the finiſhed action of writing a letter."

It is juſtly obſerved by *Dr Beattie*, that the imperfect and pluſquam-perfect are very uſeful, and may be the ſources of much elegant expreſſion; and that if one were not taught to diſtinguiſh, in reſpect of meaning as well as of form, theſe tenſes from each other, and the præterite from both, one could not pretend to underſtand, far leſs to tranſlate, any good claſſic author.

71 Future tenſes.

67. Having conſidered the tenſes which imply *preſent* and *paſt* time, it now remains that we examine the import of thoſe which are expreſſive of time *future*. In Latin and Engliſh there are *two tenſes* for this purpoſe; of which the *firſt* repreſents an action in point of *time* as *not yet exiſting*, but as about to exiſt at ſome period *to come*; but it does not bring the *completion* of the action into view. The *other* aſſerts the *futurity* of an action together with its *completion*. *Scribam*, "I ſhall be writing," denotes *future* time and *complete action*; for it does not ſay whether I am to write for a long or for a ſhort time, or whether I ſhall *finiſh* what I promiſed to *begin*. This part of the verb, therefore, to which the Greek γραψω correſponds, is an *imperfect future*, and likewiſe an *aoriſt*. The futurity of any action, it ſhould ſeem, *may* always be computed from the time of ſpeaking; for every action muſt be *future* with reſpect to the *time* at which its futurity is *declared*; but the *time* of its futurity may be more preciſely ſpecified by fixing on ſome *other* future time to which to refer it: "I ſhall be writing after he ſhall have departed." *Shall* or *will* refers to future *time indefinitely*; and *write* or *writing* refers to an action which is indeed to *begin* and ſo far to proceed, but of which nothing is ſaid concerning the completion.

On the other hand, *ſcripſero*, "I ſhall have written," is a *perfect future* denoting complete action; for *ſhall* denotes *future time*; *written*, *finiſhed action*; and *have*, *preſent poſſeſſion*. So that the meaning of the whole aſſertion

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is, that "at some future period of time I shall possess the finished action of writing. The *completion* of the action, together with the *possession* of it, is always *future* with respect to the time of *assertion;* but, with respect to some *other* time expressed or understood, the *completion* of the action is to be *past: Promittis te scripturum si rogavero*, "you promise to write if I shall have asked you." In this sentence the action of *asking* is *future* with relation to the time of *promising*, but it is *past* with relation to that of *writing*. This tense the *Latin grammarians* call the future of the *subjunctive mode;* but very improperly. The notice which it communicates, respects not the *power* or *liberty* of acting, which, as will be seen by and bye, is the characteristic of *that mode;* but the *action* itself. It ought therefore to be ranked among the tenses of the *indicative mode;* for *scripsero* is, in every sense, as really *indicative* as *scribam* or *scripturus ero*.

72 Of the tenses of the subjunctive mode.

68. These are all the tenses, essentially different from each other, which have place in the *indicative mode* of any language with which we are acquainted (R); but as there are tenses in the *mode* called *Subjunctive*, which bear the *same names* with those already examined, and which have yet a *different import*, it will be necessary to consider them before we dismiss the subject of *tenses*.

Of *modes* in general something must be said hereafter; at present we shall only observe, that the *mode* with which we are now concerned, is not very properly distinguished by the *name* assigned to it by the *Latin grammarians*. They call it the *subjunctive*, because it is often subjoined to another verb, and forms the secondary clause of a sentence: but the mode called *indicative* frequently appears in the same circumstances. The difference between these two modes appears to us to consist in this, that the *indicative* asserts something *directly* concerning the *action;* the *subjunctive*, something concerning the *power* or *liberty* of the *agent* to perform it: for that the *latter asserts* as well as the *former*, admits not of dispute.

73 The present.

69. The *present tense* of the *subjunctive mode*, in the learned languages, answers to the English auxiliaries *may* and *can*. Let us consider these a little.—*May* is evidently a verb of the *present* tense denoting *liberty*. When I assert that I MAY *write*, I give notice that "I am under no *compulsion* to *abstain* from writing;" that there is no impediment *from without* by which I am *restrained* from writing. *Can* is also a verb of the present tense, expressive of *internal power* or *skill*. "I *can* write" is equvalent to —"There is nothing *in myself* which *incapacitates* me for performing the operation of writing." This verb seems originally to have denoted *knowledge* or *skill*, and to have been afterwards extended to signify *power* or *ability* of *any kind*. There is little doubt of its being the same with the old English verb *to con*, which signifies *to know*.—The difference between the import of these two verbs *may* and *can* will be best perceived in a familiar example. Suppose we say to one of our transcribers, "You *may* write a treatise on grammar, to which he returns for answer "I *cannot:*" our assertion evidently supposes him *at liberty* to write the treatise; his answer implies, that he is *unable* or *unskilled* to do it. We may conclude, then, that the *present tense* of this mode contains a declaration of *present liberty*, *ability*, or *skill;* and its other tenses will be found to have reference to the same capacities. Verbs.

The observation is here to be repeated which was enlarged upon under the *present* of the *indicative*. The *liberty* or *ability* signified by this tense is always represented as *present;* but the *time* of this presence is *indefinite*. If no *particular* time be *specified*, we generally refer it to the time of *speaking;* but *another* point may be given from which we are to compute. "When he shall have finished, you *may* then proceed as you propose." Here the *liberty* of *proceeding* is stated as present, not at the time of *speaking*, but at the time of his *finishing*, which is *future* to the time of speaking. But though the *liberty*, *ability*, or *skill*, denoted by this tense, be represented as *present*, the *action itself* is stated as *contingent;* for it is not *necessary* that a man should *perform* an action because he has the *capacity* to perform it.

From this idea of the *present of the subjunctive* some of its most peculiar uses seem capable of being explained. —And, in the first place, it appears to have a near affinity with the *future* of the *indicative;* insomuch that in many instances they may be used promiscuously. Without materially altering the effect of the expression, we may say, "Dico me facturum esse quæ *imperet*," or "quæ *imperabit*." The reason of this, perhaps, may be, that with respect to us, *futurity* and *contingency* are in most cases nearly the same, both being involved in equal obscurity; and therefore it is often of little consequence which mode of expression we employ.

Secondly, The *present of the subjunctive* is used to denote

(R) On this point we subscribe to the opinion of the elegant and ingenious *Dr Beattie*.—"It will perhaps occur (says he), that there are two *Greek tenses*, of which I have given no account; namely, the *second aorist*, and the *second future*. The truth is, that I consider them as unnecessary. Their place, for any thing I know to the contrary, might at all times be supplied by the *first aorist* and the *first future*. Some grammarians are of opinion, that the *first aorist* signifies *time past in general*, and the *second*, *indefinite* time *past*; and that the *first future* denotes a *nearer*, and the *second* a more *remote*, *futurity*. But this, I apprehend, is mere conjecture, unsupported by proof: and therefore I incline rather to the sentiments of those who teach, that the *second future* and the *second aorist* have no meaning different from the *first* future and the *first* aorist; and that they are the *present* and *imperfect* of some *obsolete theme* of the verb; and, when the other theme came into use, happened to be retained for the sake of variety perhaps, or by accident, with a *preterite* and *future* signification. Be this as it will, as these tenses are peculiar to the Greek, and have nothing corresponding to them in other tongues, we need not scruple to overlook them as superfluous."—*The Theory of Language*, Part II. Chap. ii.

To these judicious observations we have nothing to add, but that they acquire no small degree of confirmation from this circumstance, that there are many Greek verbs which have no second future, and which are yet employed to denote every possible modification of future time. Of the *paulo-post-futurum* of the Greeks we have taken,

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note the *right* of which a person is possessed. "*I may*, or I *can*, sell this book." This application, which *Dr Priestley* considers as the *primary* signification of the tense, is easily deduced, or rather follows immediately, from the foregoing account of its import. For if one be under *no restraint*, either external or internal, to prevent him from performing an action, he has surely a *right* to perform it.

Thirdly, The *present* of the *subjunctive* is often used to signify *command* or *request*; as when one says, "You *may give* my compliments to such a person." This use of the tense under consideration seems to have arisen from a desire to *soften* the *harshness* of a command, by avoiding the appearance of claiming superiority. When a man utters the above sentence, he certainly utters *no command*, but only *asserts* that the person to whom he speaks has *liberty* or *power* to do him a favour. This assertion, however, may contain no *new information*; and therefore the person *addressed*, reflecting upon the *intention* of the *speaker* in making it, infers that it indicates a *wish* or *desire* that "his compliments should be made to such a person."

74 The præter-imperfect.

70. Of the *subjunctive* as well as of the *indicative*, the *præter-imperfect* is evidently the *past time* of the *present*. As the latter asserts *liberty*, or *ability*, to perform some action, as existing *at present*, the former asserts the same liberty or ability to *have existed* in *time past*; but the *precise portion* of time past, in which these capacities existed, must be specified by other words, or it will remain *unknown*. Thus in the following sentence, "Dixi me facturum esse quæ *imperaret*," the time of *imperaret* is referred to that of *dixi*: the person having the *right* to command, is supposed to have had it at the *time* when the other *said* that he would *obey*. This tense, as well as the present, states the action as *going on* and *incomplete*; and also as *future* with respect to the *liberty* or *ability* to perform it. It is rendered into *English* by the verbs *could* or *might*; of which the *first* is the past time of *can*, the second of *may*.

From the near affinity which the *present* of the *subjunctive* has to the *future* of the *indicative*, the tense now under consideration appears, in many instances, as the past time of the *latter* as well as the *former*. Thus *Dixi me facturum quæ imperaret*, may be rendered "I said that I would do whatever he might, or whatever he *should*, command."

75 The præter-perfect.

71. Of the *præter-perfect*, it is sufficient to observe, that as the *present* states the agent as at *liberty* to be performing an *unfinished* action; so this tense states him as at liberty to perform the action considered as *finished*. "I *may be writing* a letter when you come, i. e. I *am at liberty to be writing* a letter when you come." I *may have written* a letter when you come," i. e. I *am at liberty to be in possession of the finished action* of writing a letter when you come."

It is a common mode of expression to say, "I may have done such or such a thing in my time," when he who speaks can have little doubt whether he has done the thing or not. In that case, the words *may have done*, cannot be considered as the *præter-perfect* of the *subjunctive* of the verb *do*; for it is nonsense to talk of *liberty*, with respect to the *performance* of an action, which, at the time of speaking, is supposed to be *past* and *completed*. What then is the import of the phrase? We are persuaded that it is elliptical, and that the word *say* or *affirm* is understood: "I may (say that I) have done such or such a thing in my time;" for liberty or contingency can relate to actions only as they are conceived to be *present* or *future*.

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76 The pluquam-perfect.

72. Of all the tenses, the most complex is the *pluquam-perfect* of this mode. It combines a *past* and a *future* time with a *finished* action. It may be considered as the *past time* both of the *perfect future* and of the *præter-perfect* of the *subjunctive*: for it represents an action, *future* and *contingent* at some *past time*, as *finished before* another *period specified*; which period therefore, though *past* at the *time of speaking*, was itself *future* with respect to the time when the futurity or contingency of the *action existed*. "Promisisti te scripturum fuisse si *rogassem*;" "You promised that you would write, if I should have asked you." Here the *futurity* of the action of *asking*, which is represented as *complete* and *finished*, is stated as *co-existing* with the *past promise*; but the *action itself* must be *posterior* to that promise: it is however supposed to be *past* with respect to the action of *writing*, which is also *posterior* to the promise.

77 Of number and person.

73. Before we dismiss the subject of tenses, it may not be improper just to mention *number* and *person*; for these have place in every tense of the verb in the *learned* languages, and in many tenses even of the *English* verb. They cannot, however, be deemed *essential* to the verb; for *affirmation* is the same, whether it be made by *you*, by *me*, or by a *third* person, or whether it be made by *one* man or by a *thousand*. The most that can be said is, that verbs in the more elegant languages are provided with a variety of terminations which respect the *number* and *person* of every *substantive*, that we may know with more precision, in a complex sentence, each particular substance with its attendant verbal attributes. The same may be said of *sex* with respect to *adjectives*. They have terminations which *vary* as they respect beings *male* or *female*, though it is past dispute that *substances alone* are susceptible of *sex*. We therefore pass over these matters, and all of like kind, as being rather among the *elegancies* of *particular languages*, and therefore to be learned from the *particular grammar* of each tongue, than among the *essentials* of language; which *essentials alone* are the subject of inquiry in a treatise on *universal* grammar.

78 Of modes.

74. Besides *tenses*, *number*, and *person*, in every tongue with which we are acquainted, *verbs* are subject to another variation, which grammarians have agreed to call *Modes*. Of *modes*, as of *tenses*, it has been warmly disputed whether or not they be essential to language. The truth seems to be, that the only part of the verb *absolutely necessary* for the purpose of communicating thought is the *indicative mode*; for all the others, as has been well observed by Dr Gregory, are resolvable, by means of additional verbs and a word denoting the action of the primary verb, into circuitous expressions

taken no notice, because it is found only in the *passive* voice; to which if it were necessary, it is obvious that it would be necessary in *all* voices, as a man may be about to *act* as well as to *suffer* immediately.

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which fully convey their meaning (s). But ſuch expreſſions continually repeated would make language very prolix and wholly inanimated; for which reaſon, the import of each of the commonly received modes is a ſubject worthy of the philologiſt's inveſtigation. About the *number* of modes, whether neceſſary or only expedient, as well as about the *import* of each, the writers on grammar have differed in opinion. Mr Harris, one of the moſt celebrated of thoſe writers, has enumerated *four modes* of the verb, beſides the *infinitive;* viz. The INDICATIVE or DECLARATIVE, *to aſſert what we think certain;* the POTENTIAL or SUBJUNCTIVE, *for the purpoſes of whatever we think contingent;* the INTERROGATIVE, *when we are doubtful, to procure us information;* and the REQUISITIVE, *to aſſiſt us in the gratification of our volitions.* The requiſitive too, according to him, appears under two diſtinct ſpecies; either as it is IMPERATIVE to inferiors, or PRECATIVE to ſuperiors.

79 Different opinions about the number of modes.

For eſtabliſhing ſuch a variety of modes as this, no ſort of foundation whatever appears. The ſame reaſoning which induced the author to give us an *interrogative* and *requiſitive* mode, might have made him give us a *hortative*, a *diſſuaſive*, a *volitive*, and innumerable other modes, with which no language is acquainted. But beſides perplexing his reader with uſeleſs diſtinctions, we cannot help thinking that Mr Harris has fallen into ſome miſtakes with regard to the *import* of thoſe modes which are univerſally acknowledged. According to him, *aſſertion* is the characteriſtic of the *indicative*, and that which diſtinguiſhes it from the *ſubjunctive* or *potential:* but this is certainly not true, for without an *aſſertion*, the verb cannot be uſed in *any mode.* Of this the learned author, indeed, ſeems to have been aware, when he obſerved of the *ſubjunctive mode*, that it is employed "when we do not *ſtrictly* aſſert," and that "it implies but a *dubious* and *conjectural* aſſertion." The truth is, that the *aſſertion* implied in this mode, though it is not concerning the *ſame thing*, is equally *poſitive* and *abſolute* with that conveyed by the *indicative.* An example quoted by himſelf ſhould have ſet him right as to this matter:

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Sed tacitus paſci ſi poſſet corvus, HABERET
Plus dapis, &c.

Who does not feel that the aſſertion contained in *haberet*, is as *abſolute* and *poſitive* as any aſſertion whatever?

75. Perhaps we may be aſked to define what we mean by a mode. We know not that we can define it to univerſal ſatisfaction. Thus much, however, ſeems to be obvious, that thoſe variations which are called *modes* do not imply DIFFERENT MODIFICATIONS *of the* ACTION *of the verb. Amo*, *Amem*, *Ama*, do not ſignify *modes* of LOVING; for *modes* of loving are, *loving* MUCH, *loving* LITTLE, *loving* LONG, &c.—Shall we then get over the difficulty by ſaying, with Mr Harris, that "modes exhibit ſome way or other the *ſoul* and its *affections?*" This is certainly true: but it is nothing to the purpoſe; for it does not diſtinguiſh the meaning of *mode* from the object of *language in general*, all languages being intended to exhibit the *ſoul* and its *affections.*

80 Mode defined.

Grammatical modes of verbs have been defined by Dr Gregory to be "conciſe modes of expreſſing ſome of thoſe combinations of thoughts which occur moſt frequently, and are moſt important and ſtriking." This is a juſt obſervation; but perhaps he would have given a more complete definition had he ſaid, that *grammatical modes of verbs are conciſe modes of expreſſing ſome of thoſe combinations of thoughts which occur moſt frequently, and of which* ASSERTION *is an eſſential part* (T). This indeed ſeems to be the real account of the matter, eſpecially if our notion of the nature of *verb* be well founded,

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(s) The *imperative*, for inſtance, may be reſolved into a *verb* of *commanding* in the firſt perſon of the preſent of the indicative, and a word denoting the *action* of the *primary verb*, commonly called the *infinitive mode* of that verb. Thus, *I nunc et verſus tecum meditare canoros*, and "*Jubeo te* nunc ire et tecum meditari," &c. are ſentences of the very ſame import. The *ſubjunctive* may be reſolved in the ſame manner by means of a verb denoting *power* or *capacity;* for *credam*, and *poſſum credere*, may be often uſed indifferently. The *indicative mode*, however, is *not thus* convertible with another verb of affirming in the *firſt perſon* of the *preſent* of the *indicative*, and a word denoting the action of the primary verb; for *Titius ſcribit*, "Titius writes," is not of the ſame import with *dico Titium ſcribere*, *quod Titius ſcribat*, "I ſay that Titius writes." The firſt of theſe ſentences, as has been already ſhown, contains but one aſſertion; the ſecond obviouſly contains two. *Titius writes*, is equivalent to *Titius* IS *writing; I ſay that Titius writes*, is equivalent to *I* AM *ſaying that Titius* IS *writing.* The reaſon why the *imperative* and *ſubjunctive* are reſolvable into expreſſions into which the *indicative* cannot be reſolved, will be ſeen when the import of each of thoſe modes is aſcertained.

(T) Every verb, except the ſimple verb *am*, *art*, *is*, &c. expreſſes without modes a combination of thoughts, viz. *affirmation* and an *attribute.* The affirmation, however, alone is eſſential to the verb, for the attribute may be expreſſed by other words. It is indeed extremely probable, that, in the earlieſt ages of the world, the affirmation and attribute were always expreſſed by different words; and that afterwards, for the ſake of conciſeneſs, one word, compounded perhaps of theſe two, was made to expreſs both the affirmation and the attribute: hence aroſe the various claſſes of verbs, *active*, *paſſive*, and *neuter.* Of a proceſs of this kind there are evident ſigns in the Greek and ſome other tongues. But the improvers of language ſtopped not here. The ſame love of conciſeneſs induced them to modify the compound verb itſelf, that it might expreſs various combinations of thought ſtill more complex: but in all theſe combinations *aſſertion* was of neceſſity included; for if the word had ceaſed to aſſert, it would have ceaſed to be a verb of any kind.

Soon after this ſhort note was written, and the whole article finiſhed for the preſs, we accidentally met with *Pickbourn's Diſſertation on the Engliſh Verb.* Of that work it belongs not to us to give a character. Such of our readers as ſhall peruſe it, will ſee that on many points we differ widely in opinion from the author; but we have no painful apprehenſion of any compariſon which may be made. It gives us pleaſure, however, to find, that

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founded,—that its *essence* consists in *affirmation*. And in this opinion we are the more confirmed, from a conviction that no man *ever* employs language on *any occasion* but for the purpose of *affirming something*. The speaker may affirm something directly of the *action itself;* something of the agent's *power* or *capacity* to perform it; or something of his own *desire* that it should be performed, &c.—but still he must *affirm*.

81 All modes equally indicative.

If this be so, then are all the modes equally *indicative*. Some may be indicative of *perceptions*, and others of *volitions;* but still they all contain *indications*. On this idea the three foregoing modes of *amo* will be thus distinguished. When a man indicates his *present feeling* of the passion of love, he uses the first; when he indicates his present *capacity* of feeling it, he uses the *second;* and when he indicates his present *desire* that the person to whom he is speaking would entertain that passion, he uses the *third*.

76. As to what Mr *Harris* calls the *interrogative* mode, he himself observes that it has a near affinity to the *indicative*. It has in fact not only a near *affinity* to it, but, as far as language is concerned, there is not between the one and the other the slightest difference. For, in *written* language, take away the *mark* of *interrogation*, and, in *spoken* language, the *peculiar tone of voice*, and the *interrogative* and *indicative* modes appear *precisely* the *same*. That such should be the case is extremely natural.

To illustrate this, let us for once speak in the singular number, and conceive one of our readers to be present. I *assert* a thing, taking the *truth* of it for *granted;* but if you know me to be *wrong*, I *presume* that you will set me *right:* in this case, assertion produces the same effect as *interrogation*. Instances perpetually occur in common conversation. An acquaintance says to me—"You took a ride this morning:" I answer *yes* or *no* according to the case; and the same effect is produced as if he had said—"Did you take a ride this morning?" In this way, at first, would simple *assertions* be employed to procure information wanted. *Fecisti*—you *did* such a thing; fecisti *ne*—you did it *not;* —either would produce the proper reply, and the information wanted would be gained (u). This being observed as language improved, men would accompany such a sentence with a peculiar *tone of voice*, or other marks, to signify more unequivocally that they wanted *information*, or that *such information* was the *only object* of their speech. Farther progress in refinement would lead them to alter the *position of the words* of a sentence when they meant to *ask* a *question*, as we do in *English*, saying (when we *assert*), "*You have* read Euripides;" (when we *interrogate*), "*Have you* read Euripides?"

In *Greek* and *Latin* questions are asked commonly enough by the particles ει and *an*. These particles we know to be exactly equivalent to the English particle *if*, at least to the sense in which that particle is commonly taken. *An fecisti* is "*If you did it;*" and the sentence

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that his notions respecting the origin of such verbs as express at once *assertion* and an *attribute*, are the same with those which had occurred to ourselves.

"The copula *is* appears (says Mr *Pickbourn*) to have been coeval with language itself. But we have not the same evidence to convince us, that that must necessarily have been the case of any other finite verb; for the copula *is*, containing only an *affirmation*, is much more simple than a verb which unites in one word both an attribute and an affirmation. Since therefore people, in their first attempts to express their ideas by words, would scarcely think of any thing more than what was absolutely necessary, it is probable they would be some time before they invented any other word containing in itself an *assertion* or *affirmation;* for they would not very early think of contriving words so *complex* in their nature as to include in them both the *name* of an *action* and an *assertion*.

"I conjecture, that the first mode of expressing *actions* or *passions* would be by *participles* or *verbal nouns*, i. e. words signifying the *names* of the *actions* or *passions* they wanted to describe; and these words connected with their subject by the copula *is*, might in those rude beginnings of language tolerably well supply the place of verbs: *e. g.* from observing the operations of nature, such words as *rain* or *raining*, *thunder* or *thundering*, would soon be invented; and by adding the copula *is*, they would say, *thundering* or *thunder is* or *is not*, *raining* or *rain is;* which, by the rapidity of pronunciation, might in time form the verbs *rains*, *thunders*, &c. The observation of their own *actions*, or the *actions* of the animals around them, would soon increase their stock of ideas, and put them upon contriving suitable expressions for them. Hence might arise such words as these; *sleep* or *sleeping*, *stand* or *standing*, *run* or *running*, *bite* or *biting*, *hurt* or *hurting;* and by joining these to substantives by means of the copula *is*, they might form such sentences as these,—*Lion is sleeping*, or perhaps *lion sleep is*, *stand is*, &c. which would soon be contracted into *lion sleeps*, *stands*, *runs*, *bites*, *hurts*, &c. Thus our little insulated family might become possessed of verbs including an *attribute* and an *affirmation* in one word."

This account of the origin of *active*, *passive*, and *neuter verbs*, is certainly ingenious; and, in our opinion, it is not more ingenious than just when applied to the Greek and other ancient languages, though it is not applicable to the English: but it seems to be quite irreconcileable with the definition of *verb*, which the author has adopted from *Bishop Lowth;* and indeed with every other definition except that which makes the essence of *verb* to consist in *simple affirmation*.

(u) Of a question put in the form of an assertion we have a remarkable instance in the Gospel of St Matthew. When Christ stood before Pilate, the governor asked him, saying, Συ ει ὁ βασιλευς των Ιουδαιων. That this sentence was pronounced with a view to obtain some answer, is evident from the context; yet it is as plainly an *affirmation*, though uttered probably in a scoffing tone, as the serious confession of Nathaniel, Συ ει ὁ βασιλευς του Ισραηλ. Had not the question been put in this form, which *asserts* Christ to be the king of the Jews, the reply could not have been Συ λεγεις; for without an *assertion* the governor would have *said* nothing. See *Dr Campbell's Translation of the Gospels*, where the form used in the original is with great propriety retained in the version.

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tence may either be an abbreviation for *dic an feciſti*, "tell me if you did it;" or *an* may perhaps be, as *if* certainly is, the imperative mode of ſome obſolete verb equivalent to *give;* and in that caſe, *an feciſti* will be a complete interrogative ſentence, ſignifying, "you did it, *give that.*"—But of the *interrogative mode* of Mr *Harris* we have ſaid enough; perhaps our readers will think, too much, ſince it is a uſeleſs diſtinction not found in any language. It will, however, be proper to ſay ſomething of his *precative mode*, as far as it is the ſame with the *optative mode* of the Greek grammarians. And,

82 Of the optative mode.

77. Nothing, we think, can be clearer, than that the Greek *optative* conſtitutes *no diſtinct mode* of the *verb*, whatever meaning be annexed to the word *mode*. The different tenſes of the *optative* are evidently nothing but the *paſt tenſes* of the *correſponding tenſes* of the *ſubjunctive*. Præſ. ſub. τυπτω, I *may* ſtrike. Preſ. opt. τυπτοιμι, I *might* ſtrike, &c. This is proved to be indubitably the caſe by the uniform practice of the Greek writers. Examples might be found without number were one to read in ſearch of them. The following ſentence will illuſtrate our meaning: Ἐρχονται Ἀθηναιοι ἱνα βοηθῶσι τοις Ἀργειοις, "the Athenians *come* that they *may aſſiſt* the Argives." Here the leading verb ἐρχονται being of the *preſent* tenſe, the dependent verb βοηθωσι is the *preſent ſubjunctive*. But change the former to the *paſt time*, and the latter muſt alſo be changed. Ἠρχοντο Ἀθηναιοι ἱνα βοηθοῖεν τοις Ἀργειοις, "the Athenians *came* that they *might aſſiſt* the Argives." Here it is plain that βοηθοῖεν, the preſent of the *optative*, is the *paſt time* of βοηθωσι, the preſent of the *ſubjunctive;* and the ſame in other inſtances.

It is almoſt unneceſſary to add, that when *this mode* is employed to denote a *wiſh*, the wiſh is not *expreſſed* by the *verb*, but is *underſtood*. Such abbreviated expreſſions to denote a wiſh are common in all languages. Thus, in Greek,

Ὑμιν μεν θεοι δοιεν, ὀλυμπια δοματ' ἐχοντες
Ἐκπερσαι Πριαμοιο πολιν, &c.

ſignifies, "The gods might give you (or, as we ſay in Engliſh, *changing* the poſition of the verb, *might the gods give you*) to deſtroy," &c. So in Latin, *Ut te omnes dii deæque perdant*, "That all the gods and goddeſſes may curſe you!" Again, in Engliſh, "O that my head were waters!" &c. In all theſe, and ſuch like ſentences, the words equivalent to *I wiſh*, *I pray*, are underſtood. In Greek a *wiſh* is ſometimes introduced by the particle εἰ or εἰθε, *if;* as in Homer.

Εἰθ' ὀφελες τ' ἀγονος τ' ἐμεναι, ἀγαμος τ' ἀπολεσθαι.

"*If* it had been your fate not to be born, or to die unmarried! The ſupplement is, "It would have been happy for your country," or ſome ſuch thing. In like manner, a poor perſon not uncommonly intreats a favour by ſaying, "Sir, *if* you would be ſo good!" Here he *ſtops;* but the completion of his ſentence is, "It would make me happy." In all theſe caſes a *wiſh* is not *formally expreſſed* by the ſpeaker, but *inferred* by the hearer. They are therefore inſtances of that tendency which mankind univerſally diſcover to abbreviate their language, eſpecially in caſes where the paſſions or feelings are intereſted.

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78. The *interrogative* and *optative modes* being ſet aſide as ſuperfluous, it would appear from our inveſtigation, that the *real diſtinct modes* of the *verb*, which are found in the moſt copious and varied language, are only *three;* the *indicative*, the *ſubjunctive*, and the *imperative:* and that theſe are all that can be conſidered as *neceſſary;* the *firſt* to indicate the ſpeaker's *feeling* or *acting*, the *ſecond* to indicate his *capacity* of feeling or acting, and the third to indicate his *deſire* that the perſon to whom he ſpeaks *ſhould feel* or *act*.

83 Only three modes neceſſary, the indicative, ſubjunctive, and imperative.

Here again we have the misfortune to find ourſelves differ in opinion with Dr Gregory; who ſeems to think, that a greater number of modes, if not abſolutely neceſſary, would, however, be highly uſeful. His words are: "All languages, I believe, are defective in reſpect of that variety and accuracy of combination and of diſtinction, which we know with infallible certainty take place in thought. Nor do I know of any particular in which language is more deficient than in the expreſſing of thoſe *energies* or modifications of thought; ſome of which always are, and all of which might be, expreſſed by the grammatical moods of verbs. Of this there cannot be a clearer proof than the well-known fact, that we are obliged to expreſs by the ſame mood very different modifications or *energies* of thought. As, for inſtance, in the caſe of the grammatical mood called the *imperative*, by which we expreſs occaſionally prayer to GOD, command to a ſlave, requeſt to a ſuperior, advice to an equal or to any one, order as from an officer to his ſubaltern, ſupplication to one whom we cannot reſiſt."—If theſe be, as the author calls them, *ſpecific* differences of thought, he will not ſurely object to their being all ranked under one *genus*, which may be called *deſire* (x). That the internal feelings, which prompt us to pray to God, to command a ſlave, to requeſt a ſuperior, to adviſe an equal, to give an order to an inferior, and to ſupplicate one whom we cannot reſiſt, are all different in *degree*, cannot be denied. Each of them, however, is *deſire;* and the *predication*, by which the deſire is made known to the perſon whom we addreſs, is the ſame in all, when we utter a prayer as when we utter a command, when we requeſt as when we ſupplicate. But *predication alone* is that which conſtitutes the *verb:* for *deſire* by itſelf, however modified, can be expreſſed only by an *abſtract noun;* and the *mere energy* of deſire, when not applied to a particular *energiſer*, can be expreſſed only by a *participle*, or by what is commonly, though improperly, called the *infinitive mode*. Now it is certainly conceivable, that a few *ſhades of meaning*, or a few (y) *degrees* of one *general energy*, might be marked by

(x) "DESIRE;—wiſh; with eagerneſs to obtain or enjoy." *Johnſon.*

"The uneaſineſs a man finds in himſelf upon the abſence of any thing, whoſe preſent enjoyment carries the idea of delight with it, is that we call DESIRE. *Good* and *evil*, preſent and abſent, work upon the mind; but that which immediately determines the will, from time to time, to *every voluntary action*, is the uneaſineſs of DESIRE, fixed upon ſome abſent good." *Locke.*

This whether it be ſound philoſophy or not, is ſurely ſufficient authority for uſing the word *deſire* to denote the *genus;* of which *prayer*, *command*, *advice*, *ſupplication*, &c. may be conſidered as ſo many diſtinct *ſpecies*.

(y) Dr Gregory ſeems to think, that not barely a *few*, but a *vaſt number*, of theſe *energies* might be ſo marked. "*Affirming*

Verbs. by *corresponding variations* of such verbs as combine *energy* with *predication*; and there could be no great impropriety in calling those variations *modes*, or rather *modes* of *modes*: but that such a *multiplication* of modes would be an improvement in language, is by no means evident. The verb, with the modes and tenses which it has in all languages, is already a very complex part of speech; which few are able, and still fewer inclined, to analyze: and it would surely be of no advantage to make it more complex by the introduction of *new modes*, especially when those *degrees of energy* which could be marked by them are with equal and perhaps greater precision marked, in the *living speech*, by the different tones of voice adapted to them by nature; and, in *written language*, by the reader's general knowledge of the subject, and of the persons who may be occasionally introduced. If there be any particular delicacy of sentiment, or energy, which cannot thus be made known, it is better to express it by a name appropriated to itself, together with the *simple* and original verb of affirmation, than to clog the *compound* verb with such a multiplicity of variations as would render the acquisition of every language as difficult as is said to be that of the Chinese written characters. The *indicative*, *subjunctive*, and *imperative*, are therefore all the modes of the verb which to us appear to be in any degree *necessary* or expedient; and they are in fact all the modes that are really found in any language with which we are acquainted. Verbs.

84 The infinitive no mode of the verb, but an abstract noun.

For the INFINITIVE, as has been already observed, seems on every account to be improperly styled a *mode*. To that name it has no title which we can perceive, except that its *termination sometimes* (for even this is not true universally) differs in the learned languages from the terminations of the *other parts* of the verb. Nay, if *affirmation* be, as it has been proved to be, the very *essence* of verb, it will follow, that the *infinitive* is no part of the verb at all; for it expresses *no affirmation*. It forms no complete sentence by *itself*, nor even when *joined to a noun*, unless it be aided by some *real* part of a verb either expressed or understood. *Scribo*, *scribebam*, *scripsi*, *scripseram*, *scribam*, *scripsero*; "I am writing, I was writing, I have written, I had written, I shall write, I shall have written," do each of them contain an *affirmation*, and constitute a complete sentence: but *scribere* "to write," *scripsisse* "to have written," affirm nothing, and are not more applicable to any one person than to another. In a word, the *infinitive* is nothing more than an *abstract noun* (z), denoting *the simple* ENERGY *of the verb*, in conjunction with

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"[1] *Affirming* (says he), [2] *denying*, [3] *testifying*, foretelling, asking, answering, [3] *wishing*, *hoping*, *expecting*, believing, knowing, doubting, supposing, stipulating, being able, commanding, [3] *praying*, requesting, *supplicating*, loving, hating, fearing, despairing, being accustomed, wondering, admiring, wavering, swearing, [4] *advising*, [2] *refusing*, [5] *exhorting*, [4] *dissuading*, [5] *encouraging*, promising, threatening, &c. all admit very readily of being combined with the general import of a verb." He adds, that "if every one of them had been expressed in all languages by variations as striking as those of τυπτω, τυπτομαι, and τυπτε, they *must* have been acknowledged as distinct *moods* of the verb."

If all these words denote different energies of thought, which, however, may be doubted, and if all those different energies, with many others for which, as the author justly observes, it is not easy to find names, could, like *capacity* and *desire*, be combined with the *general action* or *energy* of *one verb*; and if those *combinations* could be marked by *corresponding variations* of that verb; we should indeed acknowledge such *variations* to be distinct *modes*, or *modes* of *modes*, of the *verb*. But we doubt much if all this be possible. We are certain that it would be no improvement: for it seems to be evident, either that, in some of the modes, the radical letters of the original verb must be changed, and then it would cease to be the same verb; or that many of the modes must be expressed by words of very unmanageable length; not to mention that the additional complication introduced by so many minute distinctions into a part of speech already exceedingly complex, would render the import of the verb absolutely unintelligible to nine-tenths even of those who are justly styled *the learned*.

(z) In our idea of the *infinitive*, we have the honour to agree with the learned and excellent *Ruddiman*; whose words are, "Non ineptè hic modus a veteribus quibusdam VERBI NOMEN est appellatum. Est enim (si non verè ac semper, quod nonnulli volunt, nomen substantivum) significatione certè ei maximè affinis; ejusque vices sustinet per omnes casus. Et quidem *manifestè* substantivum videtur, cum *adjectivum ei additur* neutri generis: ut, *Cic. Att.* xiii. 28. *Cum vivere ipsum turpe sit nobis.*—Pers. v. 53. *Velle suum cuique est.*—Cic. Fin. i. 1. *Totum hoc displicet philosophari.*—Petron. c. 52. *Meum intelligere nulla pecunia vendo.* Item, *absque adjectivo*: ut, Ovid Met. ii. 483. *Posse loqui eripitur*, i. e. *potestas loquendi.*—Plaut. Bacch. i. 2. 50. *Hic vereri perdidit*, i. e. *verecundiam.*—Cic. Tusc. v. 38. *Loquor de docto homine et erudito, cui vivere est cogitare*, i. e. *cujus vita est cogitatio.* [GRAMMATICÆ LATINÆ INSTITUTIONES: *Pars secunda*, lib. i. cap. 2. where the reader will find examples of the *infinitive* used by the best Roman writers as a substantive noun in every case.]

This opinion of *Ruddiman* and his ancient grammarians has been lately controverted with much ingenuity by *Dr Gregory*; who seems to think, that in the *infinitive* alone we should look for the *essence* of the verb divested of every accidental circumstance, time only excepted. If this be indeed the case, almost every thing which we have said of the *verb*, its *tenses*, and its *modes*, is erroneous; and he who takes his principles of grammar from the *Encyclopædia*, will fill his head with a farrago of absurdities. The writer of the article, however, has been at much pains to acquire correct notions of the subject: he has studied the writings of others; he has

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with *time*; and is not a *mode*, as far as we can conceive, of any thing. Thus, *Scire tuum nihil eſt*, is the ſame with *Scientia tua nihil eſt;* and, "*Death* is certain," with "*To die* is certain."

85 Of expreſſing commands by the future tenſe.

79. Before we diſmiſs the ſubject of *modes*, it may not be improper to take notice of the connection which Mr *Harris*, after *Apollonius*, has found between *commanding* and *futurity*. "Intreating and commanding (he ſays) have a neceſſary reſpect to the *future only*. For what have they to do with the *preſent* and the *paſt*, the natures of which are immutable and neceſſary." This is ſurely confounding *commands* with the *execution* of commands. But the learned writer proceeds to inform us, that "it is from the *connection* of *futurity* with *commands*, that the *future* of the *indicative* is ſometimes uſed for the *imperative mode*." The *connection*, of which he ſpeaks, appears to us entirely imaginary; for *futurity* has nothing to do with *commands*, though it may with the *execution* of them. The *preſent time* is the time of *commanding*, the future of *obeying*. But ſuppoſing the connection *real*, it would not account for the *future tenſes* being uſed *imperatively*. For although it were true, as it is evidently falſe, that commands are *future*, it would not follow that the relation is *convertible*, or that employing the *future* ſhould imply a *command*. The principle upon which ſuch expreſſions as, THOU SHALT NOT KILL, come to have the force of a *command*, ſeems to be this. When a perſon, eſpecially one poſſeſſed of authority, aſſerts that an *action*, depending on the *will* of a *free agent*, and therefore in its own nature *contingent*, *ſhall* or ſhall *not* actually take place; what are we to *conclude* from ſuch an aſſertion? Why ſurely it is natural to conclude, that it is his *will*, his *command*, that his aſſertion be *verified*. The Engliſh word *ſhall*, if we be well informed, denoted originally *obligation;* a ſenſe in which its paſt tenſe *ſhould* is ſtill Verbs.

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has conſulted ſeveral perſons of undoubted learning, who have devoted a great part of their time to grammatical inveſtigations; and he is extremely unwilling to ſuppoſe, that all his inquiries reſpecting the moſt important part of ſpeech have ended in error. He truſts, therefore, that he ſhall not be deemed a petulant caviller, though he examine with ſome ſeverity the principal obſervations and arguments upon which the Doctor has built his theory. Upon that examination he enters with diffidence: for the learned Profeſſor's knowledge of the various powers of the mind appears, even in this eſſay, to be ſuch as eminently qualifies him for aſcertaining the preciſe import of *every* ſpecies of words employed for the purpoſe of communicating thought; and with ſuch a man the preſent writer would be much happier to agree than to differ in opinion.

The Doctor acknowledges (Tranſ. of the Royal Society, Edinburgh, vol. ii. lit. claſs, p. 195), that the *infinitive* is moſt improperly called a *mode:* and on that account he thinks we ought to turn our thoughts *excluſively to it*, "when we endeavour to inveſtigate the general import of the verb, with a view to aſcertain the *accident* which it denotes; and be led, ſtep by ſtep, to form a diſtinct notion of what is *common* in the *accidents* of all verbs, and what is *peculiar* in the *accidents* of the ſeveral claſſes of them, and thereby be enabled to give good definitions, ſpecifying the *eſſence* of the verb," &c. It may be true, that to the *infinitive excluſively* we ſhould turn our attention, when we wiſh to aſcertain the *accident* denoted by a *particular verb* or claſs of verbs; i. e. *the kind of action*, *paſſion*, or *ſtate of being*, of which, ſuperadded to affirmation, that verb or claſs of verbs is expreſſive: but in *accidents* of this kind it may be doubted if there be any thing that with propriety can be ſaid to be *common* to *all* verbs. There ſeems indeed to be nothing *common* to *all* verbs but that which is *eſſential* to them, and by which they are diſtinguiſhed from *every other part* of ſpeech; but every kind of *action*, *paſſion*, and *ſtate* of *being*, may be completely expreſſed by *participles* and *abſtract nouns;* and therefore in ſuch *accidents* we cannot find the *eſſence* of the verb, becauſe ſuch accidents diſtinguiſh it not from other parts of ſpeech. Were a man called upon to ſpecify the *eſſence* of *verſe* or *metre*, he would not ſay, that it conſiſts in the meaning of the words, or in the uſing of theſe words according to the rules of ſyntax. In every kind of verſe where words are uſed they have indeed a meaning, and in all good verſes they are grammatically conſtructed; but this is likewiſe the caſe in *proſe*, and therefore it cannot be the *eſſence* of *verſe*. The *eſſence* of *verſe* muſt conſiſt in ſomething which is not to be found in *proſe*, viz. a certain harmonic ſucceſſion of ſounds and number of ſyllables: and the *eſſence* of the *verb* muſt likewiſe conſiſt in ſomething which is not to be found in *any other part of ſpeech;* and that, we are perſuaded, is nothing but *affirmation*. But if *affirmation* be the very *eſſence* of the verb, it would ſurely be improper, when we endeavour to aſcertain the general import of that part of ſpeech, to turn our thoughts excluſively to a word which implies *no* affirmation; for what does not affirm, cannot in ſtrictneſs of truth be either a *verb* or the *mode* of a verb.

In the ſame page it is ſaid, that "the *infinitive* denotes that kind of thought or combination of thoughts which is common to all the other modes." In what ſenſe this is true, we are unable to conceive: it denotes indeed the ſame *accident*, but certainly not the ſame *thought* or *combination* of thoughts. In the examples quoted, *Non eſt* VIVERE, *ſed* VALERE *vita*, &c. the infinitives have evidently the effect of *abſtract nouns*, and not of *verbs;* for though *vivere* and *valere* expreſs the ſame *ſtates of being* with *vivo* and *valeo*, they by no means expreſs the ſame *combination of thoughts*. VIVO and VALEO *affirm* that *I* AM *living*, and that *I* AM *well;* and he who utters theſe words muſt think *not* of *life* and *health* in the *abſtract*, but of *life* and *health* as *belonging to himſelf*. VIVERE and VALERE, on the other hand, *affirm nothing;* and he who utters them thinks only of the *ſtates of living* and of *being in health*, without applying them to any particular perſon.

The exquiſitely learned author of *The Origin and Progreſs of Language*, having ſaid that the *infinitive* is uſed either as a *noun*, or that it ſerves to connect the verb with another verb or a noun, and ſo is uſeful in ſyntax, the Doctor combats this opinion and infers the infinitive to be truly a *verb;* becauſe "the thought expreſſed by

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still commonly employed. In English, therefore, the foregoing process of *inferring* a *command* from an *assertion* of *futurity* seems to have been *reversed;* and the word *shall*, from denoting a *command* or *obligation*, has come to denote *futurity* simply.

86 Of verbs, as they are active, passive, or neuter.

80. Having considered the *verb* in its *essence*, its *tenses*, and its *modes*, we might seem to have exhausted the subject; but there is still something more to be done. Grammarians have distinguished *verbs* into several *species:* and it remains with us to inquire upon what principle in nature this distinction is made, and how far it proceeds. Now it must be obvious, that if *predication* be the essence of *verb*, *all verbs*, as such, must be of the *same species;* for *predication* is the *same* in every *proposition*, under every *possible circumstance*, and by *whomsoever it is made*. But the greater part of verbs contain the predicate as well as the predication of a proposition; or, to speak in common language, they denote an *attribute* as well as an *affirmation*. Thus, *lego* is "I am *reading;*" *ambulo*, "I am *walking;*" *sto*, "I am *standing;*" *verbero*, "I am *striking;*" *verberor*, "I am *stricken*." But the *attributes* expressed by these verbs are evidently of different kinds; some consisting in *action*, some in *suffering*, and some in a state of being which is *neither active* nor *passive*. Hence the distinction of verbs, according to the *attributes* which they denote, into *active*, *passive*, and *neuter*. *Lego*, which is an assertion that I am employed in the *act of reading*, is an *active verb; verberor*, which is an assertion that I am *suffering* under the rod, is a *passive verb*, because it denotes a *passion;* and *sto*, which is an assertion that I am *standing still*, is said to be a *neuter verb*, because it denotes neither *action* nor *passion*. But it is self-evident that there cannot be *action* without an *agent*, nor *passion*

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by means of *it*, may be expressed in synonymous and convertible phrases, in different languages, by means of other parts or moods of the verb." Of these synonymous and convertible phrases he gives several examples, of which the first is taken from Hamlet's soliloquy. "*To be* or *not to be*, that is the question," he thinks equivalent in meaning to, "The question is, *whether we shall be or shall not be?* But we are persuaded he is mistaken. "Whether we shall be or shall not be," is a question asking, whether we shall exist at some *future* and *indefinite time?* but the subject of Hamlet's debate with himself was *not*, Whether, if his conscious existence should be interrupted, it would be afterwards at some *future* and *indefinite time restored? but* whether it was to *continue uninterrupted* by his exit from this world? This, we think, must be self-evident to every reader of the Soliloquy. It is likewise very obvious, that the word *question* in this sentence does not signify *interrogatory*, but *subject of debate* or *affair to be examined;* and that the word *that* serves for no other purpose than to complete the verse, and give additional *emphasis*, perhaps, to an inquiry so important. "*To be* or *not to be*, that is the question," is therefore equivalent in all respects to "The continuance or non-continuance of my existence, is the matter to be examined;" and the infinitive is here indisputably used as an abstract noun in the nominative case. Should it be said, that the Doctor may have taken the sentence by *itself*, unconnected with the *subject* of *Hamlet's soliloquy;* we beg leave to reply that the supposition is impossible; for, independent of the circumstances with which they are connected, the words "*To be* or *not to be*," have no perfect meaning. Were it not for the subject of the soliloquy, from which every reader supplies what is wanting to complete the sense, it might be asked, "*To be* or *not to be—What?* A coward, a murderer, a king, or a dead man! Questions all equally reasonable, and which in that case could not be answered.

With the same view, to prove the infinitive to be truly a *verb*, the Doctor proceeds to remark upon the following phrases, *Dico, credo, puto, Titium existere, valere, jacere, cecidisse, procubuisse, projecisse Mævium, projectum fuisse a Mævio;* which, he says, have the very same meaning with *dico*, &c. *quod Titius existat, quod jaceat, quod ceciderit* &c. He adds, that "the *infinitives*, as thus used, acquire not any further meaning, in addition to the radical import of the verb with tense, like the proper moods; but the *subjunctives* after *quod* lose their peculiar meaning as *moods*, and signify no more than bare *infinitives*." In the sense in which this observation is made by the author, the very reverse of it seems to be the truth. The *infinitives*, as thus used, acquire, at least in the mind of the reader, something like the power of *affirmation*, which they certainly have not when standing by themselves; whereas, the *subjunctives* neither *lose* nor *acquire* any meaning by being placed after *quod*. *Dico, credo, puto, Titium existere, valere, jacere*, &c. when translated literally, signify, *I say, believe, think, Titius to exist, to be well, to lie along;* a mode of speaking which, though now not elegant, was common with the best writers in the days of *Shakespeare*, and is frequently to be found in the writings of *Warburton* at the present day. *Dico, credo, puto, quod Titius existat, quod jaceat*, &c. signifies literally, *I say, believe, think, that Titius may exist, may lie along*, &c. Remove the verbs in the indicative mode from the former set of phrases, and it will be found that the infinitives *had acquired* a meaning, when conjoined with them, which they *have not* when left by themselves; for *Titium existere, jacere;* "Titius to exist, to lie along," have no complete meaning, because they *affirm nothing*. On the other hand, when the indicative verbs are removed, together with the wonder-working *quod*, from the latter set of phrases, the meaning of the *subjunctives* remains in all respects as it was before the removal; for *Titius existat, jaceat*, &c. signify, *Titius may exist, may lie along*, as well when they stand by themselves as when they make the final clauses of a compound sentence. Every one knows that *quod*, though often called a conjunction, is always in fact the *relative pronoun*. *Dico, credo, puto, quod Titius existat*, must therefore be construed thus: *Titius existat (est id) quod dico, credo*, &c. "Titius may exist is that thing, that proposition, which I say, believe, think." In the former set of phrases, the *infinitives* are used as abstract nouns in the accusative case, denoting, in conjunction with *Titium*, one complex conception, the *existence*, &c. *of Titius: Dico, credo, puto;* I say, believe, think;" and the *object* of my speech, belief, thought, is *Titium existere*, "the existence of Titius."

In

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87 All verbs have a neceſſary reference to a noun in the nominative caſe.

without a *paſſive being;* neither can we make a *predication* of *any kind*, though it denote neither *action* nor *paſſion*, without predicating of *ſomething*. *All verbs*, therefore, whether *active*, *paſſive*, or *neuter*, have a neceſſary reference to ſome *noun* expreſſive of the *ſubſtance*, of which the *attribute*, denoted by the verb, is *predicated*. This noun, which in all languages muſt be in the *nominative caſe*, is ſaid to be the *nominative* to the *verb;* and in thoſe languages in which the *verb* has *perſon* and *number*, it muſt in *theſe reſpects* agree with its *nominative*.

88 Active verbs tranſitive or intranſitive.

Of *action*, and conſequently of *verbs denoting* action, there are obviouſly two kinds. There is an *action* which paſſes from the *agent* to ſome *ſubject*, upon which he is employed; and there is an *action* which reſpects *no object* beyond the *agent himſelf*. Thus *lego* and *ambulo* are verbs which equally denote *action;* but the action of *lego* refers to ſome *external object* as well as to the *agent;* for when a man is *reading*, he muſt be reading *ſomething*, a book, a newſpaper, or a letter, &c. whereas, the action of *ambulo* is confined wholly to the *agent;* for when a man is *walking*, he is employed upon nothing *beyond himſelf*,—his *action* produces no *effect* upon any thing external. Theſe two ſpecies of verbs have been denominated *tranſitive* and *intranſitive;* a deſignation extremely proper, as the diſtinction which gave riſe to it is philoſophically juſt. *Verbs* of both ſpecies are *active;* but the action of thoſe only which are called *tranſitive* reſpects an external object; and therefore in thoſe languages of which the nouns have caſes, it is only after *verbs* which are *tranſitive* as well as *active*, that the *noun* denoting the *ſubject* of the action is put in the *accuſative* or *objective caſe*. *Verbs* which are *intranſitive*, though they be really *active*, are in the ſtructure of ſentences conſidered as *neuter*, and govern *no caſe*.

Participles, &c.

89 The former only govern nouns in the accuſative caſe.

And ſo much for that moſt important of all words the VERB. We proceed now to the conſideration of *participles*, *adjectives*, and *adverbs;* which as they have a near relation to one another, we ſhall treat of in the ſame chapter.

CHAP. V. *Of Participles, Adjectives, and Adverbs.*

SECT. I. *Of Participles.*

90 Participles denote an attribute combined with time.

81. THE nature of VERBS being underſtood, that of PARTICIPLES is not of difficult comprehenſion. Every verb, except that which is called the *ſubſtantive* verb, is expreſſive of an *attribute*, of *time*, and of an *aſſertion*. Now if we take away the *aſſertion*, and thus deſtroy the *verb*, there will remain the *attribute* and the *time;* and theſe combined make the eſſence of that ſpecies of words called

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In confirmation of the ſame idea, that the *infinitive* is truly a *verb*, the author quotes from *Horace* a paſſage, which, had we thought quotations neceſſary, we ſhould have urged in ſupport of our own opinion:

——Nec quicquam tibi prodeſt
Aërias TENTASSE *domos, animoque rotundum*
Percurrisse polum, morituro.

To our apprehenſion, nothing can be clearer than that TENTASSE and PERCURRISSE are here uſed as *nouns;* for if they be not, where ſhall we find a *nominative* to the verb *prodeſt?* It was certainly what was ſignified by *tentasse aërias domos, animoque rotundum percurrisse polum*, that is ſaid to have been no advantage to *Archytas* at his death. This indeed, if there could be any doubt about it, would be made evident by the two proſe verſions, which the profeſſor ſubjoins to theſe beautiful lines. The firſt of which is as follows: *Nec quicquam tibi prodeſt quod aërias domos* TENTAVERIS, *et animo* PERCURRERIS *polum;* which muſt be thus conſtructed: TENTAVERIS *aërias domos, et* PERCURRERIS *animo polum* (*eſt id*) *quod nec quicquam tibi prodeſt.* This verſion, however, is not *perfectly* accurate; for it contains *two propoſitions*, while Horace's lines contain but *one*. The ſecond, which, though it may be a crabbed inelegant ſentence, expreſſes the poet's ſenſe with more preciſion, is in theſe words: *Nec quicquam tibi prodeſt morituro tua* TENTATIO *domuum aëriarum, et* CURSUS *tuus circa polum*. Having obſerved, with truth, that this ſentence has the very ſame meaning with the lines of Horace, *Dr Gregory* aſks, "Why are not *tentatio* and *curſus* reckoned verbs as well as *tentaſſe* and *percurriſſe?*" Let thoſe anſwer this queſtion who believe that any of theſe words are truly verbs; for they are ſurely, as he adds, all very near akin; indeed ſo near, that the mind, when contemplating the import of each, cannot perceive the difference. Meanwhile, we beg leave in our turn to aſk, Why are not *tentaſſe* and *percurriſſe* reckoned *abſtract nouns* as well as *tentatio* and *curſus?* To this queſtion it is not eaſy to conceive what anſwer can be returned upon the Doctor's principles. In his theory there is nothing ſatisfactory; and what has not been done by himſelf, we expect not from his followers. On the other hand, our principles furniſh a very obvious reaſon for excluding *tentatio* and *curſus* from the claſs of *verbs;* it is, becauſe theſe words expreſs no *predication*. *Tentaſſe* and *percurriſſe* indeed denote *predication* no more than *tentatio* and *curſus*; and therefore upon the ſame principle we exclude them likewiſe from a claſs to which, if words are to be arranged according to their import, they certainly do not belong.

Should the reader be inclined to think that we have dwelt too long on this point, we beg him to reflect, that if our ideas of the eſſence of the verb and of the nature of the infinitive be erroneous, every thing which we have ſaid of modes and tenſes is erroneous likewiſe. We were therefore willing to try the ſolidity of thoſe principles which hold the eſſence of the verb to conſiſt in *energy:* and we ſelected Dr Gregory's theory for the ſubject of examination, not from any diſreſpect to the author, whom the writer of this article never ſaw; but becauſe we believe his abilities to be ſuch, that

——Si Pergama dextrâ
Defendi poſſent, etiam hac defenſa fuiſſent.

Participles. ed PARTICIPLES. Thus, take away the *assertion* from the verb γραφει *writeth*, and there remains the *participle* γραφων *writing*; which, without the *assertion*, denotes *the same attribute* and the *same time*. After the same manner, *by withdrawing the assertion*, we discover γραψας *written* in εγραψε *wrote*; γραψων *about to write* in γραφει *shall be writing*. This is Mr *Harris's* doctrine respecting *participles*; which, in our opinion, is equally elegant, perspicuous, and just. It has, however, been controverted by an author, whose rank in the republic of letters is such, that we should be wanting in respect to him, and in duty to our readers, were we to pass his objections wholly unnoticed.

82. It is acknowledged by *Dr Beattie*, that this, which we have taken, is the most convenient light in which the *participle* can be considered in universal grammar: and yet he affirms that *present participles* do not always express *present time*, nor *preterite participles past time*; nay, that *participles* have often no connection with *time* at *all*. He thus exemplifies his assertion, in *Greek*, in *Latin*, and in *English*.

"When Cebes says, Ετυγχανομεν περιπατουντες εν τω του Χρονου ιερω 'We WERE WALKING *in the temple of Saturn*,' the participle of the present WALKING, is, by means of the verb WERE, applied to *time past*; and therefore of itself cannot be understood to signify any sort of time." Again, after observing, that in English we have but two simple participles, such as *writing* and *written*, of which the *former* is generally considered as the *present* and the *latter* as the *past*, the Doctor adds, But "the participle *writing*, joined to a verb of different tenses, may denote either *past* or *future* action; for we may say not only, *I* AM *writing*, but also *I* WAS *writing* yesterday, and *I* SHALL BE *writing* to-morrow;" whence he infers that *no time whatever* is denoted by the present participle. But surely this is a hasty inference, drawn from the doctrine of *absolute time* and a *definite present*, which we have already shown to be groundless and contradictory. When we speak simply of an action as *present*, we *must* mean that it is *present* with respect to *something besides itself*, or we speak a jargon which is unintelligible, but we do not ascertain the *time* of its *presence*. From the very *nature of time*, an action may be *present now*, it may have *been present formerly*, or it may *be present* at some *future period*; but the *precise time* of its presence cannot be ascertained even by the *present* of the *indicative* of the *verb* itself; yet who ever supposed that the *present* of the *indicative* denotes *no time*? The *participle* of the *present* represents the *action* of the verb as *going on*; but an action cannot be going on without being *present in time* with something. When, therefore, Cebes says, "We were walking in the temple of Saturn," he represents the action of the verb *walk* as *present* with something; but by using the *verb* expressive of his *assertion* in a *past tense*, he gives us to understand that the *action* was *not* present with any thing at the period of his *speaking*, but at some *portion of time prior* to that period: what that *portion of time* was, must be collected from the subsequent parts of his discourse. The same is to be said of the phrases *I was writing yesterday*, and *I shall be writing to-morrow*. They indicate, that the *action* of the verb WRITE *was present* with me *yesterday*, and *will again be present* with me *to-morrow*. The *action*, and the *time* of action, are denoted by the *participle*; that action is *affirmed* to belong to *me* by means of the verb; and the *time* at *which* it *belonged to me* is pointed out by the *tenses* of that verb, *am*, *was*, and *shall be*. All this is so plain, that it could not have escaped Dr Beattie's penetration, had he not hastily adopted the absurd and contradictory notion of a *definite present*.

Adjectives.

Of the truth of his assertion respecting *past participles*, he gives a Greek and a Latin example. The *former* is taken from St Mark: ὁ πιστευσας σωθησεται; and the *latter* is that which is commonly called the *perfect future* of the passive verb *amor*, *amatus fuero*. In the first instance, he says that the *participle*, though belonging to the aorist of the *past time*, must be rendered either by the *indefinite present*, "he who *believeth*;" or by the *future*, "he who *will* believe;" and the reason which he gives for this rendering of the word is, that "the believing here spoken of is considered as *posterior* in time to the *enunciation* of the *promise*." This is indeed true, but it is not to the purpose; for with the *enunciation* of the promise, the *time* of the *participle* has no manner of concern. The time of πιστευσας depends entirely upon the time of σωθησεται, with respect to which it must *undeniably* be *past*. Our Lord is not here asserting, that he who *shall believe* at the *day* of *final retribution*, shall be *saved*; but that he who shall on that day be found to *have believed* in time *past*, shall be saved: and if the participle had not been expressive of a *finished action* and a *past time*, the whole sentence would have conveyed a meaning not friendly to the interests of the gospel. In like manner, the time of *amatus* is referred, *not* to the time of *speaking*, but to the time of *fuero*, with respect to which, who sees not that it is *past*? The two words, taken together, contain a declaration, that he who utters them *shall*, at some time *posterior* to that of speaking, *have* BEEN *loved*; *shall have been loved* denotes *two times*, both *future* with respect to the time of *speaking*; but when the time, denoted by *shall have*, comes to be present, that of the participle *loved* must be *past*, for it is declared that the *action* of it shall *then* be *complete* and *finished*.

We conclude, then, that it is *essential* to a participle to express both an *attribute* and *time*; and that such words as denote *no time*, though they may be in the *form* of participles, as *doctus* "learned," *eloquens* "eloquent," &c. belong to *another part of speech*, which we now proceed to consider.

SECT. II. *Of Adjectives.*

91 Adjectives denote attributes as belonging to substances.

83. The nature of *verbs* and *participles* being understood, that of ADJECTIVES becomes easy. A *verb* implies (as we have said) an *attribute*, *time*, and an *assertion*; a *participle* implies only an *attribute* and *time*; and an ADJECTIVE implies only an *attribute* as *belonging* to some *substance*. In other words, an ADJECTIVE has *no assertion*, and it denotes *only such* an *attribute* as has not its *essence* either in *motion* or its *privation*. Thus, in general, the attributes of *quantity*, *quality*, and *relation*, such as *many*, *few*, *great*, *little*, *black*, *white*, *good*, *bad*, *double*, *treble*, &c. are all denoted by ADJECTIVES.

92 They have the import of abstract nouns, together with the power of a connective.

84. To understand the import and the use of this species of words, it must be observed that *every adjective* is resolvable into a *substantive* and an *expression* of *connection* equivalent to *of*. Thus, a *good man* is a *man of goodness*; where we see the *attribute* denoted by the *adjective* fully expressed by an *abstract noun*. But it is evident

Adjectives. evident that the *noun goodneſs* does *not* expreſs the *whole meaning* of the *adjective good;* for every *adjective* expreſſes not only an *attribute*, but alſo the *connection* between the *attribute* and its *ſubſtance;* whereas in the *abſtract noun*, the *attribute* is conſidered as a *ſubſtance unconnected* with any *other* ſubſtance.

In the next place, it is to be obſerved, that the *connection* expreſſed by *adjectives*, like that expreſſed by *of*, is of a nature ſo *general* and *indefinite*, that the particular *kind* of connection muſt, in ſome languages, be inferred from our previous knowledge of the objects between which it ſubſiſts, or it will for ever remain unknown. This might be proved by a variety of examples, but will perhaps be ſufficiently evident from the following. *Color ſalubris* ſignifies colour that *indicates* health; *exercitatio ſalubris*, exerciſe that *preſerves* health; *victus ſalubris*, food that *improves* health; *medicina ſalubris*, medicine that *reſtores* health. In all theſe examples the *connection* expreſſed by the adjective form of *ſalubris* is different; and though it may be known from *previous experience*, there is nothing in any of the expreſſions themſelves by which it can be aſcertained. Thus, adjectives are each ſignificant of an *attribute* and *connection;* but the particular *kind* of connection is aſcertained by experience.—The uſual effect of *adjectives* in language, is to *modify* or *particulariſe* a *general term*, by adding ſome *quality* or *circumſtance* which may diſtinguiſh the object *meant* by that term, from the *other* objects of the *ſame ſpecies*. I have occaſion, for example, to ſpeak of a particular man, of whoſe name I am ignorant. The word *man* is too general for my purpoſe, it being applicable to *every individual* of the human ſpecies. In what way then do I proceed, in order to particularize it, ſo as to make it denote *that very man* whom I *mean* to *ſpecify?* I annex or conjoin to it ſuch words as are ſignificant of *objects* and *qualities* with which *he is connected*, and which are *not* equally applicable to *others* from whom I mean to *diſtinguiſh him*. Thus I can ſay, a *man of prudence* or a *prudent man*, a *wiſe man*, a *good man*, a *brave man*, &c. By theſe additions the general term *man* is limited, or modified, and can be applied only to *certain men* to whom belong the *attributes* expreſſed by the *adjectives prudent*, *wiſe*, *good*, and *brave*. If it be ſtill too general for my purpoſe, I can add to it other qualities and circumſtances, till I make it ſo particular as to be applicable to but *one individual man* in the univerſe.

93 The uſual effect of adjectives is to modify a general term.

94 The reverſe of this is ſometimes the caſe.

85. This is the way in which ADJECTIVES are *commonly* uſed, but this is not the *only* way. Inſtead of being employed to *modify* a *ſubſtantive*, they ſometimes appear as the *principal words* in the ſentence, when the ſole uſe of the *ſubſtantive* ſeems to be to modify the *abſtract noun*, contained under the *adjective* to which that ſubſtantive is *joined*. In order to underſtand this, it will be neceſſary to attend to the following obſervations.

It may be laid down as a general propoſition, that when any term or phraſe is employed to denote a *complex conception*, the mind has a power of conſidering, in what order it pleaſes, the *ſimple ideas* of which the *complex conception* is compoſed. To illuſtrate this obſervation by an example: The word *eques* in Latin denotes a *complex conception*, of which the *conſtituent ſimple ideas* are thoſe of *a man* and *a horſe;* with this *connection* ſubſiſting between them, that the *man* is conceived as on the *back* of the *horſe*. In the uſe of this word, it is well known that the *idea firſt* in *order*, as being the *principal ſubject* of the propoſition, is commonly *the MAN on the back of the horſe;* but it is not ſo always, for the mind may conſider the HORSE as the principal object. Thus when Virgil ſays, Adjectives.

Fræna Pelethronii Lapithæ gyroſque dedere,
Impoſiti dorſo; atque EQUITEM *docuere ſub armis*
Insultare ſolo, et GRESSUS GLOMERARE *ſuperbos*—

the energies attributed to the object ſignified by EQUITEM, make it evident that the *horſe* and not the *man* is meant; for it is not the property of a *man*, *inſultare ſolo, et greſſus glomerare ſuperbos*.

The ſame obſervation holds true where the *complex object* is denoted by two or more words; an *adjective*, for inſtance, and a *ſubſtantive*. Thus in the phraſe *ſummus mons ſe inter nubila condit*, the words *ſummus mons* repreſent a *complex conception*, of which the conſtituent ideas are thoſe of *height* and *mountain*, connected together by the *adjective* form of *ſummus*. Either of theſe ideas may be the ſubject of the propoſition; and the expreſſion will accordingly admit of two different ſignifications. If *mons* be made the ſubject of the propoſition, the meaning will be, "the higheſt mountain hides itſelf among the clouds." If the *ſubſtantive* included in the radical part of *ſummus* be made the ſubject of the propoſition, the expreſſion will ſignify, "the ſummit, or higheſt part of the mountain, hides itſelf among the clouds." The latter is the true import of the ſentence.

95 Two uſes of the adjective.

86. From theſe obſervations and examples, we ſhall be enabled to underſtand the *two uſes* of the *adjective*. It is either employed, as has been already obſerved, to *reſtrict* or *modify*, a *general term;* or the *abſtract ſubſtantive* contained in the *adjective* is modified by the *noun*, with which, in the concrete or adjective form, that *abſtract ſubſtantive* is joined. The firſt may be called the *direct*, the ſecond the *inverſe*, acceptation of adjectives.

The *inverſe* acceptation of *adjectives* and *participles* (for both are uſed in the ſame manner) has not, except in a very few inſtances, been noticed by any *grammarian;* yet the principle is of great extent in language. In order to explain it, we ſhall produce a few examples; which on any other principle it is impoſſible to underſtand.

Livy, ſpeaking of the abolition of the regal authority at Rome, ſays, *Regnatum eſt Romæ ab* URBE CONDITA *ad* LIBERATAM *annos ducentos quadraginta quatuor*, "Monarchy ſubſiſted at Rome, *not* from the *city built* (which would convey no meaning), but from the *building of the city*, to its *deliverance*," &c. Both the participles *condita* and *liberatam* are here uſed *inverſely;* that is, the *abſtract ſubſtantives* contained in *condita* and *liberatam* are modified or reſtricted by the ſubſtantives *urbe* and *urbem*, with which they unite. Again, *Ovid*, ſpeaking of the conteſt between *Ajax* and *Ulyſſes* for the arms of *Achilles*, has theſe lines:

Qui, licet eloquio fidum quoque Neſtora vincat,
Haud tamen efficiet, DESERTUM *ut* NESTORA CRIMEN
Nullum eſſe rear.———

Here alſo the *adjective* or *participle* DESERTUM is taken inverſely, and the *general notion of deſertion* contained in it is *modified* or rendered *particular* by being joined with the ſubſtantive NESTORA. The meaning of the

paſſage

Adjectives.

passage is, "I will never be induced to believe that the *deſertion of Neſtor* was not a crime." Were *deſertum* to be taken *directly* as an *adjective* modifying its *ſubſtantive*, the ſentence muſt be tranſlated, "I cannot believe that *Neſtor deſerted* was not a crime." But it is evident that this is nonſenſe: as NESTOR, whether *deſerted* or *not deſerted*, could not be a *crime*.

It were eaſy to produce many more examples of adjectives taken *inverſely*; but theſe may ſuffice to illuſtrate the *general principle*, and to ſhow, that without attending to it, it is impoſſible to underſtand the ancient authors. We ſhall adduce one inſtance of it from Shakeſpeare, to evince that it is not *confined* to the *ancient* languages, though in theſe it is certainly more frequent than in the *modern*:

"Freeze, freeze, thou bitter ſky;
"Thou canſt not bite ſo nigh
"As *benefits forgot*:
"Though thou the waters warp,
"Thy ſting is not ſo ſharp
"As *friends remember'd not*.

Here it is evident, that the *adjective* FORGOT is taken inverſely; for it is not a *benefit*, but the *forgetting* of a benefit, which bites more than the bitter ſky: and therefore, in this paſſage, the *adjective* ſerves *not* to modify the *noun*; but the noun *benefits* is employed to modify the *abſtract ſubſtantive* contained in the adjective *forgot*, which is the ſubject of the propoſition, and the principal word in the ſentence.

Had Mr *Harris* attended to this principle, and reflected upon what he could not but know, that all *adjectives* denote *ſubſtances*; not indeed *ſubſiſting by themſelves*, as thoſe expreſſed by nouns, but *concretely*, as the *attributes* of other ſubſtances; he would not have claſſed *adjectives* with *verbs*, or have paſſed ſo ſevere a cenſure upon the *grammarians* for claſſing them with *nouns*. It matters very little how *adjectives* are *claſſed*, provided their *nature* and *effect* be underſtood; but they have at leaſt as good a title to be ranked with *nouns* as with *verbs*, and in our opinion a better. To adopt Mr *Harris*'s language, they are *homogeneous* with reſpect to *nouns*, as both denote *ſubſtances*; they are *heterogeneous* with reſpect to *verbs*, as they *never* do denote aſſertion.

96 Adjectives formed from ſubſtantives,

87. Beſides original adjectives, there is another claſs, which is formed from ſubſtantives. Thus, when we ſay, *the party of Pompey*, *the ſtyle of Cicero*, *the philoſophy of Socrates*; in theſe caſes, the *party*, the *ſtyle*, and the *philoſophy* ſpoken of, receive a ſtamp and character from the perſons whom they reſpect: Thoſe perſons, therefore, perform the part of *attributes*. Hence they *actually paſs into attributives*, and aſſume as ſuch the form of *adjectives*. It is thus we ſay, the *Pompeian party*, the *Ciceronian ſtyle*, and the *Socratic philoſophy*. In like manner, for a trumpet *of braſs*, we ſay a *brazen* trumpet, and for a crown *of gold*, a *golden* crown, &c. Even

97 and from pronouns.

pronominal ſubſtantives admit the like mutation. Thus, inſtead of ſaying, the book *of me*, and *of thee*, we ſay *my* book, and *thy* book; and inſtead of ſaying, the country *of us*, and *of you*, we ſay *our* country, and *your* country. Theſe words *my*, *thy*, *our*, *your*, &c. have therefore been properly called *pronominal adjectives*.

Adverbs, &c.

88. It has been already obſerved, and muſt be obvious to all, that *ſubſtances* alone are ſuſceptible of *ſex*; and that therefore *ſubſtantive nouns* alone ſhould have diſtinctions reſpecting *gender*. The ſame is true with reſpect to *number* and *perſon*. An ATTRIBUTE admits of no change in its nature, whether it belong to YOU or to ME, to a MAN or a WOMAN, to ONE *man* or to MANY; and therefore the *words* expreſſive of *attributes*, ought on all occaſions, and in every ſituation, to be *fixed* and *invariable*. For as the qualities *good* and *bad*, *black* and *white*, are the ſame, whether they be applied to a *man* or a *woman*, to *many* or to *few*; ſo the word which expreſſes any one of theſe attributes ought in ſtrictneſs to admit of no alteration with *whatever ſubſtantive* it may be joined. Such is the order of nature; and that order, on this as on other occaſions, the Engliſh language moſt ſtrictly obſerves: for we ſay equally, *a good man* or *a good woman*; *good men* or *good women*; *a good houſe* or *good houſes*. In ſome languages, indeed, ſuch as *Greek* and *Latin*, of which the *nouns* admit of *caſes*, and the *ſentences* of an *inverted ſtructure*, it has been found neceſſary to endow *adjectives* with the threefold diſtinction of *gender*, *number*, and *perſon*; but as this is only an accidental variation, occaſioned by particular circumſtances, and not in the leaſt eſſential to language, it belongs not to our ſubject, but to the *particular* grammars of theſe tongues.

98 Adjectives from their nature ſhould have no variation to denote ſex, number, or perſon.

99 They have however one variation found-ed in the nature of things.

There is, however, one variation of the *adjective*, which has place in all languages, is founded in the nature of things, and properly belongs to *univerſal grammar*. It is occaſioned by comparing the *attribute* of *one* ſubſtance with a *ſimilar* attribute of *another*, and falls naturally to be explained under the next ſection.

SECT. III. *Of Adverbs, and the Compariſon of Adjectives.*

100 The import of adverbs.

89. As *adjectives* denote the *attributes of ſubſtances*, ſo there is an inferior claſs of words which denote the *modifications* of theſe *attributes*. Thus, when we ſay "*Cicero* and *Pliny* were both of them *eloquent*; *Statius* and *Virgil* both of them *wrote*;" the attributes expreſſed by the words *eloquent* and *wrote* are immediately referred to *Cicero*, *Virgil*, &c.; and as denoting the *attributes* of *ſubſtances*, theſe words, the one an *adjective*, and the other a *verb*, have been both called ATTRIBUTIVES OF THE FIRST ORDER. But when we ſay, "*Pliny* was *moderately* eloquent, but *Cicero exceedingly* eloquent; *Statius* wrote *indifferently*, but *Virgil* wrote *admirably*; the words *moderately*, *exceedingly*, *indifferently*, and *admirably*, are not referable to *ſubſtantives*, but to other *attributes*; that is, to the words *eloquent* and *wrote*, the ſignification of which they *modify*. Such words, therefore, having the ſame effect upon *adjectives* that adjectives have upon *ſubſtantives*, have been called ATTRIBUTIVES OF THE SECOND ORDER. By grammarians they have been called ADVERBS; and, if we take the word VERB in its moſt *comprehenſive ſignification* (A), as including not only *verbs properly ſo called*, but alſo *every ſpecies of words*, which, whether *eſſentially* or *accidentally*, are ſignificant of the *attributes* of ſubſtances, we ſhall find the name ADVERB

101 The reaſon of their name.

to

(A) *Ariſtotle* and his followers called every word a *verb*, which denotes the predicate of a propoſition. This claſſification was certainly abſurd; for it confounds not only *adjectives* and *participles*, but even *ſubſtantives*, with *verbs*: but the authority of Ariſtole was great; and hence the name of *adverb*, though that word attaches itſelf only to an *adjective* or *participle*, or a *verb* ſignificant of an *attribute*: it does not attach itſelf to the *pure verb*.

Adverbs, &c.

to be a very juſt appellation, as denoting A PART OF SPEECH, THE NATURAL APPENDAGE OF SUCH VERBS. So great is this dependence in grammatical ſyntax, that an *adverb* can no more ſubſiſt without its *verb*, i. e. without *ſome word* ſignificant of an *attribute*, than a *verb* or *adjective* can ſubſiſt without its *ſubſtantive*. It is the ſame here as in certain natural ſubjects. Every *colour*, for its exiſtence, as much requires a *ſuperficies*, as the *ſuperficies* for its exiſtence requires a *ſolid body*.

102 Adverbs denoting intenſion and remiſſion.

90. Among the attributes of ſubſtances are reckoned *quantity* and *quality*: thus we ſay a *white garment*, a *high mountain*, &c. Now ſome of theſe quantities and qualities are capable of *intenſion* or *remiſſion*; or, in other words, *one ſubſtance* may have them in a *greater* or *leſs degree* than *another*. Thus we ſay, *a garment* EXCEEDINGLY *white*, *a mountain* TOLERABLY or MODERATELY *high*. Hence, then, one copious ſource of *ſecondary attributives* or ADVERBS to denote theſe two, that is, *intenſion* and *remiſſion*; ſuch as *greatly*, *tolerably*, *vaſtly*, *extremely*, *indifferently*, &c.

103 Attributes of the ſame kind compared by means of ſuch adverbs.

But where there are different intenſions of the ſame attribute, they may be *compared* together: Thus, if the garment A be EXCEEDINGLY *white*, and the garment B be MODERATELY *white*, we may ſay, the garment A is MORE *white* than the garment B. This *paper* is *white*, and *ſnow* is *white*; but ſnow is MORE *white* than this paper. In theſe inſtances, the adverb MORE not only denotes *intenſion*, but *relative intenſion*: nay, we ſtop not here, as we not only denote *intenſion merely relative*, but *relative intenſion than which there is none greater*. Thus we ſay, *Sophocles* was *wiſe*, *Socrates* was MORE *wiſe* than he, but *Solomon* was the MOST *wiſe* of men. Even *verbs*, properly ſo called, which denote an *attribute* as well as an *aſſertion*, muſt admit both of *ſimple* and alſo of *comparative intenſions*; but the *ſimple verb* TO BE admits of neither the one nor the other. Thus, in the following example, *Fame he* LOVETH MORE *than riches; but virtue of all things he* LOVETH MOST; the words MORE and MOST denote the different *comparative intenſions* of the *attribute* included under the verb *loveth*; but the *aſſertion* itſelf, which is the *eſſential* part of the *verb*, admits neither of *intenſion* nor *remiſſion*, but is the ſame in all poſſible propoſitions.

104 The compariſon of adjectives, either by adverbs,

91. From this circumſtance of *quantities* and *qualities* being capable of *intenſion* and *remiſſion*, ariſe the COMPARISON of *adjectives*, and its different DEGREES, which cannot well be more than the two ſpecies above mentioned; one to denote *ſimple exceſs*, and one to denote *ſuperlative*. Were we indeed to introduce more degrees than theſe, we ought perhaps to introduce *infinite*, which is abſurd. For why ſtop at a limited number, when in all ſubjects ſuſceptible of intenſion, the intermediate exceſſes are in a manner infinite? Between the firſt *ſimple white* and the ſuperlative *whiteſt*, there are infinite degrees of *more white*; and the ſame may be ſaid of *more* great, *more* ſtrong, *more* minute, &c. The doctrine of grammarians about *three* ſuch degrees of compariſon, which they call the *poſitive*, the *comparative*, and the *ſuperlative*, muſt be abſurd; both becauſe in their *poſitive* there is no *compariſon* at all, and becauſe their *ſuperlative* is a *comparative* as much as their *comparative* itſelf. Examples to evince this may be met with everywhere: *Socrates was the* MOST WISE *of all the Athenians; Homer was the* MOST SUBLIME *of all poets*, &c. In this ſentence *Socrates* is evidently compared with the *Athenians*, and *Homer* with all other poets. Again, if it be ſaid that *Socrates was* MORE WISE *than any other Athenian, but that Soloman was the* MOST WISE *of men*; is not a compariſon of *Solomon* with *mankind* in general, as plainly implied in the laſt clauſe of the ſentence, as a compariſon of *Socrates* with the *other Athenians* in the firſt? Adverbs, &c.

But if both imply compariſon, it may be aſked, In what conſiſts the difference between the *comparative* and *ſuperlative*? Does the *ſuperlative* always expreſs a *greater exceſs* than the *comparative*? No: for though Socrates was the *moſt wiſe* of the *Athenians*, yet is Solomon affirmed to have been *more wiſe* than he; ſo that here a *higher ſuperiority* is denoted by the comparative *more* than by the ſuperlative *moſt*. Is this then the difference between theſe two degrees, that the *ſuperlative* implies a compariſon of *one with many*, while the *comparative* implies only a compariſon of *one with one*? No: this is not always the caſe neither. The Pſalmiſt ſays, that "he is *wiſer* (or *more wiſe*) than all his teachers; where, though the *comparative* is uſed, there is a compariſon of *one with many*. The real difference between theſe two degrees of compariſon may be explained thus:

When we uſe the *ſuperlative*, it is in conſequence of having compared *individuals* with the *ſpecies* to which they belong, or one or more *ſpecies* with the *genus* under which they are comprehended. Thus, *Socrates was the* MOST WISE *of the Athenians, and the Athenians were the* MOST ENLIGHTENED *of ancient nations*. In the firſt clauſe of this ſentence, *Socrates*, although compared with the *Athenians*, is at the ſame time conſidered as *one* of them; and in the laſt, the *Athenians*, although compared with *ancient nations*, are yet conſidered as *one* of thoſe nations. Hence it is that in *Engliſh* the *ſuperlative* is followed by the prepoſition *of*, and in *Greek* and *Latin* by the *genitive caſe* of the *plural* number; to ſhow, that the object which has the pre-eminence is conſidered as *belonging to that claſs* of things with which it is *compared*.

But when we uſe the *comparative* degree, the objects *compared* are ſet in direct *oppoſition*; and the one is conſidered *not* as a *part* of the other, or as *comprehended* under it, but as ſomething altogether *diſtinct* and *belonging to a different claſs*. Thus, were one to ſay, "Cicero was *more eloquent* than the Romans," he would ſpeak abſurdly; becauſe every body knows, that of the claſs of men expreſſed by the word *Romans* Cicero was one, and ſuch a ſentence would affirm that orator to have been more eloquent than himſelf. But when it is ſaid that "Cicero was *more eloquent* than all the *other* Romans, or than *any other* Roman," the language is proper, and the affirmation true: for though the perſons ſpoken of were all of the ſame claſs or city, yet Cicero is here ſet in contradiſtinction to the reſt of his countrymen, and is not conſidered as *one* of the perſons with whom he is compared. It is for this reaſon that in Engliſh the *comparative* degree is followed by a noun governed by the word of contradiſtinction *than*, and in Latin by a noun in the *ablative caſe* governed by the prepoſition *præ* (B) either expreſſed or underſtood. We have already obſerved, that the *ablative caſe* denotes concomitancy: and therefore when an

(B) See *Ruddimanni Grammaticæ Inſtitutiones*, *Pars ſecunda*, lib. i. cap. 2. Although it is certainly true, that when we uſe the *ſuperlative*, we ought in propriety to conſider the things com-

Adverbs, &c.

an adjective in the comparative degree is prefixed to a noun, that noun is put in the *ablative case*, to denote that two things are compared together in *company*; but by means of the preposition, expressed or understood, that which is denoted by the *comparative adjective* is seen to be preferred *before* that which is denoted by the *noun*.

105 Or by inflexion.

92. We have hitherto considered *comparatives* as expressed by the words *more* and *most*; but the authors, or improvers of language, have contrived a method to retrench the use of these *adverbs*, by expressing their force by an *inflection* of the *adjective*. Thus, instead of *more fair*, they say FAIRER; instead of *most fair*, FAIREST: and the same method of comparison takes place both in the Greek and Latin languages; with this difference, however, between the genius of these languages and ours, that we are at liberty to form the comparison either in the one method or in the other; whereas in those languages the comparison is seldom if ever formed by the assistance of the adverb, but always by the inflection of the adjective. Hence this inflection is by the Greek and Latin grammarians considered as a *necessary accident* of the *adjective*; but it has reached no farther than to *adjectives*, and *participles sharing the nature of adjectives*. The attributes expressed by *verbs* are as susceptible of comparison as those expressed by *adjectives*; but they are always compared by means of *adverbs*, the *verb* being too much diversified already to admit of more variations without perplexity.

106 Comparatives sometimes lose their relative nature.

93. It must be confessed that *comparatives*, as well the *simple* as the *superlative*, seem sometimes to part with their *relative* nature, and to retain only their *intensive*. Thus in the degree denoting *simple* excess:

TRISTIOR, *et lacrymis oculos suffusa nitentes.* VIRG.

Tristior means nothing more than that *Venus* was *very* sad. In the degree called the *superlative* this is more usual. Phrases extremely common are, *Vir doctissimus, vir fortissimus*, "a most learned man, a most brave man;" i. e. *not* the *bravest* and *most learned* man that ever existed, but a man possessing those qualities *in an eminent degree*. In English, when we intimate that a certain quality is possessed in an eminent degree, without making any *direct comparison* between it and a similar quality, we do it by the *intensive* word *very*, more commonly than by *most*: as, *Cicero was* VERY *eloquent; the mind of Johnson was* VERY *vigorous*. This mode of expression has been called the *superlative* of *eminence*, to distinguish it from the *other superlative*, which is *superlative* upon *comparison*. Yet it may be said, that even in the *superlative* of *eminence* something of *comparison* must be *remotely* or *indirectly* intimated, as we cannot reasonably call a man *very* eloquent without comparing *his* eloquence with the eloquence of *other men*. This is indeed true; but we cannot therefore affirm that *comparison* is more clearly intimated in *this superlative* than in the *simple adjective eloquent*: for when we say that a man is *eloquent*, we mark between *his* eloquence and that of *other men* a distinction of the same *kind*, though not in the same *degree*, as when we say that he is *very* eloquent.

In English we distinguish the two superlatives, by prefixing to the *one* the definite article *the*, to show that something is predicated of the object expressed by it, which cannot be predicated of *any other* object; and by subjoining the preposition *of*, to show that the objects with which it is compared are of the same class with itself: as, "Solomon was *the* wisest *of* men; Hector was *the* most valiant *of* the Trojans." To the other (c) superlative we only prefix the indefinite article *a*: as, "he was *a very* good man: he was *a most* valiant soldier."

107 Adjectives which admit not of degrees of comparison.

94. As there are some *qualities* which admit of *comparison*, so there are others which admit of none: such, for example, are those which denote that *quality of bodies arising from their figure*; as when we say, a *circular* table, a *quadrangular* court, a *conical* piece of metal, &c. The reason is, that a million of things participating the same figure, participate it *equally*, if they do it at all. To say, therefore that while A and B are both *quadrangular*, A is *more* or *less* quadrangular than B, is absurd. The same holds true in all attributives denoting *definite quantities* of whatever nature: for as there can be no comparison without *intension* or *remission*, and as there can be no intension or remission in *things always definite*, therefore these attributives can admit of no comparison. By the same method of reasoning, we discover the cause why no *substantive is susceptible of these* degrees *of comparison*. *A mountain* cannot be said MORE TO BE *or* TO EXIST than a *mole-hill*; but the *more* or *less* must be sought for in their quantities. In like manner, when we refer many individuals to one species, the lion A cannot be called *more a lion* than the lion B (D); but if more any thing, he is *more fierce*, *more swift*, or exceeding in some such attribute. So again, in referring many species to one genus, a crocodile is not *more an animal* than a lizard; nor a tiger more than a cat: but, if any thing, the crocodile and tiger are *more bulky*, *more strong*, &c. than the animals with which they are compared; the excess, as before, being derived from their attributes.

95.

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compared as of the same class; and when we use the *comparative*, as of different classes; yet is not this *distinction* always attended to by the best writers in any language. In Latin and Greek the *comparative* is sometimes used, where in English we should use the *superlative*; as *dextra est fortior manuum*; and in the Gospel it is said, that "a grain of mustard-seed is the *smaller* (μικροτερος) of all seeds, but when grown up it is the *greater* (μειζων) of herbs." Even in English, the custom of the language permits us not to say "he is the *tallest* of the two," it must be the *taller* of the two; but we cannot say "he is the *taller* of the *three*," it must be the *tallest*. For these and other deviations from the general rule no reason is to be found in the nature of things; they are errors made proper by use.

(c) In English, the termination *est* is peculiar to the superlative of *comparison*, to which the *definite* article is prefixed. Thus we may say, "Homer was *the sublimest* of poets;" but we cannot say, "Homer was *a* sublimest poet." Again, we may say, "Homer was *a very* sublime poet;" but not, "Homer was *the very* sublime poet."

(D) When Pope says of a certain person, that he is "a tradesman, meek, and *much a liar*;" the last phrase is the same with *much given* to lying, the word *liar* having the effect of an *attributive*.

Adverbs, &c.

108 Adverbs divided into classes.

95. Of the *adverbs* or *secondary attributives* already mentioned, those denoting *intension* and *remission* may be called ADVERBS of QUANTITY CONTINUOUS, as *greatly*, *vastly*, *tolerably*, &c. *once*, *twice*, *thrice*, &c. (E) are ADVERBS of QUANTITY DISCRETE; *more* and *most*, *less* and *least*, to which may be added *equally*, *proportionally*, &c. are ADVERBS of RELATION. There are others of QUALITY: as when we say, HONESTLY *industrious*, PRUDENTLY *brave*; *they fought* BRAVELY, *he painted* FINELY.

And here it may be worth while to observe, how the same thing, participating the same essence, assumes different grammatical forms from its different relations. For example, suppose it should be asked, How differ *honest*, *honestly*, and *honesty*? The answer is, They are in *essence* the same: but they differ in as much as *honest* is the *attributive* of a *noun*; *honestly*, of *verb* or *adjective*; and *honesty* being divested of these its attributive relations, assumes the power of a *noun* or *substantive*, so as to stand by itself.

96. The adverbs hitherto mentioned are common to *verbs of every species*; but there are some which are confined to *verbs properly so called*, that is, to such verbs as denote *motions* or *energies* with their *privations*. All *motion* and *rest* imply *time* and *place* as a kind of necessary coincidence. Hence, when we would express the place or time of either, we have recourse to *adverbs* formed for this purpose; of PLACE, as when we say, *he stood* THERE, *he went* HENCE, *he came* HITHER; of time, as when we say, *he stood* THEN, *he went* AFTERWARDS, *he travelled* FORMERLY. To these may be added the adverbs which denote the *intensions* and *remissions peculiar to* MOTION, such as *speedily*, *hastily*, *swiftly*, *slowly*, &c.; as also adverbs of *place* made out of *prepositions*, such as *upward* and *downward* from *up* and *down*. It may, however, be doubted whether some of these words, as well as many others, which do not so properly *modify attributes*, as mark some *remote circumstance* attending an attribute or our way of conceiving it, are truly *adverbs*, though so called by the grammarians. The simple *affirmative* and *negative* YES and NO are called *adverbs*, though they surely do not signify that which we hold to be the very essence of the adverb, a *modification of attributes*. "Is he learned? *No*. "Is he brave? *Yes*." Here the two adverbs, as they are called, signify *not* any *modification* of the attributes *brave* and *learned*, but a total negation of the attribute in the one case, and in the other a declaration that the attribute belongs to the person spoken of.

109 The meaning of adverbs to be ascertained by etymology.

110 Many of them mere abbreviations.

Adverbs are indeed applied to many purposes; and their general nature may be better understood by reading a list of them, and attending to their etymology, than by any general description or definition. Many of them seem to have been introduced into language in order to express by *one word* the meaning of two or three; and are mere abbreviations of nouns, verbs, and adjectives. Thus, the import of the phrase, *in what place*, is expressed by the single word WHERE; *to what place*, by WHITHER; *from this place*, by HENCE; *in a direction ascending*, by UPWARDS; *at the present time*, by NOW; *at what time*, by WHEN; *at that time*, by THEN; *many times*, by OFTEN; *not many times*, by SELDOM, &c.

Adverbs, &c.

97. Mr *Horne Tooke* has, with great industry and accuracy, traced many of the English adverbs from their origin in the ancient Saxon and other northern tongues, and shown them to be either corruptions of other words or abbreviations of phrases and sentences. He observes, "that all adverbs ending in LY, the most prolific branch of the family, are sufficiently understood: the termination being only the word *like* corrupted; and the corruption so much the more easily and certainly discovered, as the termination remains more pure and distinguishable in the other sister languages, in which it is written *lick*, *lyk*, *lig*, *ligen*." He might have added, that in Scotland the word *like* is, at this day, frequently used instead of the English termination *ly*; as for a *goodly figure*, the common people say a *good-like* figure. Upon this principle the greater part of *adverbs* are resolved into those parts of speech which we have already considered, as *honestly* into *honest-like*, *vastly* into *vast-like*, &c. so that when we say of a man he is *honestly industrious*, we affirm that he is *honest-like industrious*, or that his *industry* has the *appearance* of being *honest*. *Adverbs* of a different termination the same acute writer resolves thus; AGHAST into the past participle AGAZED;

"The French exclaimed,—the devil was in arms.
"All the whole army stood *agazed* on him." SHAKESP.

AGO, into the past participle AGONE or GONE. ASUNDER he derives from ASUNDRED, *separated*; the past participle of the Anglo-Saxon verb *asundrian*: a word which, in all its varieties, is to be found, he says, in all the northern tongues; and is originally from *sond*, i. e. *sand*. TO WIT, from WITTAN *to know*; as *videlicet* and *scilicet*, in Latin, are *abbreviations* of *videre-licet* and *scire-licet*. NEEDS, he resolves into NEED IS, used parenthetically; as, "I must *needs* do such a thing."—"I must (need is) do such a thing;" i. e. "I *must* do it, there *is need* of it." ANON, which our old authors use for *immediately*, *instantly*, means, he says, *in one*; i. e. *in one instant*, *moment*, *minute*. As,

"And right *anon* withouten more abode."
"*Anon* in all the haste I can."

ALONE and ONLY are resolved into ALL ONE, and ONE-LIKE. In the Dutch, EEN is *one*; and ALL-EEN-LIKE, *only*, anciently *alonely*. ALIVE is *on live*, or *in life*. Thus,

"Christ eterne *on live*." CHAUCER.

AUGHT or OUGHT; A WHIT or O WHIT; O being formerly written for the article A, or for the numeral ONE; and *whit* or *hwit*, in Saxon, signifying a small thing, a a *point* or *jot*. AWHILE, which is usually clasped with *adverbs*, is evidently a *noun* with the indefinite *article* prefixed; *a while*, i. e. *a time*. WHILST, anciently and more properly WHILES, is plainly the Saxon HWILEES, *time that*. ALOFT was formerly written ON-LOFT: As,

"And ye, my mother, my soveregne pleasance
"Over al thing, *out take* Christ ON LOFTE." CHAUCER.

Now, says Mr Horne Tooke, *lyft*, in the Anglo Saxon, is

(E) These words were anciently written *one's*, *twie's*, *thrie's*; and are merely the genitives of *one*, *two*, *three*, the substantive *time* or *turn* being omitted. Thus, *How often did you write?* Answer, *Once*, i. e. *one's time*. See *Horne Tooke's Diversions of Purley*.

Verbs.

is *the air* or *the clouds*, as IN LYFTE CUMMENDE, *coming in the clouds* (*St Luke*). In the Daniſh, LUFT is *air*; and "at ſpronge i *luften*," *to blow up into the air*, or ALOFT. So in the Dutch, *de loef hebben*, to ſail before the wind; *loeven*, to ply to windward; *loef*, the weather gage, &c. From the ſame root are our other words; *Loft*, *lofty*, to *luff*, *lee*, *leeward*, *lift*, &c. It would be needleſs, as the ingenious author obſerves, to notice ſuch adverbs as, *afoot*, *adays*, *aſhore*, *aſtray*, *aſlope*, *aright*, *abed*, *aback*, *abreaſt*, *afloat*, *aloud*, *aſide*, *afield*, *aground*, *aland*, &c. Theſe are at firſt view ſeen for what they are. Nor ſhall we follow him through the analyſis which he has given of many other adverbs, of which the origin is not ſo obvious as of theſe. Of the truth of his principles we are ſatisfied; and have not a doubt, but that upon thoſe principles a man converſant with our earlieſt writers, and thoroughly ſkilled in the preſent languages, may trace every Engliſh (s) adverb to its ſource, and ſhow that it is no part of ſpeech ſeparate from thoſe which we have already conſidered. The *adverbs*, however, of *affirmation* and *negation*, are of too much importance to be thus paſſed over; and as we have never ſeen an account of them at all ſatisfactory, except that which has been given by *Horne Tooke*, we ſhall tranſcribe the ſubſtance of what he ſays concerning AYE, YEA, YES, and NO. To us theſe words have always appeared improperly claſſed with *adverbs* upon every definition which has been given of that part of ſpeech. Accordingly, our author ſays, that AYE or YEA is the imperative of a verb of northern extraction; and means, *have*, *poſſeſs*, *enjoy*. And YES is a contraction of AY-ES, have, poſſeſs, enjoy, *that*. Thus, when it is aſked whether a man be learned, if the anſwer be by the word YES, it is equivalent to *have that*, *enjoy that*, belief or that propoſition. (See what was ſaid of the nature of interrogation, Chap. IV. N° 76.)

The northern verb of which *yea* is the imperative, is in Daniſh EJER, *to poſſeſs*, *have*, *enjoy*. EJA, *aye* or *yea*; EJE, *poſſeſſion*; EJER, *poſſeſſor*. In Swediſh it is EGA, *to poſſeſs*; of which the imperative is JA, *aye*, *yea*: EGARE, *poſſeſſor*. In German, JA ſignifies *aye*, or *yea*; EIGENER, *poſſeſſor*, *owner*; EIGEN, *own*. In Dutch, EIGENEN is *to poſſeſs*; JA, *yea*.

Greenwood derives NOT and its abbreviate NO from the *Latin*; Minſhow, from the *Hebrew*; and Junius, from the *Greek*. Our author very properly obſerves, that the inhabitants of the north could not wait for a word expreſſive of diſſent till the eſtabliſhment of thoſe nations and languages: and adds, that we need not be inquiſitive nor doubtful concerning the origin and ſignification of NOT and NO; ſince we find that, in the Daniſh, NODIG, in the Swediſh NODIG, and in the Dutch, NOODE, NODE, and NO, mean *averſe*, *unwilling*. So that when it is aſked whether a man be brave, if the anſwer be NO, it is a declaration that he who makes it is *averſe from* or *unwilling* to *admit* that propoſition.

Prepoſition, &c.

98. Moſt writers on grammar have mentioned a ſpecies of adverbs, which they call *adverbs* of *interrogation*, ſuch as *where*, *whence*, *whither*, *how*, &c. But the truth is, that there is no part of ſpeech, which, of itſelf, denotes interrogation. A queſtion is never aſked otherwiſe than by *abbreviation*, by a *ſingle* word, whether that word be a *noun*, a *pronoun*, a *verb*, or an *adverb*. The word WHERE is equivalent to—*in what place*; WHENCE to—*from what place*; and HOW to—*in what manner*, &c. In theſe phraſes, IN *what place*, FROM *what place*, and IN *what manner*, the only word that can be ſuppoſed to have the force of an *interrogative*, is *what*, which is reſolvable into *that which*: But we have already explained, in the chapter of *Pronouns*, the principles upon which the *relative* is made to denote interrogation, and the ſame reaſoning will account for the adverbs *where*, *whence*, *whither*, *how*, &c. being employed as *interrogatives*. When we ſay, *where were you yeſterday? whence have you come? whither are you going? how do you perform your journey?* We merely uſe ſo many *abbreviations* for the following ſentences; *tell us*, or *deſcribe to us*, THE PLACE *where* (or in which) *you were yeſterday*; THE PLACE *whence* (or from which) *you have come*; THE PLACE *to which you are going*; THE MANNER *in which you perform your journey?* And ſo much for *adverbs*. We now proceed to thoſe parts of ſpeech which are uſually called *prepoſitions* and *conjunctions*, and of which the uſe is to connect the other words of a ſentence, and to combine two or more *ſimple* ſentences into *one compound* ſentence.

CHAP. VI. *Of Prepoſitions, Conjunctions, and Interjections.*

Objects, and of courſe ideas, linked together.

99. IT has been obſerved, that a man while awake is conſcious of a continued train of perceptions and ideas paſſing in his mind, which depends little upon his own will; that he cannot to the train add a new idea; and that he can but very ſeldom break its connexion. To the ſlighteſt reflection theſe truths muſt be apparent. Our firſt ideas are thoſe which we derive from external objects making impreſſions on the ſenſes; but all the external objects which fall under our obſervation are linked together in ſuch a manner as indicates them to be parts of one great and regular

(s) The ſame reſolution might probably be made of the *Greek* and *Latin adverbs*, were we as intimately acquainted with the ſources of thoſe tongues as Mr Horne Tooke is with the ſources of the Engliſh language. "Many of the *Latin* adverbs (ſays the learned Ruddiman) are nothing elſe but *adjective nouns* or *pronouns*, having the *prepoſition* and *ſubſtantive* underſtood; as, *quo*, *eo*, *eodem*, for *ad quæ*, *ea*, *eadem* (*loca*) or *cui*, *ei*, *eidem* (*loco*); for of old theſe datives ended in *o*. Thus, *qua*, *hac*, *illac*, &c. are plainly adjectives in the *abl. ſing. femin.* the word *via*, "a way," and the prepoſition *in*, being underſtood. Many of them are compounds; as, *quomodo*, i. e. *quo modo*; *quemadmodum*, i. e. *ad quem modum*; *quamobrem*, i. e. *ob quam rem*; *quare*, i. e. (*pro*) *qua re*; *quorſum*, i. e. *verſus quem* (*locum*); *ſcilicet*, i. e. *ſcire licet*; *videlicet*, i. e. *videre licet*; *ilicet*, i. e. *ire licet*; *illico*, i. e. *in loco*; *magnopere*, i. e. *magno opere*; *nimirum*, i. e. *ni* (*eſt*) *mirum*; *hodie*, i. e. *hoc die*; *poſtridie*, i. e. *poſtero die*; *pridie*, i. e. *præ die*. *Profecto*, *certe*, *ſane*, *male*, *bene*, *plane*, are obviouſly adjectives. *Forte* is the ablative of *fors*; and if we had leiſure to purſue the ſubject, and were maſters of all the languages from which the Latin is derived, we doubt not but we ſhould be able to reſolve every *adverb* into a *ſubſtantive* or adjective.

Prepoſitions, &c.

112 by various relations:

ſyſtem. When we take a view of the things by which we are ſurrounded, and which are the archetypes of our ideas, their inherent qualities are not more remarkable than the various relations by which they are connected. *Cauſe* and *effect*, *contiguity*, in time or in place, *high* and *low*, *prior* and *poſterior*, *reſemblance* and *contraſt*, with a thouſand other relations, connect things together without end. There is not a ſingle thing which appears ſolitary and altogether devoid of connexion. The only difference is, that ſome are intimately and ſome ſlightly connected, ſome nearly and ſome at a diſtance. That the relations by which external objects are thus linked together muſt have great influence in directing the train of human thought, ſo that not one perception or idea can appear to the mind wholly unconnected with all other perceptions or ideas, will be admitted by every man who believes that his ſenſes and intellect repreſent things as they are.

This being the caſe, it is neceſſary, if the purpoſe of language be to communicate thought, that the ſpeaker be furniſhed with words, not only to expreſs the ideas of ſubſtances and attributes which he may have in his mind, but alſo to indicate the order in which he views them, and to point out the various relations by which they are connected. In many inſtances all this may be done by the parts of ſpeech which we have already conſidered. The cloſeſt connexion which we can conceive is that which ſubſiſts between a ſubſtance and its qualities; and in every language with which we are acquainted, that connexion is indicated by the immediate coaleſcence of the *adjective* with the *ſubſtantive;* as we ſay, *a good man*, *a learned man; vir bonus*, *vir doctus*. Again, there is a connection equally intimate, though not ſo permanent, between an *agent* and his *action:* for the action is really an attribute of the agent; and therefore we ſay, the *boy reads*, the *man writes;* the noun coaleſcing with the verb ſo naturally, that no other word is requiſite to unite them. Moreover, an *action* and *that* which is *acted upon* being contiguous in nature, and mutually affecting each other, the words which denote them ſhould in language be mutually attractive, and capable of coaleſcing without external aid; as, he *reads a book*, he *builds a houſe*, he *breaks a ſtone*. Further; becauſe an *attribute* and its *modifications* are inſeparably united, an *adjective* or a *verb* is naturally connected with the *adverb* which illuſtrates or *modifies* its ſignification; and therefore, when we ſay, he *walks ſlowly*, he is *prudently brave*, it is plain that no other word is neceſſary to promote the coaleſcence of the attributes *walking* and *bravery* with their modifications of *ſlowneſs* and *prudence*. The agreement between the terms of any propoſition which conſtitutes truth is abſolutely perfect; but as *either* of the terms may agree with *many other* things beſides its *correlate*, ſome word is requiſite in every propoſition to connect the particular *predicate* with the particular *ſubject:* and that is the office of the ſimple verb TO BE; as, *the three angles of every triangle* ARE *equal to two right angles*.

Thus we ſee, that many of the relations ſubſiſting between our ideas may be clearly expreſſed by means of *nouns*, *adjectives*, *verbs*, and *adverbs;* and in thoſe languages of which the nouns have *caſes*, there is perhaps *no* relation of much importance which *might not* be thus pointed out, without being under the neceſſity of employing the aid of any additional part of ſpeech. In Engliſh, however, the caſe is otherwiſe; for were we to ſay, "He rode Edinburgh, went the parliament-houſe, walked his counſel the court met," we ſhould ſpeak unintelligibly; as in theſe expreſſions there is either a total want of connexion, or ſuch a connection as produces falſehood and nonſenſe. In order to give meaning to the paſſage, the ſeveral gaps muſt be filled up by words ſignificant of the various relations by which the different ideas are connected in the mind; as, "He rode *to* Edinburgh, went *to* the parliament-houſe, *and* walked *with* his counſel *till* the court met." Of theſe *connecting* words, TO and WITH are called *prepoſitions*, AND and TILL are uſually called *conjunctions*. Although theſe *prepoſitions* and *conjunctions* are not ſo *abſolutely neceſſary* in Greek and Latin as they are in Engliſh; yet as there is no language wholly without them, nor any language in which it is not of importance to underſtand their force, they well deſerve a place in univerſal grammar.

Prepoſitions, &c.

113 Expreſſed by prepoſitions and conjunctions.

114 These connect either ſentences or words.

100. The ſole uſe of *conjunctions* and *prepoſitions* in language is to connect either *ſentences* or *other words;* but the theory of theſe *connectives* themſelves has certainly never been underſtood, unleſs HORNE TOOKE has at laſt hit upon the truth. Mr HARRIS writes *about them* and *about them*, quoting paſſages from Greek and Latin authors, and produces at laſt no information. His *definitions* of both, as *parts of ſpeech void of ſignification*, are highly abſurd; and even the principal *diſtinction* which he makes between them ſeems not to be well founded. *Prepoſitions* and *conjunctions* denote the *relations* ſubſiſting between the ideas expreſſed by thoſe words or ſentences which they ſerve to connect; and as *relations* are contemplated by the mind as well as *poſitive ideas* themſelves, the *words* which *denote* thoſe relations cannot be *inſignificant*. The eſſential difference between the *conjunction* and *prepoſition*, according to the ſame author, conſiſts in this, that the *former* connects *ſentences*, and the *latter words:* but the fact is often otherwiſe. An obvious example occurs where the conjunction AND connects *not ſentences* but *words*. "A man of *WISDOM and VIRTUE* is a perfect character." Here it is not meant to be aſſerted, "that the man of WISDOM is a perfect character, *and* that the man of VIRTUE is a perfect character:" both theſe aſſertions would be falſe. This ſentence therefore (and many ſuch will occur) is not reſolvable into two; whence it follows, that the conjunction AND does not always connect *ſentences;* and the ſame is frequently the caſe with other *conjunctions*.

Horne Tooke's idea of *prepoſitions* and *conjunctions* is, that they do not form *diſtinct claſſes* of words, but are merely *abbreviations* of *nouns* and *verbs:* and with reſpect to the *Engliſh* language, he has been remarkably ſucceſsful in proving his poſition. But though ſuch be undeniably the caſe in Engliſh, it would be raſh to conclude *à priori* that it is ſo in all other tongues. To eſtabliſh this general concluſion would require a long and tedious deduction in each particular language: and how much learning, leiſure, induſtry, and acuteneſs, ſuch an undertaking would require, even in one tongue, it is not eaſy to determine. In the languages with which we are beſt acquainted, many *conjunctions*, and moſt *prepoſitions*, have the *appearance* at leaſt of *original words;* and though this moſt acute grammarian, from his knowledge of the northern tongues, has been able to trace the moſt important of thoſe in Engliſh to very

Conjunctions.

very plauſible ſources, the ſame thing would be difficult in other languages of which the ſources are obſcure, and abſolutely impoſſible in thoſe of which they are wholly unknown. It is, however, a ſtrong preſumption in favour of his opinion, that grammarians have never been able to aſſign any *general characteriſtic* of thoſe ſpecies of words; which, did they conſtitute *diſtinct parts* of *ſpeech*, one would think could not have ſo long remained undiſcovered. It is a farther preſumption in his favour, that many words in Greek and Latin, as well as in Engliſh, which have been called *conjunctions*, are obviouſly reſolvable upon his principles, and indeed diſcover their meaning and origin upon mere inſpection. We ſhall therefore content ourſelves with retailing the common doctrine reſpecting theſe parts of ſpeech ſo far as it is intelligible; ſubjoining at the bottom of the page the analyſis given by Horne Tooke of the moſt important *Engliſh conjunctions* and *prepoſitions*; and requeſting our readers, who would underſtand the ſubject, to attend more to the relations between their various ideas, than to the frivolous diſtinctions which, in compliance with cuſtom, we are compelled to lay before them. We ſhall treat firſt of the *conjunction*.

SECT. I. *Of Conjunctions.*

115 Definition of conjunctions.

101. A *conjunction* is *a part of ſpeech of which*, as its name indicates, *the uſe is to connect either two or more words in a ſentence, or to make of two ſimple ſentences one compound ſentence.* It is uſually ſaid, that conjunctions never connect words, but ſentences only, and that this is the circumſtance which diſtinguiſhes them from *prepoſitions*. We have already given one example which proves this diſtinction to be ill founded; we ſhall now give from *Horne Tooke* one or two more, which will place its abſurdity in a ſtill clearer light: *Two* AND *two are four; John* AND *Jane are a handſome couple; AB and BC and CA form a triangle.* Are *two four?* Is *John* a *couple* and *Jane* a *couple?* Does *one ſtraight line* form a *triangle?* From the ſubjoined note it appears, that AND (G) may connect any two things which can be connected, as it ſignifies *addition*.

116 Which are either conjunctive or disjunctive

Conjunctions connecting *ſentences*, ſometimes *connect their meaning*, and *ſometimes not*. For example, let us take theſe two ſentences, *Rome was enſlaved, Cæſar was ambitious*, and connect them together by the conjunction BECAUSE; *Rome was enſlaved* BECAUSE *Cæſar was ambitious*. Here the *meanings*, as well as the *ſentences*, appear to be connected by that natural *relation* which ſubſiſts between an *effect* and its *cauſe*; for the enſlaving of Rome was the *effect* of Cæſar's ambition. That *particular relation* therefore is that which is denoted by the conjunction BECAUSE (H), which would be improperly uſed to connect two ſentences between which the *relation* of an *effect* to its *cauſe* exiſts not. But if it be ſaid, *manners muſt be reformed,* OR *liberty will be loſt*; here the conjunction OR, though it *join* the *ſentences*, yet as to their meaning is a perfect *disjunctive*. Between the *reformation* of *manners* and the *loſs of liberty* there is certainly a *natural relation*; but it is not the relation of *contiguity* or *ſimilitude*, or of *cauſe* and *effect*, but of *contrariety*. The *relation* of *contrariety* therefore is the ſignification of the word OR (I). And thus it appears, that though all conjunctions may combine *ſentences*, yet, with reſpect to the *ſenſe*, ſome are CONJUNCTIVE and others are DISJUNCTIVE.

Conjunctions.

117 Conjunctions either copulative or continuative.

102. Thoſe *conjunctions which conjoin both ſentences and their meanings* are either COPULATIVES or CONTINUATIVES. The principal copulative in *Engliſh* is AND, which we have already conſidered. The continuatives are much more numerous; IF, AN, BECAUSE, THEREFORE, WHEREFORE, HENCE, &c. The difference between them is this: The *copulative* does no more than barely *couple* words or ſentences, and is therefore applicable to all ſubjects of which the natures are *not incompatible* (K). The relation which it denotes is that of *juxtapoſition*, or of *one thing added to another*. *Continuatives*, on the contrary, by a more intimate connection, conſolidate ſentences *into one continuous whole*; and are therefore applicable only to ſubjects which have an *eſſential relation* to each other, ſuch as *that* of an *effect to its cauſe* or of *a cauſe to its effect*. For example, it is no way improper to ſay, *Lyſippus was a ſtatuary,* AND *Priſcian a grammarian; the ſun ſhineth,* AND *the ſky is clear*; becauſe theſe are things that may coexiſt, and yet imply no abſurdity. But it would be abſurd to ſay, *Lyſippus was a ſtatuary* BECAUSE *Priſcian was a grammarian*; though not to ſay, *the ſun ſhineth* BECAUSE *the ſky is clear*. With reſpect to the firſt, the reaſon is, that the word BECAUSE denotes the *relation* which an *effect* bears to its *cauſe*: but the ſkill of *Priſcian* in *grammar* could not poſſibly be the *cauſe* of *Lyſippus's* ſkill in *ſtatuary*; the coincidence between the ſkill of the one and that of the other, in arts ſo very different, was merely *accidental*. With reſpect to *the ſhining of the ſun* and the *clearneſs of the ſky*, the caſe is widely different; for the *clearneſs of the ſky* is the CAUSE of the *ſun's ſhining*, at leaſt ſo as to be ſeen by us.

118 Continuatives, either ſuppoſitive or poſitive.

As to the *continuatives*, they are either SUPPOSITIVE, ſuch as *if, an;* or POSITIVE, ſuch as *becauſe, therefore, as,* &c. Take examples of each: *You will live happily* IF *you live honeſtly; you live happily* BECAUSE *you live honeſtly; you live honeſtly,* THEREFORE *you live happily.* The difference between theſe *continuatives* is this: The *ſuppoſitives* denote *connection*, but do not aſſert *actual* exiſtence:

(G) AND is a Saxon word, being (according to Mr *H. Tooke*) an abbreviation of ANAD, the imperative of the verb ANANAD, *to add to* or *heap up*. So that when we ſay *two* AND *two are four*, we only declare that *two* ADDED TO *two are four*.

(H) BECAUSE is compounded of the Saxon BE—*by*, and *cauſe*; and by ſome of our moſt ancient authors it was written BY CAUSE. *Rome was enſlaved* BECAUSE *Cæſar was ambitious*, is therefore equivalent to, *Rome was enſlaved by the cauſe* CÆSAR WAS AMBITIOUS; taking the phraſe, *Cæſar was ambitious* as an abſtract noun in concord with the other noun *cauſe*.

(I) OR ſeems to be a mere contraction of the Saxon ODER, which ſignifies *other*, i. e. ſomething *different* and often *contrary*. So that the conjunction *or* muſt always denote *diverſity*, and very often *contrariety*.

(K) As *day* and *night*, *heat* and *cold*: for we cannot ſay of the ſame portion of time, *it is day* AND *it is night*; or of the ſame body, it is both *hot* AND *cold*.

Conjunctions.

118 Positives, either causal or collective.

iſtence; the *poſitives* imply both the *one* and the *other* (L).

The *poſitives* above mentioned are either CAUSAL; ſuch as, *becauſe*, *ſince*, *as* (M), &c.: Or COLLECTIVE; ſuch as, *therefore*, *wherefore*, &c. The difference between theſe is this: The *cauſals* ſubjoin *cauſes* to *effects*; as, *the ſun is in eclipſe*, BECAUSE *the moon intervenes*: The *collectives* ſubjoin *effects* to *cauſes*; as, *the moon intervenes*, THEREFORE

Conjunctions.

(L) The reaſon of all this will be apparent from the analyſis given by *Horne Tooke* of thoſe words which we have called *ſuppoſitive* conjunctions. IF and AN may be uſed mutually and indifferently to ſupply each other's place; for they are both *verbs*, and of the ſame import. IF is merely the imperative of the *Gothic* and *Anglo-Saxon* verb GIFAN, *to give*; and in thoſe languages, as well as in the Engliſh formerly, this *ſuppoſed conjunction* was pronounced and written as the common imperative GIF. Thus,

"——————————— My largeſſe
" Hath lotted her to be your brother's miſtreſſe,
" GIF ſhee can be reclaimed; GIF not, his prey." *Sad Shepherd*, Act ii. ſcene 1.

Gawin Douglaſs almoſt always uſes GIF for IF, as the common people in ſome counties of Scotland do even at this day; and it is obvious, that our IF has always the *ſignification* of the Engliſh imperative *give*, and no other. So that the reſolution of the conſtruction in the ſentence, *IF you live honeſtly you will live happily*, is ſimply this, *GIVE you live honeſtly* (taking *you live honeſtly* as an abſtract noun) *you will live happily*. Your living *happily* is declared to depend upon your living *honeſtly* as the *condition*; but *give that*, and your happineſs is poſitively aſſerted. In like manner may ſuch ſentences be reſolved as,

" I wonder he can move! that he's not fixed!
" IF THAT his feelings be the ſame with mine."

Thus, " His feelings be the ſame with mine, *give that*, I wonder he can move," &c. And here we cannot forbear giving our aſſent to the truth of Mr Tooke's obſervation, that when the *datum* upon which any concluſion depends is a *ſentence*, the article THAT, if not expreſſed, *may* always be inſerted. We do not, however, think the *inſertion* at all times abſolutely *neceſſary* to complete the ſyntax; for active verbs govern *whole ſentences* and *clauſes* of ſentences as well as ſubſtantive *nouns*. Inſtances of this occur ſo frequently in the Latin claſſics, that they can have eſcaped no man's notice who has ever read *Horace* or *Virgil* with attention. We agree likewiſe with our moſt ingenious author, that where the *datum* is not a ſentence, but ſome *noun* governed by the verb IF or GIVE, the article THAT can never be inſerted. For example, if we be aſked, how the weather will diſpoſe of us to morrow? we cannot ſay: IF THAT fair, it will ſend us abroad; IF THAT foul, it will keep us at home;" but " IF fair, it will ſend us abroad," &c. The reaſon is obvious: the verb in this caſe directly governs the noun; and the reſolved conſtruction is, " GIVE fair weather, it will ſend us abroad; GIVE foul weather, it will keep us at home."

AN, the other ſuppoſitive conjunction mentioned, is nothing elſe than the *imperative* of the Anglo-Saxon verb ANAN, which likewiſe means to *give* or to GRANT. As, " AN you had an eye behind you, you might ſee more detraction at your heels than fortunes before you;" that is, " GRANT you had an eye behind you, you might ſee," &c. This account of the two *conditional conjunctions* in Engliſh is ſo rational and ſatisfactory, that we are ſtrongly inclined to believe that all thoſe words which are ſo called, are in all languages to be accounted for in the ſame manner: Not indeed that they muſt all mean preciſely to *give* or *grant*, but ſome word equivalent; ſuch as, *be it*, *ſuppoſe*, *allow*, *permit*, &c.; which meaning is to be ſought for in the particular etymology of each reſpective language.

(M) Of the *cauſal conjunctions* mentioned in the text, BECAUSE has been already conſidered; and ſome account muſt be now given of the two words SINCE and AS. The former of theſe, according to Mr H. Tooke, is a very corrupt abbreviation, confounding together different words and different combinations of words. To us it appears to be compounded of SEAND, *ſeeing*; and ES, *that* or *it*; or of SIN, *ſeen*, and ES. SEAND and SIN are the *preſent* and *paſt* participles of the Anglo-Saxon verb SEON, to *ſee*. In modern Engliſh SINCE is uſed four ways; *two* as a PREPOSITION affecting *words*, and *two* as a CONJUNCTION affecting *ſentences*. When uſed as a prepoſition, it has always the ſignification of the paſt participle SEEN joined to THENCE (i. e. *ſeen and thenceforward*), or elſe the ſignification of the paſt participle *SEEN only*. When uſed as a *conjunction*, it has ſometimes the ſignification of the *preſent* participle SEEING, or SEEING THAT; and ſometimes the ſignification of the paſt participle SEEN, or SEEN THAT. We ſhall give examples of all theſe ſignifications. 1ſt, As a *prepoſition* ſignifying *SEEN and thenceforward*: " A more amiable ſovereign than George III. has not ſwayed the Engliſh ſceptre *SINCE the conqueſt*." That is, " *The conqueſt ſeen* (or at the completion of the ſight of the conqueſt), and thenceforward, a more amiable ſovereign than George III. has not ſwayed the Engliſh ſceptre." SINCE, taken in this ſenſe, ſeems rather to be a corruption of SITHTHAN or SITHENCE, than a compound of SEAND and ES. 2dly, As a prepoſition ſignifying SEEN ſimply: Did George III. reign *before* or SINCE that example? 3dly, As a conjunction, SINCE means *ſeeing that*: as, " If I ſhould labour for any other ſatisfaction but that of my own mind, it would be an effect of phrenzy in me, not of hope; SINCE (or *ſeeing that*) it is not truth but opinion that can travel through the world without a paſſport." 4thly, It means SEEN THAT or THAT SEEN; as, " SINCE death in the end takes from all whatſoever fortune or force takes from any one, it were a fooliſh madneſs in the ſhipwreck of worldly things, when all ſinks but the ſorrow, to ſave that;" i. e.—" Death in the end takes from all whatſoever fortune or force takes from any one; THAT SEEN, it were a fooliſh madneſs," &c.

As, the other *cauſal* conjunction mentioned in the text, is an *article* meaning always IT, or THAT, or WHICH. Take the following example:

" She glides away under the foamy ſeas
" As ſwift AS darts or feather'd arrows fly."

That

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THEREFORE (N) *the ſun is in eclipſe.* We therefore uſe *cauſals* in thoſe inſtances where, the *effect* being conſpicuous, we ſeek for its *cauſe;* and *collectives*, in demonſtration and ſcience, properly ſo called, where the *cauſe* being firſt known, by its help we diſcern *effects*.

119 Cauſal conjunctions denote four kinds of cauſes.

As to *cauſal* conjunctions, we may further obſerve, that there is no one of the four ſpecies of cauſes which they are not capable of denoting. For example, the MATERIAL *cauſe; The trumpet ſounds* BECAUSE *it is made of metal.* The FORMAL; *The trumpet ſounds* BECAUSE *it is long and hollow.* The EFFICIENT; *The trumpet ſounds* BECAUSE *an artiſt blows it.* The FINAL; *The trumpet ſounds* THAT *it may raiſe our courage.* It is worth obſerving, that the three firſt cauſes are expreſſed by the ſtrongeſt affirmation; becauſe if the *effect* actually be, theſe muſt be alſo. But this is not the caſe with reſpect to the laſt, which is only affirmed as a thing that *may* happen. The reaſon is obvious; for whatever may be the *end* which ſet the artiſt firſt to work, *that end* it may ſtill be beyond his power to obtain; as, like all other contingents, it may either happen or not. Hence alſo it is connected by a particular conjunction, THAT (O), abſolutely confined to this *cauſe*.

120 Disjunctive conjunctions.

103. We come now to the DISJUNCTIVE CONJUNCTIONS; a ſpecies of words which bear this contradictory name, becauſe while they *conjoin the ſentences*, they DISJOIN the ſenſe; or, to ſpeak a language more intelligible, they denote *relations* of DIVERSITY or OPPOSITION.

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That there ſhould be ſuch words, whether called *conjunctions* or not, is extremely natural. For as there is a principle of UNION diffuſed through all things, by which THIS WHOLE is kept together and preſerved from diſſipation; ſo is there in like manner a principle of DIVERSITY diffuſed through all, the ſource of *diſtinction*, of *number*, and of *order*. Now it is to expreſs in ſome degree the *modifications of this diverſity*, that thoſe words called DISJUNCTIVE CONJUNCTIONS are employed.

121 Either ſimple or adverſative.

Of theſe *disjunctives* ſome are SIMPLE and ſome ADVERSATIVE: *Simple;* as when we ſay, EITHER *it is day or it is night: Adverſative;* as when we ſay, *it is not day* BUT *it is night*. The difference between theſe is, that the *ſimple* expreſs nothing more than a *relation* of DIVERSITY; the *adverſative* expreſs a *relation* not barely of *diverſity*, but alſo of OPPOSITION. Add to this, that the *adverſatives* are DEFINITE, *the ſimple* INDEFINITE. Thus when we ſay, *the number three is not an even number* BUT (P) *an odd*, we not only *disjoin* two oppoſite attributes, but we *definitely* affirm the *one* to *belong* to the

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That is, "She glides away (with) THAT ſwiftneſs (with) WHICH darts or feathered arrows fly." In German, where AS ſtill retains original ſignification and uſe, it is written ES. So is another *conjunction* of the ſame import with AS, being evidently the Gothic article SA or SO, which ſignifies *it* or *that*.

(N) As Mr Harris has called THEREFORE, WHEREFORE, &c. *collective conjunctions*, we have retained the denomination, though perhaps a more proper might be found. It is indeed of little conſequence by what name any claſs of words be called, provided the import of the words themſelves be underſtood. WHEREFORE and THEREFORE evidently denote the *relation* of a *cauſe* to its *effects*. They are compounds of the Saxon words HWÆR and THÆR with FOR or VOOR: and ſignify, *for which*, *for thoſe*, or *that*. It is worthy of remark, that in ſome parts of Scotland the common people even at this day uſe THIR for *theſe*.

(O) We have already conſidered the word THAT, and ſeen that it is never a conjunction, but uniformly a definite article. "The trumpet ſounds (for) THAT it may raiſe our courage;" taking the clauſe *it may raiſe our courage* as an abſtract noun in concord with *that* and governed by *for*. Or the ſentence may be reſolved thus: "The trumpet may raiſe our courage (for) that (purpoſe) it ſounds."

(P) Mr Horne Tooke has favoured us with ſome ingenious remarks on the two different derivations of the word BUT, when uſed in the two acceptations that are uſually annexed to it, viz. that which it bears in the *beginning* of a ſentence, and that which it has in the *middle*. He has given it as his opinion, that this word, when employed in the *former way*, is corruptly put for BOT, the imperative of the Saxon verb BOTAN, *to boot, to ſuperadd, to ſupply*, &c. and that when uſed in the *latter* it is a contraction of BE-UTAN, the imperative of BEONUTAN, *to be out*. Our ancient writers made the proper diſtinction between the orthography of the one word and that of the other. Gawin Douglaſs, in particular, although he frequently confounds the two words, and uſes them improperly, does yet abound with many inſtances of their proper uſe; and ſo contraſted, as to awaken, ſays our author, the moſt inattentive reader. Of the many examples quoted by him, we ſhall content ourſelves with the two following:

"BOT thy worke ſhall endure in laude and glorie,
"BUT ſpot or fault condigne eterne memorie." *Preface.*
——"BOT gif the fates, BUT pleid,
"At my pleaſure ſuffer it me life to leid." *Book* 4.

If this derivation of the word BUT from BOTAN, to *ſuperadd*, be juſt, the ſentence in the text, "the number three is not an even number BUT an odd," will be equivalent to, "the number three is not an even number, ſuperadd (it is) an odd number;" and if ſo, the oppoſition is not marked (at leaſt directly) by the word BUT, but by the adjectives EVEN and ODD, which denote attributes in their own nature oppoſite. It is only when BUT has this ſenſe that it anſwers to *ſed* in Latin, or to *mais* in French. In the ſecond line of the quotation from Gawin Douglaſs's Preface, the word BUT is evidently a contraction of BE-UTAN, and has a ſenſe very different from that of BOT in the preceding line. The meaning of the couplet is, "SUPERADD (to ſomething ſaid or ſuppoſed to be ſaid before) thy work ſhall endure in laude and glorie, BE OUT (i. e. *without*) ſpot or fault," &c. In the following paſſage from DONNE, the word BUT, although written in the ſame manner, is uſed in both its meanings: "You muſt anſwer, that ſhe was brought very near the fire, and as good as thrown in; or elſe, that ſhe was provoked to it by a divine inſpiration. BUT that another divine inſpiration moved the beholders to believe that ſhe did therein a noble act, this act of her's might have been calumniated." That is,

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the *ſubject*, and *deny the other*. But when we ſay, *the number of the ſtars is* EITHER (Q) *even* OR *odd;* though we aſſert *one* attribute *to be*, and the other *not to be*, yet the alternative is notwithſtanding left *indefinite*.

122 An improper diſtinction.

As to *adverſative disjunctives*, it has been already ſaid, after Mr Harris, that they imply OPPOSITION: but the truth ſeems to be, that they only unite in the ſame ſentence *words* or *phraſes* of oppoſite meanings. Now it is obvious, that *oppoſite attributes* cannot belong to the *ſame ſubject;* as when we ſay, *Nereus was beautiful*, we cannot SUPERADD to this ſentence, that *he was ugly;* we cannot ſay, *he was beautiful*, BUT *ugly*. When there is oppoſition, it muſt be either of the *ſame* attribute in *different* ſubjects; as when we ſay, "*Brutus* was a patriot, BUT *Cæſar* was not:" Or of *different* attributes in the *ſame* ſubject; as when we ſay *Gorgius* was a *ſophiſt*, BUT not a *philoſopher*." Or of *different attributes* in *different ſubjects;* as when we ſay, "*Plato* was a *philoſopher*, BUT *Hippias* was a *ſophiſt*." The conjunctions uſed for all theſe purpoſes have been called *abſolute* adverſatives, we think improperly, as the *oppoſition* is not marked by the *conjunctions*, but by the *words* or *ſentences* which they ſerve to *connect*. Mr *Locke*, ſpeaking of the word BUT, ſays, that "it ſometimes intimates a *ſtop* of the mind, in the courſe it was going, before it came to the end of it:" to which Mr *Tooke* replies with truth, that BUT itſelf is the fartheſt of any word in the language from *intimating a ſtop*. On the contrary, it always intimates ſomething to *follow;* inſomuch, that when any man in diſcourſe finiſhes his words with BUT, inſtead of ſuppoſing him to have *ſtopped*, we always aſk, BUT *what?*

Beſides the adverſatives already mentioned, there are two other ſpecies, of which the moſt important are UNLESS and ALTHOUGH. For example, "*Troy* will be taken, UNLESS the *palladium* be preſerved; *Troy* will be taken, ALTHOUGH Hector defend it." The nature of theſe adverſatives may be thus explained. As every *event* is naturally allied to its cauſe, ſo by parity of reaſon it is oppoſed to its *preventive;* and as every cauſe is either *adequate* or *inadequate* (inadequate when it endeavours without being effectual), ſo in like manner is every *preventive*. Now *adequate* preventives are expreſſed by ſuch *adverſatives* as UNLESS: "*Troy* will be taken, UNLESS the *palladium* be preſerved;" that is, *this* alone is ſufficient to *prevent* it. The *inadequate* are expreſſed by ſuch adverſatives as ALTHOUGH: "*Troy* will be taken ALTHOUGH *Hector* defend it;" that is, *Hector's* defence will prove *ineffectual*. Theſe may be called adverſatives ADEQUATE and INADEQUATE.

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Such is the doctrine of Mr *Harris;* which although we can diſcover in it no determinate meaning, we have ventured with others to retail, in reſpect to our readers, who may be more perſpicacious than ourſelves. The author was a man of great learning; and the ſubject, as he has treated it, appears to be intricate. But whatever ſenſe or nonſenſe there may be in what he ſays of *cauſes* and *preventives adequate* and *inadequate*, we have no heſitation to affirm that he has totally miſtaken the import of the words UNLESS and ALTHOUGH. From theſe being called both *preventives*, the *one adequate* and the *other inadequate*, an unwary reader might be led to infer, that they denote the *ſame idea* or the *ſame relation;* and that the whole difference between them is, that the expreſſion of the one is more forcible than that of the other. Nothing, however, can be farther than this from the truth. The meaning of UNLESS is directly oppoſite to that of ALTHOUGH. UNLESS (R) and THOUGH are

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is, "You muſt anſwer, that ſhe was brought very near the fire, &c." "Superadd (to that anſwer) BE OUT (or UNLESS or WITHOUT; for, as will be ſeen by and bye, all thoſe words are of the ſame import) that another divine inſpiration moved," &c. To theſe remarks and examples it may be worth while to add, that even now BUT is often uſed by the illiterate Scotch for WITHOUT; as nothing is more common than to hear a clown ſay, "He came from home BUT his breakfaſt."

Having mentioned WITHOUT as a word of the ſame import with BUT when diſtinguiſhed from BOT, it may not be improper to conſider that word here; for though in modern Engliſh it is entirely confined to the office of a prepoſition, it was formerly uſed indifferently either as a *prepoſition* or a *conjunction*. WITHOUT then is nothing but the imperative WYRTHAN-UTAN, from the Anglo-Saxon and Gothic verb WEORTHAN, WITHAN; which in the Anglo-Saxon language is incorporated with the verb BEON, *eſſe*. According to this derivation, which is *Horne Tooke's*, the word WITHOUT, whether called conjunction or prepoſition, is the ſame as BE OUT; and ſuch will be its import, ſhould it after all be nothing more than a compound of WITH, which ſignifies to *join*, and ſometimes to *be*, and UTE, *out*.

(Q) EITHER is nothing more than a diſtributive *pronoun*, which every body underſtands; and OR we have already explained.

(R) So low down as in the reign of Queen Elizabeth (ſays *Horne Tooke*) this conjunction was ſometimes written *oneles* or *oneleſſe;* but more anciently it was written ONLES and ſometimes ONLESSE. Thus, in the trial of Sir John Oldcaſtle in 1413, "It was not poſſible for them to make whole Chriſtes cote without ſeme, ONLESSE certeyn great men were brought out of the way." So, in "The image of governance," by Sir T. Elliot, 1541, "Men do fere to approache unto their ſovereigne Lord, ONELES they be called." So again, in "A neceſſary doctrine and erudition for any Chriſtian man, ſet furthe by the king's majeſtie of England," 1543, "ONLES ye believe, ye ſhall not underſtande." "No man ſhall be crowned, ONLES he lawfully fight." "The ſoul waxeth feeble, ONLESSE the ſame be cheriſhed." "It cannot begynne, ONELESSE by the grace of God." Now, ONLES is the imperative of the Anglo-Saxon verb ONLESAN, to *diſmiſs* or *remove*.

LES, the imperative of LESAN (which has the ſame meaning as ONLESAN), is likewiſe uſed ſometimes by old writers inſtead of UNLESS. Inſtances might be given in abundance fron *G. Douglaſs* and *Ben Johnſon;* but perhaps it may be of more importance to remark, that it is this ſame imperative LES, which, placed at the end of nouns and coaleſcing with them, has given to our language ſuch adjectives as *hopeleſs*, *reſtleſs*, *deathleſs*, *motionleſs*, &c. i. e. *diſmiſs* hope, reſt, death, motion, &c.

Mr Tooke obſerves, that all the languages which have a conjunction correſponding to LESS or UNLESS, as well

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are both *verbs* in the *imperative mode*: the former signifying *take away* or *diſmiſs*: the latter *allow*, *permit*, *grant*, *yield*, *aſſent*. This being the caſe, "*Troy* will be taken UNLESS the *palladium* be preſerved," is a ſentence equivalent to "REMOVE *the palladium be preſerved* (taking *the palladium be preſerved* as an abſtract noun, *the preſervation of the palladium*) Troy will be taken." Again, "*Troy* will be taken, ALTHOUGH *Hector* defend it," is the ſame as "*Troy* will be taken ALLOW *Hector* (to) defend it." The idea, therefore, expreſſed by UNLESS is that of *the* REMOVAL *of one thing to make way for another*; the idea expreſſed by ALTHOUGH (s) is *that of* ALLOWING *one thing to* COEXIST *with another, with which it is* APPARENTLY *incompatible*.

104. Before we take leave of this ſubject, we might treat, as others have treated, of *adverbial* conjunctions, and conjunctions (T) of various other denominations. But of multiplying ſubdiviſions there is no end; and ſyſtems, in which they abound, convey for the moſt part no information. The nature of conjunctions can be thoroughly underſtood only by tracing each to its original in ſome parent or cognate tongue; and when that ſhall be done in other languages with as much ſucceſs as it has lately been done by Mr *Horne Tooke* in Engliſh, then, and not till then, may we hope to ſee a rational, comprehenſive, and conſiſtent theory of this part of ſpeech. Then too ſhall we get rid of all that farrago of uſeleſs diſtinctions into *conjunctive*, *adjunctive*, *diſjunctive*, *ſubjunctive*, *copulative*, *continuative*, *ſubcontinuative*, *poſitive*, *ſuppoſitive*, *cauſal*, *collective*, *preventive adequate* and *inadequate*, *adverſative*, *conditional*, *illative*, &c. &c.; which explain nothing, and which ſerve only to veil ignorance and perplex ſagacity. Conjunctions. 123 Which ſerves only to veil ignorance.

That Mr *Tooke's* principles will apply exactly to the conjunctions of *every language* both dead and living, is what our limited knowledge of theſe languages does not authoriſe us poſitively to affirm. It is, however, a ſtrong preſumption in favour of his opinion, that illiterate ſavages, the firſt cultivators of language, are little likely to have ſent out their faculties in queſt of words to denote the *abſtract relations* ſubſiſting among their ideas, when we have ſuch evidence as his book affords that the names of the moſt *common ſubſtances* and *qualities* could anſwer *that* and every *other* purpoſe, which in the ordinary intercourſe of life can be anſwered by the faculty of ſpeech. It is a farther preſumption in his favour,

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well as the manner in which the place of theſe words is ſupplied in the languages which have not a conjunction correſpondent to them, ſtrongly juſtify his derivation which we have adopted. The Greek εἰμὴ, the Latin *niſi*, the Italian *ſe non*, the Spaniſh *ſino*, the French *ſi non*, all mean *be it not*. And in the ſame manner do we ſometimes ſupply its place in Engliſh by *but*, *without*, *be it not*, *but if*, &c. It may be proper juſt to add, that, according to the ſame author, the conjunction LEST is a contraction of LESED, the paſt participle of LESEN; and that LEST, with the article *that*, either expreſſed or underſtood, means no more than *hoc dimiſſo* or *quo dimiſſo*.

(s) ALTHOUGH is compounded of *al* or *all*, and THO', THOUGH, THAT, or, as the vulgar more purely pronounce it, THAF, THAUF, and THOF. Now, THAF or THAUF, is evidently the imperative THAF or THAFIG of the verb THAFIAN or THAFIGAN to *allow*, *permit*, *grant*, *yield*, *aſſent*; and THAFIG becomes *thah*, *though*, *thoug*, (and *thoch*, as G. Douglaſs, and other Scotch authors write it) by a tranſition of the ſame ſort, and at leaſt as eaſy as that by which HAFUC becomes *hawk*. It is no ſmall confirmation of this etymology, that antiently they often uſed *all be*, *albeit*, *all had*, *all were*, *all give*, inſtead of ALTHOUGH; and that as the Latin SI (*if*) means *be it*, and NISI and SINE (*unleſs* and *without*) mean *be not*, ſo ETSI (*although*) means *and be it*.

(T) In a work of this kind, which profeſſes to treat of *univerſal* grammar, it would be impertinent to waſte our own and our readers time on a minute analyſis of each conjunction which may occur in any one particular language. We ſhall therefore purſue the ſubject no farther; but ſhall ſubjoin Mr HORNE TOOKE's table of the Engliſh conjunctions, referring thoſe who are deſirous of fuller ſatisfaction to his ingenious work entitled *The Diverſions of Purley*.

Are the Imperatives	Of their Reſpective Verbs	
IF	GIF	GIFAN To give.
AN	AN	ANAN To grant.
UNLESS	ONLES	ONLESAN To diſmiſs.
EKE	EAC	EAKAN To add.
YET	GET	GETAN To get.
STILL	STELL	STELLAN To put.
ELSE	ALES	ALESAN To diminiſh.
THOUGH or THO'	THAFIG or THAF	THAFIGAN or THAFIAN To allow.
BUT	BOT	BOTAN To boot, to ſuperadd.
BUT	BE-UTAN	BEON-UTAN To be out
WITHOUT	WYRTH-UTAN	WYRTHAN-UTAN To be out.
AND	AN AD	ANAN AD Dare congeriem.

LEST is the participle LESED of LESAN, to diſmiſs.

SINCE { SITHTHAN, SYNE, SEAND-ES, SITHTHE or SIN-ES } is the participle of SEON, to ſee.

THAT is the article or pronoun THAT.

AS is ES, a German article, meaning *it*, *that*, or *which*. And SO is SA or SO, a Gothic article of the ſame import with AS.

Prepositions.

favours, that in the rudeſt languages there are few if any conjunctions; and that even in others which are the moſt highly poliſhed, ſuch as *Greek* and *Latin*, as well as *Engliſh*, many of thoſe words which have been called conjunctions are obviouſly reſolvable into other parts of ſpeech. Thus αλλα tranſlated *but*, is evidently the neuter gender of either the *nominative* or *accuſative plural* of αλλος *another;* and when uſed as a *conjunction*, it intimates that you are going to *add ſomething* to what you have already ſaid. *Cæterum* has the ſame meaning, and is nothing but και ετερον. MAIS (*but* in French) is the Latin *majus; ut, uti, ὁτι, quod*, is the *relative pronoun*. Of *quocirca, quia, præterea, antequam, quenquam, quemvis, quantumvis, quamlibet*, &c. the reſolution is too obvious to require being mentioned. Where ſuch reſolutions as theſe can be made, or when the *conjunctions* of any *particular tongue* can be traced to their *origin* in *any other*, there needs be no diſpute about their *true import*; but when the caſe is otherwiſe, and the *conjunction* either appears to be an *original* word, or is derived from a *ſource* to which it cannot be *traced*, we would adviſe ſuch of our readers as wiſh to ſpeak or write correctly, to diſmiſs from their minds all conſideration of *copulatives*, *continuatives*, *cauſals*, and *disjunctives*, with the reſt of that jargon which we have already mentioned; and to inquire diligently in what *manner* and for what *purpoſe* the *conjunction* in *queſtion* is uſed by the *beſt writers*, both *ancient* and *modern*, of the particular language which they are ſtudying. This will indeed be found a work of labour; but it appears to us to be the only means left of diſcovering the preciſe *relations* which ſuch conjunctions were intended to expreſs; and, by conſequence, of knowing what words or ſentences they are fitted to connect, ſo as to produce a ſtyle at once accurate and perſpicuous.

124 The import of conjunctions in any language to be learned from the beſt authors ancient and modern.

SECT. II. *Of Prepoſitions.*

125 Prepoſitions unite two words that refuſe to coaleſce of themſelves,

105. By Mr Harris and his followers, a PREPOSITION is defined to be *a part of ſpeech devoid itſelf of ſignification, but ſo formed as to unite two words that are ſignificant, and that refuſe to coaleſce or unite of themſelves.* We have already expreſſed our opinion of that theory which holds certain *words* to be *devoid of ſignification;* but its abſurdity, in the preſent inſtance, is more than ever glaring. Concerning the number of *prepoſitions*, it is well known that hitherto authors have never agreed. The ancient Greek grammarians admitted only 18; the ancient Latin grammarians above 50; though the moderns, *Sanctius, Sciopius, Perizonius, Voſſius*, and *Ruddiman*, have endeavoured to leſſen the number without fixing it. Biſhop *Wilkins* thinks that 36 are ſufficient; and *Girard* ſays that the French language has done the buſineſs effectually with 32. But if *prepoſitions* be words *devoid* of *ſignification*, why ſhould there be diſputes reſpecting their numbers? or why in any language ſhould there be more than *one* prepoſition, ſince a *ſingle unmeaning* mark of connection would certainly anſwer the purpoſe as well as a thouſand? The *cypher*, which has no value of itſelf, and only ſerves (if we may uſe the language of grammarians) to *connote* and *conſignify*, and to change the value of *figures*, is not *ſeveral* and *various*, but uniformly *one* and the *ſame*. That "the *prepoſition* is ſo formed, as to unite two words which refuſe to coaleſce or unite of themſelves," is indeed true; and this union it effects, *not* by having *no ſignification* of its own, but by *ſignifying* the *relation* by which the *things* expreſſed by the *united words* are connected in nature. *Prepoſitions* are to be accounted for in much the ſame manner as the *caſes* of *nouns*. The neceſſity of *this ſpecies* of words, or of ſome equivalent invention, follows from the impoſſibility of having in language a diſtinct *complex term* for each diſtinct *collection of ideas* which we may have occaſion to put together in diſcourſe. The addition or ſubtraction of *any one idea* to or from a *collection* of ideas, makes it a *different* collection; and if, after either of theſe operations, it were to be expreſſed by the *ſame word* as *before*, nothing could enſue but miſrepreſentation and falſehood. Now, to uſe in language a *different* and *diſtinct complex term* for *each* different and diſtinct *collection of ideas*, is equally impoſſible, as to uſe a diſtinct *particular term* for each *particular* and *individual idea*. To ſupply, therefore, the place of the complex terms which are wanting in a language, are the *caſes of nouns* and *prepoſitions* employed; by the aid of which, *complex* and *general terms* are prevented from being infinite or too numerous, and are uſed only for thoſe collections of ideas which we have moſt frequent occaſion to mention in diſcourſe. By means of *prepoſitions* this end is obtained in the moſt ſimple manner. For, having occaſion to mention a collection of ideas for which there is no *ſingle complex term* in the language, we either take that complex term which includes the *greateſt number*, though not *all* of the ideas we would communicate; or elſe we take that complex term which includes *all*, and the feweſt ideas *more* than thoſe we would communicate; and then, by the help of the prepoſition, we either make up the *deficiency* in the one caſe, or retrench the *ſuperfluity* in the other. For inſtance, having occaſion to mention a houſe of a *particular deſcription*, and knowing that the term *houſe* is too *general* for our purpoſe, and that the building we have in view has no appropriate name, we ſay, perhaps, *a houſe* WITH *a party-wall*, or *a houſe* WITHOUT *a roof*.—In the firſt inſtance, the complex term *houſe* is *deficient*, and the prepoſition directs to *add* what is *wanting*.—In the ſecond inſtance, the complex term is *redundant* as it denotes a *complete houſe;* the prepoſition, therefore, directs to *take away* what is *ſuperfluous*.

Prepoſitions. 126 By ſignifying the relation between them.

Now, conſidering *prepoſitions* in this the moſt ſimple light, as ſerving only to limit or modify general terms, it is abſolutely neceſſary that they ſhould have meanings of their own; for otherwiſe, how could we, in the inſtance before us, make known by them our intention, whether of adding to, or retrenching from, the ſame general term *houſe*. If, to a diſciple of Mr HARRIS, we ſhould ſay, *a houſe* JOIN; he would reply, JOIN WHAT? But he would not contend that JOIN is an *indeclinable* word which has *no meaning* of its *own*, becauſe he knows that it is the *imperative* of a *verb*, of which the other parts are ſtill in uſe; and its own meaning is clear, though the ſentence is not completed. If, inſtead of JOIN, we ſhould ſay to him, *a houſe* WITH; he would ſtill aſk the ſame queſtion, WITH *what?* But if we were to diſcourſe with him concerning the word WITH, he would probably tell us, that WITH is a *prepoſition*, an indeclinable word, which is itſelf *devoid of ſignification*, but ſo *formed as to unite two words that are ſignificant*. And yet it would be evident by his queſtion, that he *felt* it had a *meaning* of its *own;* which

is

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is in reality the same as JOIN (U). Indeed, so far has always been plainly perceived, that WITH and WITHOUT are directly opposite and contradictory; and it would puzzle the most acute philosopher to discover opposition and contradiction in two words where neither of them had any signification. Wilkins, therefore, has well expressed their meaning, where he says, that WITH is a preposition "relating to the notion of *social*, or circumstance of *society* AFFIRMED; and that WITHOUT is a preposition relating to the same notion of *social*, or circumstance of *society* DENIED."

127 They all serve to modify in different ways some general term or general affirmation.

106. But to denote the relations of *adding* and *taking away*, is not the only purpose for which prepositions are employed. They all indeed serve to modify some *general term* or *general affirmation*, but not precisely in the same way as WITH and WITHOUT. It has been already observed, that words significant of those things which coincide in nature, coalesce with one another in syntax, without being beholden to any auxiliary tie. For instance, an *adjective* coalesces with its *substantive*, a *verb* with its *nominative*; a noun expressing an *object* acted upon, with a *verb* denoting *action*; and an *adverb* with its *verb*. Take the following example: THE SPLENDID SUN GENIALLY WARMETH THE FERTILE EARTH. But suppose we were desirous to modify this affirmation by the addition of other substantives, AIR, for instance, and BEAMS: how would these coincide with the other words of the sentence, or under what character could they be introduced? Not as *nominatives* or *accusatives* to the *verb*, for both these places are already filled the *nominative* by the substance SUN, which is certainly the *agent* in this operation; the *accusative* by the substance EARTH, which is as certainly the object acted upon. Not as *qualities* of the SUN and EARTH; for qualities inhering in their substances can only be expressed by *adjectives*, and the words *air* and *beams* are both *substantives*. Here then we must have recourse to prepositions; but we can employ only such prepositions as point out the *relations* which the AIR and the BEAMS have to the *sun warming the earth*. In English we should say, *the splendid sun* WITH *his beams genially warmeth* THROUGH *the air the fertile* earth. The sentence, as before, remains *entire* and *one*; the *substantives* required are both *introduced*; and not a word which was there before is detruded from its proper place. The import of WITH we have already discovered; it directs to UNITE the *beams* to the *sun*, as JOINTLY with him performing the operation. But the AIR has no other connexion with this operation, than as the MEDIUM or PASSAGE between the SUN and the EARTH: and therefore the preposition THROUGH (X) must denote that *relation* which subsists between an *object* in *motion*, and the *medium in which it moves*; nor could a preposition of a different import have been employed, without altering the meaning of the whole sentence (Y.)

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107. Mr Harris is of opinion that most, if not all,

(U) This account of prepositions is taken from *Horne Tooke*, who adds, that the only difference between the two words WITH and JOIN, is, that the other parts of the Gothic and Anglo-Saxon verb WITHAN, *to join* (of which WITH is the imperative), have ceased to be employed in the language. As WITH means *join*, so the correspondent French preposition AVEC means, *and have that*, or, *have that also*. But though WITH, as the imperative of WITHAN, means *join*, it has sometimes a very different signification. Mr *Tyrwhit* in his Glossary has truly observed, that WITH and BY are often synonymous. They certainly are so; but then WITH seems to be an abbreviation of the imperative of WYRTHAN, *to be*; as WITHOUT is of WYRTHAN-UTAN, *to be out*. This being the case, our two instances in the text will stand thus: *a house* JOIN *a party-wall*; *a house* BE-OUT *a roof*. Nor let any one be surprised that we make no difference between the *conjunction* WITHOUT and the preposition WITHOUT. The word is the same, whether it be employed to unite *words* or *sentences*. *Prepositions* were originally, and for a long time, classed with *conjunctions*; and when first separated from them, they were only distinguished by the name of *prepositive conjunctions*. They are *generally* used to unite *words*, but not *always*; for we may say indifferently, *I came after* HIS DEPARTURE, or *I came after* HE DEPARTED. By the greater part of grammarians, indeed, AFTER, when employed as in the first sentence, is classed with the prepositions; when employed as in the second, it is classed with the conjunctions. The word, however, is the same in both sentences, its *meaning* is the same, and its *effect* precisely the same. The only circumstance of discrimination is, that in the first example it is prefixed to a noun, *his departure*; in the second, it is prefixed to a nominative and a verb, *he departed*. But even the nominative and the verb, thus applied, express no more than a specifying circumstance annexed to the other proposition, *I came*; and whenever they are rightly apprehended by the mind, they are stript of their prepositionary form, and considered *abstractly* under a new phasis, *his departure*. Thus, then, the two sentences are synonymous in every respect, excepting the *apparent* grammatical nature of the words *his departure*, and *he departed*; and even these are reduced to one grammatic form in the mind, whenever the import of the propositions is rightly apprehended. WITHOUT, and many other prepositions, especially in the learned languages, are used exactly as AFTER is used in the two instances which we have given. *Horne Tooke* quotes Lord Mansfield for saying, "It cannot be read WITHOUT the Attorney-General consents to it." This, in modern English, is not the common phraseology; but it offends not against any principle of grammar. The *nominative and the verb* are here, as in the former instance, considered as an *abstract noun*. "It cannot be read WITHOUT the consent of the Attorney-General."

(X) THOROUGH, THOUROUGH, THOROW, THROUGH, or THRO', is no other, says *Horne Tooke*, than the Gothic substantive DAURO, or the Teutonic substantive THURUH, and, like them, means *door*, *gate*, *passage*. So that the sentence in the text, resolved upon his principles, stands thus: "The splendid sun—JOIN his beams—genially warmeth—PASSAGE *the air*, (or, the air being the *passage* or *medium*)—the fertile earth." And in the same manner may we translate the preposition *through* in every instance where *through* is used in English, or its equivalent preposition in any language; as from the Latin and Italian word *porta* (in Spanish *puerta* and in French *porte*), have come the Latin and Italian preposition *per*, the French *par*, and the Spanish *por*.

(Y) If, for instance, we were to substitute WITH or OF instead of THROUGH, we should in the one case *alter* the *meaning*,

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prepoſitions were originally formed to denote the *relations of* PLACE. For this opinion we ſee not ſufficient evidence. If indeed we could ſuppoſe the *inventors* or earlieſt *improvers* of language to have at all concerned themſelves with *relations* as *abſtracted* from the *objects* related, we muſt believe that thoſe which firſt attracted their attention were the *relations* ſubſiſting among themſelves, and the various bodies with which they were ſurrounded. We muſt likewiſe agree with our author, that *place* is the grand relation which *bodies* or *natural ſubſtances* maintain at all times to one another; but we do not therefore think that it would attract the *earlieſt* notice of untaught barbarians. On the contrary, we are of opinion that mankind muſt have made very conſiderable progreſs in ſcience before they attempted to abſtract *place* from *body*; an attempt which, according to ſome of the moſt profound philoſophers (Z), is not only difficult, but abſolutely impracticable. But whatever be in this, the relations of *cauſe* and *effect*, of *duration* and *motion*, are in themſelves as *obvious*, and as likely to *arreſt* the *attention* and obtain *names*, as thoſe of *place*.—Among men totally illiterate they are evidently more ſo; for *pain* and *pleaſure* would ſuggeſt ſome idea of cauſe and effect as *matters of importance*. There is, however, no probability that the inventors of any language had the leaſt idea of *abſtract relations*. They doubtleſs expreſſed *complex conceptions* by *nouns* and *verbs*, ſignificant at once of the *particular ideas* and of the *various relations* by which they viewed thoſe ideas as *combined together* in a *complex conception*. Afterwards, when mens minds became enlarged, and when, from the fluctuation inſeparable from a living language, objects or ideas received new names, the old words, whether nouns or verbs, which were originally employed to expreſs a *particular complex conception*, of which *certain particular* RELATIONS made a part, might be retained for the purpoſe of denoting *thoſe* and *all ſimilar* RELATIONS; and thus *verbs* and *nouns* would degenerate into *particles* bearing the names of *prepoſitions* and *conjunctions*. For inſtance, one *Anglo-Saxon* being deſirous to communicate to another his own conception of a *houſe with a party-wall*, and having (we ſhall ſuppoſe) no ſuch word in his tongue as a *prepoſition*, would naturally utter the word *houſe*, deſiring his friend, at the ſame time, to *add* to that well known ſound *another ſound* (uttering it) ſignificant of the particular circumſtance wanting to complete his *complex conception;—A houſe* WITH (i. e. JOIN) *a party wall*. The word WITH, as the *imperative* of a *verb*, denotes of courſe *three ideas* combined together, viz. a *command* or *wiſh*, an *affirmation*, and the idea of *junction*. But when the verb WITHAN was diſmiſſed from the Engliſh language, the imperative WITH was ſtill retained; but loſing its *verbal* and *modal* nature, it was thenceforth employed to denote only *one* of the *three ideas* for which it originally ſtood, viz. the idea of *junction*. And thus it is, that *verbs*, and alſo *nouns* and *adjectives*, in paſſing from one language to another, may become *prepoſitions* (A) and *conjunctions*. Thus too it is, that ſome of thoſe *prepoſitions* come to denote the *contiguous*, and ſome the *detached*, relation of body. The *contiguous*, as when we ſay, *Caius walked* WITH *a ſtaff*; i. e. *Caius* JOIN *a ſtaff, walked; the ſtatue ſtood* UPON (B) *a pedeſtal*, i. e. *the ſtatue ſtood* (the *place* of its ſtanding) the HIGHER PART *of a pedeſtal; the river ran* OVER *a ſand*, i. e. *the river ran* (the place of its running) *the* HIGHER PART *of a ſand*. The *detached relation*, as when we ſay, *He is going* TO (C) *Italy*, i. e. *He is going*, THE END

Prepoſitions originally denoted the various relations of body,

and were at firſt either verbs or nouns.

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meaning, and in the other ſpeak *nonſenſe*. "The ſun warmeth WITH the *air* the fertile earth," is an affirmation that *the ſun warmeth* BOTH THE AIR AND THE EARTH; whereas the original ſentence affirmed nothing more than that *he warmeth the* EARTH. "The ſun warmeth OF the air the fertile earth," is nonſenſe, as it makes the earth a *part*, or a *conſequence*, of the air. So neceſſary is it that prepoſitions have a *meaning*, and that the meaning of each be attended to.

(Z) The Biſhops BERKELEY and LAW, with the very learned and ingenious Principal CAMPBELL of Aberdeen. See *The Principles of Human Knowledge*, LAW's *Notes* on KING's *Origin of Evil*, and *The Philoſophy of Rhetoric*.

(A) As the Italian ſubſtantive CASA, a *houſe*, *race*, *family*, *nation*, &c. in paſſing to the FRENCH, becomes the prepoſition CHEZ, to which there is not, ſo far as we know, a prepoſition of preciſely the ſame import in any language. SENZA or SENZE, in Italian, becomes SANS in French, and means *abſence*. Nor is it neceſſary that *verbs* and *nouns* ſhould always paſs from one language to another, in order to be converted into *prepoſitions*. The Greek prepoſition χωρις is evidently the corrupted imperative of χωριζειν, *to ſever, to diſjoin, to ſeparate*. The Latin SINE is SIT NE, *be not*. The German SONDER is the imperative of SONDERN, which has the ſame meaning as χωριζειν.

(B) UP, UPON, OVER, BOVE, ABOVE, have all, ſays *Horne Tooke*, one common origin and ſignification. In the Anglo-Saxon, UFA, UFERA, UFEMÆST, are the *adjectives* ALTUS, ALTIOR, ALTISSIMUS. UFA or UFAN, *up*; comparative UFERA, OFERE or OFER, *over* or *upper*; ſuperlative UFEMÆST, *upmoſt* or *uppermoſt*. BEUFAN, BUFAN, ON-BUFAN, *bove*, *above*. If this be a juſt account of the origin of theſe words, the ſentences in the text, where *upon*, *over*, and *above*, occur, will run thus: "The ſtatue ſtood ON HIGH a pedeſtal;" "the river ran HIGHER a ſand;" "the ſun is riſen ON HIGH the hills." And here we may obſerve, that the mere *relation* between *ſtanding*, *running*, &c. and *place*, is rather *inferred* from the *verb itſelf*, than *expreſſed* by a *ſeparate word*; and the reaſon is obvious. For if a ſtatue *ſtand*, every one knows that it muſt ſtand *on* ſome thing as well as *at* ſome time. There is therefore no *neceſſity*, whatever *elegance* there may be in it, for employing any word to denote that *relation*, which is commonly believed to be ſignified by *on*; but it is *neceſſary* to inſert, between the *verb* and *pedeſtal*, a *word* ſignificant of *place*, that *pedeſtal* may not be miſtaken, by an ignorant perſon, for a *portion of time*, or any thing elſe connected with the *ſtanding of the ſtatue*.

(C) That TO is ſignificant of *detached* relation, is the language of Mr HARRIS, which, though it may be allowed in a looſe and vulgar ſenſe, is certainly not philoſophically juſt. The prepoſition TO (in Dutch written TOE and TOT) is the Gothic ſubſtantive; TAUI or TAUHTS ſignifying *act*, *effect*, *reſult*, or *conſummation*; which Gothic ſubſtantive is itſelf no other than the paſt participle TAUID or TAUIDS of the verb TAUJAN *agere*. And it

Prepositions. END (of his journey) *Italy; the ſun is riſen* ABOVE *the hills*, i. e. *the ſun is riſen* (the place) THE TOP *of the hills: theſe figs came* FROM *Turkey*, i. e. *theſe figs came* BEGINNING (their journey at) *Turkey*.

Beſides the *detached* relation of body, Mr *Harris* is of opinion that the prepoſition FROM denotes two other relations not leſs different than thoſe of *motion* and *reſt*. Thus if we ſay, "*That lamp hangs* FROM *the ceiling*, the prepoſition FROM aſſumes a character of *quieſcence*. But if we ſay, *That lamp is falling* FROM *the ceiling*, the prepoſition in ſuch caſe aſſumes a character of *motion*." But this is evidently a miſtake: the *detached relation* in the former inſtance of the *figs*, as well as the *motion* and *reſt* in the preſent inſtances, are expreſſed *not* by the *prepoſition*, but by the verbs *came*, *falls*, *hangs*. The word *from* has as clear, as preciſe, and at all times as uniform and unequivocal a meaning, as any word in the language. FROM means merely BEGINNING, and nothing

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it is obvious, that what is *done*, is *terminated*, *ended*, *finiſhed*. In the Teutonic, this verb is written TUAN or TUON; whence the modern German THUN, and its prepoſition TU. In the Anglo-Saxon, the verb is TEOGAN, and the prepoſition TO. Do, the auxiliary verb, as it has been called, is derived from the ſame root, and is indeed the ſame word as TO. The difference between a T and a D is ſo very ſmall, that an etymologiſt knows by the *practice* of languages, and an anatomiſt by the *reaſon* of that practice, that in the derivation of words it is ſcarce worth regarding. To ſupport this etymon of TO, Mr *Horne Tooke* gives a ſimilar inſtance in the Latin tongue. The prepoſition AD, he ſays, is merely the paſt participle of AGERE, which paſt participle is likewiſe employed as a Latin *ſubſtantive*. He exhibits the derivation of AD thus;

Agitum—agtum { AGDUM—AGD—AD / or or or / ACTUM—ACT—AT }

The moſt ſuperficial reader of Latin verſe (he obſerves), knows how readily the Romans dropped their final *um*. And a little conſideration of the organs and practice of ſpeech will convince him how eaſily AGD or ACT would become AD or AT; as indeed this prepoſition was indifferently written either way by the ancients. By the later writers of Rome, the prepoſition was written AD with D only, in order to diſtinguiſh it from the other corrupt word called the *conjunction* AT; which for the ſame reaſon was written with the T only, though that likewiſe had anciently been written, as the *prepoſition*, either AD or AT. The prepoſition TO and the conjunction TOO in Engliſh, are both in *ſyntax* and in *meaning* uſed exactly as the prepoſition AD and the conjunction AT in Latin. From the ſpecimens prefixed to Johnſon's dictionary, as a hiſtory of our language, it appears that, as late as the reign of Elizabeth, the *prepoſition* and *conjunction* were both written with one O. And it has been ſhown in the firſt volume of *the Tranſactions of the Royal Society of Edinburgh*, that TO and TOO, as well as AD and AT, are preciſely of the ſame import. The only difference, in either language, between the *prepoſition* and the *conjunction*, is, that the former *directs*, as a modification of ſome previous propoſition, the addition of ſome *ſubſtantive* or *noun*; the latter, ſometimes a *ſentence* or *clauſe* of a ſentence conſidered *abſtractly* as a noun; and that, when the *former* is uſed, the prepoſition, to which the modifying circumſtance is to be added, is *formally expreſſed*, but *omitted* when the *latter* is employed. Thus *Denham* ſays,

"Wiſdom he has, and, TO his wiſdom courage;
"Temper TO that, and, UNTO all, ſucceſs."

In this example, every ſucceeding circumſtance is by the prepoſition TO marked as an *addition* to the preceding. "Wiſdom he has, and courage *additional* to his wiſdom." But Denham might with equal propriety have omitted the object which TO governs, or to which it directs ſomething to be *added*, though he muſt then, from the cuſtom of the language, have employed the *conjunction* inſtead of the *prepoſition*. As,

"Wiſdom he has, and courage too," &c.

This mode of expreſſion would have been more conciſe, and as intelligible as the other, "Wiſdom he has, and courage TO *his wiſdom*," &c.

Not only is the object governed by TO omitted, when it is repreſented by a *ſubſtantive* in the context, but alſo when it is involved in a *prepoſition*; and then the conjunction, as it is called, is always uſed. Thus,

"———Let thoſe eyes that view
"The daring crime, behold the vengeance TOO."

So, "He made him priſoner, and killed him *too*." In the one example, the circumſtance of *beholding the vengeance* is ſtated as an *addition to the viewing of the crime*; and in the other, the *killing him* is ſtated as an *addition to the making him a priſoner*. In both examples, the object governed by TOO is the *amount* of the preceding propoſition taken *abſtractly* as a *noun* or *ſubſtantive*. Thus then it appears, that TO and TOO, though claſſed the one with the prepoſitions, and the other with the conjunctions, are really one and the ſame word. The ſame is true of AD and AT. Thus, "AD *hoc*, promiſſa barba et capilli efferaverant ſpeciem oris," ſignifies "*Additional to this*, his long beard and hair had given a wildneſs to his aſpect." But when the object governed by AD is not formally ſtated, AD itſelf is claſſed with the *conjunctions*, and written differently, AT. Thus TERENCE, "PH. Fac ita ut juſſi, deducantur iſti. PA. Faciam. PH. AT diligenter. PA. Fiet. PH. AT maturè." By the means of AT, the circumſtances of *diligence* and *haſte* are *ſuperadded* to the action commanded. "PH. It is not enough that you do it, you muſt do it carefully TOO. PA. Well, it ſhall be carefully done. PH. In good time TOO." AT, taken in this ſenſe, is moſt commonly employed, like the Engliſh BUT, *to mark the unexpected union of incongruous objects*: As, "Aulam tyranni frequentabat, AT patriam amabat;" literally, "He frequented the court of the tyrant; joined EVEN TO that he loved his country." "He was a courtier and a patriot TOO." But if AD and AT in Latin, and TO and TOO in Engliſh, be derived from verbs which ſignify to DO or ACT, it may be aſked how they come themſelves to denote *addition*. The anſwer is obvious.

If

Prepoſitions.

thing elſe. It is ſimply the *Anglo-Saxon* and *Gothic* noun FRUM, *beginning, origin, ſource, fountain, author* (D). Now if this meaning be applied to Mr *Harris's* inſtances, FROM will ſpeak clearly for itſelf, without the aſſiſtance of the *interpreting* verbs, which are ſuppoſed by him to *vary its character*.

"Theſe figs *came* FROM Turkey."
"That lamp *falls* FROM the ceiling."
"That lamp *hangs* FROM the ceiling."

Came is a complex term for one ſpecies of motion; *falls* is a complex term for another ſpecies of motion; and *hangs* is a complex (E) term for a ſpecies of attachment. Have we occaſion to communicate or mention the COMMENCEMENT or BEGINNING of theſe motions, and of this attachment, and alſo the *place where* they commence or begin? To have complex terms for each occaſion of this ſort is abſolutely impoſſible; and therefore nothing can be more natural or more ſimple than to add the ſigns of thoſe ideas, viz. the word BEGINNING (which will remain always the ſame) and the NAME of the *place* (which will perpetually vary). Thus,

"Theſe figs came—*BEGINNING Turkey*."
"That lamp falls—*BEGINNING ceiling*."
"That lamp hangs—*BEGINNING ceiling*."

That is,

"Turkey the *place* of BEGINNING to come."
"Ceiling the *place* of BEGINNING to fall."
"Ceiling the *place* of BEGINNING to hang."

It has been ſaid by no leſs a man than Biſhop Wilkins, that FROM refers *primarily* to *place*, and *ſecondarily* to *time*. But the truth is, that FROM relates to every thing to which *beginning* relates, and to nothing elſe.

"FROM morn till night the eternal larum rang."

That is, "The larum rang BEGINNING morning (or morning being the *time* of its BEGINNING) till night."

As FROM always denotes *beginning*, ſo TO and TILL always denote the *end*. There is, however, this difference between them, that TO denotes the *end* of *any thing*; TILL the *end* only of *time*. We may ſay indifferently—"From morn TO night," or "from morn TILL night, the eternal larum rang;" but we cannot ſay—"Theſe figs came from Turkey TILL England."

That TILL can, with propriety, be oppoſed to FROM only when we are talking of *time*, is evident; for it is a word compounded of TO and WHILE, i. e. *time*. And as the coaleſcence of theſe two words TO-WHILE, took place in the language long before the preſent ſuperfluous uſe of the article THE, the phraſe—"From morn TILL night"—is neither more nor leſs than—*From morn TO TIME night*. When we ſay, "*from morn TO night*," the word TIME is omitted as unneceſſary.

Prepoſitions.

Beſides FROM, Mr *Harris* mentions OVER as ſignificant ſometimes of *motion* and ſometimes of *reſt*; and quotes as inſtances the two following paſſages from *Milton*;

——To ſupport uneaſy ſteps
Over the burning marl.

Here, ſays he, OVER denotes *motion*. Again,

——He with looks of cordial love
Hung OVER *her enamoured.*

Here OVER denotes *reſt*. But the truth is, that OVER denotes neither *motion* nor *reſt* in either of the paſſages. In the firſt quotation, indeed, MOTION is *implied*; but it is implied in the word STEPS; and not in OVER, which denotes only that the *place* of the ſteps was the *top* of the burning marl. In the ſecond quotation *reſt* is implied, and *that* too a particular *ſpecies* of reſt; but it is *implied* or rather *expreſſed* by the verb HUNG, and OVER denotes the *place* of that ſpecies of reſt.

130 They were by degrees extended to ſubjects incorporeal.

108. But though the original uſe of prepoſitions was to denote *the relations of body*, they could not be confined to this office only. They by degrees extended themſelves to ſubjects *incorporeal*; and came to denote relations, as well *intellectual* as *local*. Thus, becauſe in place he who is *above* has commonly the advantage over him who is *below*; hence we transfer OVER and UNDER (F) to *dominion* and *obedience*. Of a king, we ſay, *he ruled OVER his people*; of a ſoldier, *he ſerved UNDER his general*. So too we ſay, *with* thought; *without* attention; thinking *over* a ſubject; *under* anxiety; *from* fear; *through* jealouſy, &c. All which inſtances, with many others of like kind, ſhow, that the firſt words of men, like their *firſt ideas*, had an immediate reference to *ſenſible objects*; and that in after days, when they began to diſcern with their *intellect*, they took thoſe words which they

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If a man ſhould utter a ſentence, and to the end of it ſubjoin the very general word DO, the perſon to whom he ſpoke, would naturally aſk, DO what? and this queſtion would, of courſe, produce an *additional* ſentence or clauſe of a ſentence. Beſides, it is to be obſerved, that AGERE, from which the Latin prepoſition is derived, as well as the Gothic verb, which is the ſource of the Engliſh particles, means not only TO DO, but alſo to *adduce* or *bring*; ſo that when we ſay, "he is going TO Italy," we do nothing more than *affirm* that "he is *going*," and deſire the perſon to whom we ſpeak, "to ADD Italy to the journey."

From this derivation of the prepoſition TO, it will be ſeen at once upon what principle it is employed to mark the infinitive mode. In the learned languages that mode is generally known by its termination; but in Engliſh it would be impoſſible, without the aid of TO or of ſome other word ſignificant of *action*, to diſtinguiſh the VERB *love* from the *noun* or *ſubſtantive*.

(D) This derivation is Mr Horne Tooke's; and he ſupports it by the following ſentence: NE RÆDD GE SE THE ON FRUMMAN WORTHE, HE WORHTE WÆPMAN AND WIFMEN; which is the Anglo-Saxon of St Matt. xix. 4. "Annon legiſtis, quod qui eos *in principio* creavit, creavit eos marem et fœminam?"

(E) Theſe are *complex* terms becauſe they are *verbs*. *Each* denotes an *affirmation* and *time*; and combined with theſe, *came* and *falls* denote *motion*, and *hangs* denotes *reſt*.

(F) UNDER and BENEATH, though by the ſound they ſeem to have little connection, are yet in fact almoſt the ſame word, and may very well ſupply each other's place. UNDER is nothing but ON-NEDER, and BENEATH is compounded of the imperative BE and the noun NEATH. NEATH uncompounded having ſlipped away from our language, would perhaps be unintelligible, had not the *nouns* NETHER and NETHERMOST ſtill continued in common uſe. NEATH; Anglo-Saxon, NEOTHAN, NEOTHE; Dutch, NEDEN; Daniſh, NED; German, NIEDRE; and Swediſh, NEDRE and NEDER; is undoubtedly as much a ſubſtantive, and has the ſame meaning, as the word NADIR. In common language it denotes the *bottom*.

Prepositions.

they found *already* made, and transferred them by metaphor to *intellectual* conceptions.

Among the relations which may be considered rather as intellectual than corporeal, are those of *cause* and *consequence;* and for the denoting of these we have *two prepositions*, which sometimes *appear* in direct *opposition* to one another, and at other times may *exchange places* without *injury* to the sense.

"Well! 'tis e'en so! I have got the London disease they call love. I am sick OF my husband, and FOR my gallant." *Wycherley's Country Wife.*

Here OF and FOR seem almost placed in opposition; at least their effects in the sentence appear to be very different; for, by the help of these two prepositions alone, and without the assistance of any other words, she expresses the two contrary affections of *loathing* and *desire*. The truth, however, is, that the author, if it had pleased him, might have used OF where he has employed FOR, and FOR where he has put OF. This is evident from the following quotation:

"Marian. *Come, Amie, you'll go with us.*"

"Amie. *I am not well.*

"Lionel. *She's sick OF the young shepherd that beliſt her.*" Sad Shepherd.

In the same manner we may, with equal propriety, say—"We are sick OF hunger;" or—"We are sick FOR hunger." And in both cases we shall have expressed precisely the same thing, with only this difference, that, in the former sentence, we *declare sickness* to be a CONSEQUENCE; in the latter, we *declare hunger* to be a CAUSE. But to return to the *country wife;* that poor lady seems to have had a complication of distempers; she had, at least, two disorders—a sickness OF *loathing*, and a sickness OF *love*. She was sick FOR disgust, and sick FOR love. She was

Sick OF disgust FOR her husband;
Sick OF love FOR her gallant.
Sick FOR disgust OF her husband.
Sick FOR love OF her gallant.

In the first sentence, as thus stated, *sickness* is declared to be the CONSEQUENCE of *disgust*, of which *her husband* is declared to be THE CAUSE. In the second, *sickness* is declared to be the CONSEQUENCE OF love, of which her *gallant* is declared to be the CAUSE. In the third sentence, DISGUST is declared to be the *CAUSE of her sickness*, and the CONSEQUENCE or OFFSPRING of her *husband*. In the fourth, *love* is declared to be the CAUSE of her *sickness*, and the CONSEQUENCE or OFFSPRING of her *gallant*.

Thus, then, it appears, that though the *two first* of these sentences, taken entire, convey the very same meaning with the *two last*, yet the import of the preposition FOR is as different from that of OF, as CAUSE is from CONSEQUENCE (G). When two *words* or *sentences* are linked together by the *former* of these prepositions, the *object* expressed by the *last* word or sentence is declared to be the CAUSE of that which is expressed by the *preceding;* when two *words* or sentences are linked together by the *latter* preposition, the *object* expressed by the *first* word or sentence is declared to be the CONSEQUENCE OF, or to PROCEED FROM, the *object* expressed by the *second*. It is therefore a matter of perfect indifference to the sense, whether we say *sickness* OF *hunger*, or *sickness* FOR *hunger; The man,* OF *he speaks little, is wise*, or *the man is wise,* FOR *he speaks little*. By means of the preposition OF, we declare *sickness* to be the CONSEQUENCE proceeding from *hunger*, and *wisdom* to be the CONSEQUENCE we infer from the *man's speaking little;* by means of FOR, we declare hunger to be the CAUSE of *sickness*, and the circumstance of *speaking little* to be the CAUSE from which we infer the *man's wisdom*. In the one sentence, OF is to be considered as a *noun* in *apposition* to *sickness;* in the other, as a *noun* in *apposition* to *the man is wise* taken *abstractly* as a *noun*. In the one sentence FOR (i. e. CAUSE) is to be considered as a *noun* in *apposition* to *hunger;* in the other, as the *same noun* in *apposition* to *he speaks little* taken *abstractly* as a *noun*.

131 Prepositions compounded with other words,

109. In the foregoing use of prepositions, we have seen how they are applied by way of *juxta-position;* that is to say, where they are prefixed to a word without becoming a part of it. But they are used also *by way of composition;* that is, they are prefixed to other words so as to become real parts of them. Thus in *Greek* we have επισταεθαι; in *Latin intelligere;* and in *English* UNDERSTAND. So also, to FORETEL, to OVERACT, to UNDERVALUE, to OUTGO, &c.; and in *Greek* and *Latin* other instances innumerable. In this case the prepositions commonly transfuse something of their own meaning into the word with which they are compounded. For example, if we suppose some given space, E and EX signify *out of* that space; PER, *through it;* IN, *within it;* SUB *under it*. Hence E and PER, in composition, *augment: Enormis* is something not simply big, but big in excess; something got *out of the rule*, and *beyond the measure*. *Dico*, "to speak;" *edico*, "to speak out;" whence *edictum* "an edict," something so effectually spoken as all are supposed to hear and all to obey.—On the contrary, IN and SUB diminish and lessen. *Injustus, iniquus*, "UNjust, INequitable;" something that lies *within* justice and equity, that reaches not so far, that falls *short of them*. *Subniger*, "blackish;" *subrubicundus* "reddish;" *tending* to black, and *tending* to red; but yet *under* the standard, and *below* perfection.

132 transfuse something of their own meaning into those words.

133 Their real import how to be discovered.

110. Before we dismiss this part of our subject, we shall make the same general remark on *prepositions* that we formerly made on *conjunctions; viz.* that the precise import of each can with certainty be known only by tracing it to its *source* in some word of *known* and *determinate* meaning, either in the language where the preposition itself has place, or in some parent or cognate tongue. And it may be laid down as an infallible rule, that where different languages use the same or a similar *particle*, that language ought to be considered as its legitimate parent, in which the true meaning of the word can be found, and where its use is as common and familiar as that of any other verbs and substantives.

(G) *Junius* derives FOR from the Greek προ; *Skinner*, from the Latin *pro;* but I believe, says *Horne Tooke*, that it is no other than the Gothic substantive FAIRINA, "cause." He imagines also that OF (in the Gothic and Anglo-Saxon AF) is a fragment of the Gothic and Anglo-Saxon words AFARA and AFORA, *posteritas, proles*, &c. In a word, he considers FOR and OF as nouns or substantives; the former always meaning *cause*, the latter always meaning *consequence, offspring, successor, follower*, &c. If this account of these words be just, and we have no doubt of it, the prepositions FOR and OF are in syntax to be considered as *nouns* in *apposition* with other *nouns*, or with sentences taken *abstractly* as nouns.

Interjections.

ſtantives. When prepoſitions can be traced to ſuch ſources as theſe, no room can be left for diſputes concerning their meaning. In carrying on this etymological purſuit, we find advantages in the nature of *prepoſitions* which *conjunctions* do not afford us. WITH and WITHOUT, FROM and TO, with many other words belonging to this claſs, have meanings directly oppoſite and contradictory to each other. If, then, by the total or partial extinction of an original language, the root of any one prepoſition be loſt, whilſt that of its oppoſite remains, the philoſopher ought to be ſatisfied with reaſoning from *contrariety*; as nothing is more evident, than that the meaning of a word is known when we know with preciſion the meaning of its oppoſite. When we meet, however, with a luckleſs prepoſition of which no root is left to be dug up, and which has itſelf no direct oppoſite in the language, nothing remains but that we inquire for what purpoſe it is uſed by the beſt writers both ancient and modern; and if we can fix upon *one meaning* which will apply, however awkwardly, to all the places where it occurs, or to the greater part of them, the probability is, that we have diſcovered the *true* and *original* (H) meaning of the prepoſition; and by keeping that meaning conſtantly in view, we ſhall ourſelves be enabled to uſe the word with perſpicuity and preciſion.

SECT. III. *Of Interjections.*

134 The interjection not properly any part of ſpeech.

III. Beſides the above parts of ſpeech, there is another acknowledged in all the languages of Europe, called the INTERJECTION; a word which cannot be comprehended under any of the foregoing claſſes. The *genuine interjections* are very few in number, and of very little importance, as they are thrown into a ſentence without altering its *form* either in *ſyntax* or in *ſignification*. In the words of *Horne Tooke*, the brutiſh *inarticulate* interjection has nothing to do with ſpeech, and is only the miſerable refuge of the ſpeechleſs. The dominion of ſpeech, according to the ſame author, is erected on the downfal of *interjections*. Without the artful contrivances of languages, mankind would have nothing but *interjections* with which to communicate orally any of their feelings. "The neighing of a horſe, the lowing of a cow, the barking of a dog, the purring of a cat, ſneezing, coughing, groaning, ſhrieking, and every other involuntary convulſion with oral ſound, have almoſt as good a title to be called parts of ſpeech as *interjections*. In the intercourſe of language, *interjections* are employed only when the ſuddenneſs or vehemence of ſome affection or paſſion returns men to their natural ſtate, and makes them for a moment forget the uſe of ſpeech; or when, from ſome circumſtance, the ſhortneſs of time will not permit them to exerciſe it." The genuine interjection, which is always expreſſive of ſome very ſtrong ſenſation, ſuch, as AH! when we feel pain, does not owe its characteriſtical expreſſion to the arbitrary form of articulation, but derives its whole force from the tone of voice and modification of countenance and geſture. Of conſequence, theſe tones and geſtures expreſs the ſame meaning, without any relation to the articulation which they may aſſume; and are therefore univerſally underſtood by all mankind. *Voluntary* interjections are uſed in books only for embelliſhment, and to mark forcibly a ſtrong emotion. But where ſpeech can be employed, they are totally uſeleſs; and are always inſufficient for the purpoſe of communicating thought, Dr Beattie ranks *ſtrange*, *prodigious*, *amazing*, *wonderful*, *O dear*, *dear me*, &c. when uſed alone, and without apparent grammatical ſyntax, among the *interjections:* but he might with as much propriety have conſidered *hardly*, *truly*, *really*, and even many Latin *verbs*, as *interjections;* for theſe two are often uſed *alone*, to ſupply the place of *whole ſentences*. The truth is, that all men, when ſuddenly and violently agitated, have a ſtrong tendency to ſhorten their diſcourſe by employing a *ſingle word* to expreſs a *ſentiment*. In ſuch caſes, the word employed, whether *noun*, *adjective* or *verb*, would be the *principal* word of the ſentence, if that ſentence were completed; and the *agitation* of the ſpeaker is ſuch, and the *cauſe* of it ſo obvious, that the hearer is in no danger of miſtaking the *ſenſe*, and can himſelf ſupply the words that are wanting. Thus if a perſon, after liſtening to a romantic narrative, were to exclaim, *ſtrange!* would any man of common ſenſe ſuppoſe, that the word *ſtrange*, becauſe uttered alone, had loſt the power of an *adjective* and become an *interjection?* No, ſurely: Every one ſees, that the exclamation is equivalent to, *That is* STRANGE, or *That is a* STRANGE *ſtory*. *Real* interjections are never employed to convey *truth* of any kind. They are not to be found amongſt *laws*, in books of *civil inſtitutions*, in *hiſtory*, or in any treatiſe of uſeful *arts* or *ſciences;* but in *rhetoric* and *poetry*, in *novels*, *plays* and *romances*, where in Engliſh, ſo far from giving *pathos* to the ſtyle, they have generally an effect that is diſguſting or ridiculous.

Interjections.

HAVING now analyſed *every part* of ſpeech which can be neceſſary for the *communication of thought*, or which is acknowledged in any language with which we are acquainted; we ſhall diſmiſs the article of *Grammar*, after annexing a Table, which may preſent at one view the ſeveral *claſſes* and *ſubdiviſions of words*. Of the different modes of dividing the parts of ſpeech, as well as of the little importance of *ſyſtematic claſſifications*, we have already declared our decided opinion: but for the ſake of thoſe who may think differently from us, we ſhall in the annexed Table adopt Mr *Harris's* claſſification as far as it is intelligible; after informing our readers that Mr *Horne Tooke* admits only *three* parts of ſpeech, the *article*, the *noun*, and the *verb*, and conſiders all other words as corruptions or abbreviations of the two laſt of theſe.

A

(H) For inſtance, let us ſuppoſe that *Horne Tooke's* derivation of FOR, from the Gothic ſubſtantive FAIRINA, is fanciful and ill-founded; yet there can be little doubt but CAUSE is its true and original meaning, when it is found, that of ſixteen examples brought by *Greenwood*, and forty-ſix by *Johnſon*, of different ſignifications of the word FOR, there is not one where the *noun* CAUSE may not be ſubſtituted inſtead of the *prepoſition* FOR; ſometimes indeed awkwardly enough, but always *without injury* to the *ſenſe*. Even where FOR ſeems to be *loco alterius*, which *Lowth* aſſerts to be its *primary ſenſe*, it will be found to be CAUSE, and nothing elſe: Thus *He made conſiderable progreſs in the ſtudy of the law before he quitted that profeſſion* FOR *this of poetry;* i. e. *before he quitted that profeſſion, this of poetry* being *the* CAUSE of his quitting it.

Grammarian || Granada.

GRAMMARIAN, one that is ſkilled in or teaches grammar.

Anciently the name *grammarian* was a title of honour, literature, and erudition, being given to perſons accounted learned in any art or faculty whatever. But it is otherwiſe now, being frequently uſed as a term of reproach, to ſignify a dry plodding perſon, employed about words and phraſes, but inattentive to the true beauties of expreſſion and delicacy of ſentiment. The ancient grammarians, called alſo *philologers*, muſt not be confounded with the grammatiſts, whoſe ſole buſineſs was to teach children the firſt elements of language. Varro, Cicero, Meſſala, and even Julius Cæſar, thought it no diſhonour to be ranked grammarians, who had many priveliges granted to them by the Roman emperors.

GRAMMONT, a town of France, in Upper Vienne, remarkable for its abbey, which is the chief of the order. E. Long. 1. 30. N. Lat. 46. 1.

GRAMPIAN HILLS; a chain of high mountains in Scotland, which run from eaſt to weſt almoſt the whole breadth of the kingdom. See (*Scottiſh*) ALPS and SCOTLAND.—They take their name from only a ſingle hill, the *Mons Grampius* of Tacitus, where Galgacus waited the approach of Agricola, and where the battle was fought ſo fatal to the brave Caledonians.

GRAMPOUND, a town of Cornwall in England, ſeated on the river Valle, over which there is here a bridge. W. Long. 5. 25. N. Lat. 50. 20. The inhabitants have a conſiderable manufacture of gloves; and the town ſends two members to parliament. Some think that this town is the Voluba of the ancients, becauſe it ſtands on the ſame river; and that on the building of the bridge, the name was changed into Grandpont. It was made a borough in the reign of Edward III. by whoſe charter it was endowed with large privileges, particularly freedom from toll through all Cornwall, a market on Saturday, and three fairs in the year; which the burgeſſes hold of the duchy of Cornwall in fee-farm, at the rent of about 12 guineas. Its privileges were confirmed by King Henry VIII. but it did not ſend members to parliament till the reign of Edward VI. It is a corporation with a mayor, eight magiſtrates, a recorder, and town-clerk. The mayor is choſen annually the Tueſday before Michaelmas, and the members by the majority of the magiſtrates and freemen, who are ſuch of the inhabitants as pay ſcot and lot. There is a chapel of eaſe in the town to the pariſh-church, which is at Creed about a quarter of a mile off.

GRAMPUS, a ſpecies of delphinus. See DELPHINUS, CETOLOGY *Index*.

GRANADA, a province of Spain, which for a long time was a kingdom diſtinct from the reſt of that country. See the article SPAIN.—It made a part of the ancient Bætica; and was inhabited by the Baſtuli, the Sexitani, &c. At preſent it is ſometimes called Upper Andaluſia. It is bounded to the ſouth and eaſt by the Mediterranean, to the weſt and north by Lower Andaluſia, and to the north-eaſt by Murcia. Its extent from weſt to eaſt is two hundred and ten miles; but its greateſt breadth exceeds not eighty. The air here is temperate and healthy; and though there are many mountains in the province, and ſome of them very high, yet they are almoſt everywhere covered with vines and fruit-trees, together with laurel, myrtle, ſweet-baſil, thyme, lavender, marjoram, and other aromatic herbs, which give an exquiſite taſte to the fleſh of their ſheep and cattle. A great deal of ſilk and ſugar, flax and hemp, honey and wax, is alſo produced here; beſides dates and acorns, ſuperior to the fineſt nuts; good ſtone for building; ſeveral ſorts of gems; ſumach, uſed in dreſſing goat-ſkins; and galls, of which a dye is made for leather. The valleys, with which the mountains are interſperſed, are extremely beautiful and fertile. The inhabitants of ſome of the higheſt mountains are ſaid to be deſcendants of the Moors; and, though they are become Roman Catholics, retain, in a great meaſure, their ancient cuſtoms, manners, and language. The principal rivers in the province are the Genil or Xenil, and Guadalantin, beſides which there are many leſſer ſtreams. Abundance of ſalt is made in this province; which, though neither ſo populous nor ſo well cultivated as when ſubject to the Moors, yet is as much ſo as any in Spain. It was the laſt of the kingdoms poſſeſſed by the Moors, and was not reduced and annexed to the crown of Caſtile until 1492. Granada.

GRANADA, the capital of the above province, is ſituated at the foot of the Sierra Nevada, or the Snowy Mountain, in a wholeſome air and fruitful country, an hundred and eighty miles ſouth of Madrid, in W. Long. 2. 30. N. Lat. 36. 56. It ſtands upon two hills ſeparated by the Darro. The Genil runs under the walls, and theſe two rivers are formed from the melting of the ſnow with which the mountain is conſtantly covered. The Darro is ſaid to carry with it ſmall particles of gold; and its name, derived from *dat aurum*, may be alleged as a proof of this: the Genil, in like manner, rolls with its ſtream little pieces of ſilver. When Charles V. came to Granada in 1526, with the empreſs Iſabella, the city preſented him with a crown made of gold gathered from the Darro. The city is large and magnificent, containing a great number of very handſome public and private buildings. Its walls, which are adorned with many towers at equal diſtances, are ſaid to be ten miles in compaſs. Here are two caſtles; the one built by the Moors, and the other by Charles V. and Philip II. They both command a very fine proſpect; and the firſt is ſo large, that it looks like a city by itſelf, and, it is ſaid, has room enough to accommodate forty thouſand people, excluſive of the royal palace, and the convent of St Francis. Here is alſo a court of inquiſition; a royal tribunal; and an univerſity, founded in 1531; with the ſee of an archbiſhop, who has a revenue of forty thouſand ducats per annum. A great many noblemen, clergymen, and wealthy citizens, reſide in this city, of which the ſilk trade and manufacture is very great, and the arſenal is ſaid to be the beſt furniſhed of any in Spain. The inhabitants, who are partly deſcended of the Moors, are well ſupplied with water. There are ſeveral fine ſquares, particularly that called the *Bivaramba*, or *Plaça Mayor*, where the bull-fights are held; and without the city is a large plain, full of towns and villages, called *La Vega de Granada*.

The Moors are ſaid to regret nothing but Granada, amongſt all the loſſes they have ſuſtained in Spain; they mention it in all their evening prayers, and ſupplicate heaven

Granada. heaven to reſtore it to their poſſeſſion. The laſt Moorish ambaſſador who came into Spain obtained permiſſion of the king to ſee Granada; he ſhed tears on entering the Alhambra, and could not refrain from exclaiming, that the folly of his anceſtors had deprived them and their poſterity of that delightful country. Granada.

Granada had formerly twenty gates: the firſt, that of Elvira, which ſtill remains; the ſecond, that of Bibalmazar, or of conference, becauſe, with the Moors, it was a kind of place of reſort where they converſed on affairs; the third, Vivarambla, ſo called from its leading to a grand ſquare which ſtill bears the ſame name; the fourth, Bib Racha, or of proviſions; the fifth, Bibtaubin, or the gate of the hermits, which led to different ſolitudes, the abodes of derviſes; the ſixth, Bibmitre, or Bibiacha, the firſt gate; the ſeventh, the mill gate; the eighth, that of the ſun, becauſe it opened to the eaſt; the ninth, the gate of the Alhambra, called by the Moors Bib Luxar; the tenth, Bib Adam, or the gate of the bones of Adam; the twelfth, Bib Ciedra, the gate of the nobles; the Moors kept this gate ſhut for a long time, becauſe it had been predicted that the enemies which ſhould one day take the city, would enter by that gate; the thirteenth, is that of Faxalauza, or of the hill of almond trees; the fourteenth, the lion gate, in Arabic, Bib Elecei; the fifteenth, the coaſt gate, called by the Moors Alacabar; the ſixteenth, Bib Albonut, or the gate of the Banners, at preſent the magdalen gate; the ſeventeenth, that of the Darro; the eighteenth, that of the Moſayca; the nineteenth, that called the gate of *Ecce Homo*; the twentieth, that by the ſide of the Alhambra.

The Moors have left more monuments in Granada than in any other city in Spain. From the great number of inſcriptions in and about the city, and the fine edifices of the Alhambra and the Generalif, it might be ſuppoſed theſe people intended to make Granada the greateſt depoſitory of their religion, manners, cuſtoms, and magnificence. There is not a wall which does not bear ſome marks of their power; but, notwithſtanding this abundance of monuments, the reign of the Moors in Spain is ſtill buried in confuſion and obſcurity. The ignorance of the Spaniards, their ſuperſtition, and the hatred they bore the Moors, have much contributed to this darkneſs; they have either deſtroyed, or ſuffered to be effaced by time, every thing which bore the mark of Mahometaniſm, inſtead of preſerving the monuments of antiquity, which at the ſame time were thoſe of their own glory; and it may be ſaid, that chance alone, and the ſolidity of their conſtruction, much more than curioſity or a love of the arts, has preſerved thoſe which ſtill exiſt, though daily going to ruin.

An account of the ALHAMBRA has been already given under its name in the order of the alphabet. From the hall of *Comares* there mentioned, there is a modern little ſtaircaſe; the old one, which correſponded to the beauty of the edifice, having been deſtroyed. At the top of the ſtaircaſe is a gallery, a part of which is incloſed with an iron railing: this kind of cage is called the priſon of the queen. It was here the wife of the laſt king of Granada was impriſoned. The Gomels and Legris, two families of diſtinction, bore falſe witneſs againſt her virtue, and occaſioned the deſtruction of the greateſt part of the Abencerrages, another powerful and numerous family of Granada of whom they were jealous. The hiſtory of this event is given as follows: Granada.

In the year 1491, Abdali, ſurnamed the Little, ſtill reigned in Granada; but this city was upon the brink of ruin, for the principal families were divided againſt each other. The Moors had carried their arms againſt Jaen, and had been bravely repulſed. Abdali was conſoling himſelf in one of his pleaſure houſes for the ill ſucceſs of his enterpriſe, when the Zegris, who long had been the ſecret enemies of the Abencerrages, took the opportunity of this defeat to repreſent them to the king as rebellious ſubjects, who employed their immenſe riches to gain the favour of the people and dethrone their ſovereign. They accuſed Albin Hamet, the moſt rich and powerful among them, of having an adulterous commerce with the queen, and produced witneſſes who aſſerted they had on a certain feſtival ſeen, at Generalif, under a bower of roſe trees, Albin Hamet in the arms of that princeſs. The fury of Abdali may eaſily be imagined; he ſwore the deſtruction of the Abencerrages. But the Zegris, too prudent to let his anger break forth, adviſed him to diſſimulate, and not to ſuffer it to be known to that numerous and powerful family that he was informed of their perfidy. It will be better, ſaid they, to entice them into the ſnare, and, before they can unite and put themſelves into a ſtate of defence, revenge upon their heads the inſult offered to the crown. This advice was followed; Abdali went to the Alhambra, having ordered thirty of his guards to arm themſelves, and the executioner to attend. The Abencerrages were ſent for one by one, and beheaded as ſoon as they entered the hall of the lions, where there is ſtill a large vaſe of alabaſter, which was quickly filled with blood and the heads of expiring bodies. Thirty-five heads had already been ſtruck off, and all the Abencerrages would have died in the ſame manner, had not a page, who had followed his maſter, and remained unperceived in the hurry of the execution, taken an opportunity of withdrawing and giving information to the reſt of the unhappy family of what had paſſed. Theſe immediately aſſembled their friends in arms, crying out through the city of Granada, "Treaſon! treaſon! Let the king die! he unjuſtly puts to death the Abencerrages!" The people, with whom they were favourites, did not heſitate in aſſiſting them: fourteen thouſand men were ſoon found in arms, and immediately proceeded towards the Alhambra, ſhouting all the way, Let the king die! Abdali, ſurpriſed his ſecret ſhould have been ſo ſoon diſcovered, and ſeverely repenting of having followed the pernicious counſels he had received, ordered the caſtle gates to be ſhut; but they were preſently ſet on fire. Muley Hacen, who had been forced to abdicate the throne in favour of his ſon, hearing the tumult of the people, had one gate opened, and preſented himſelf to appeaſe the rage of the citizens; but he no ſooner appeared, than he was lifted up by the multitude neareſt the gate, who cried out, "Behold our king, we will have no other, long live Muley Hacen;" and leaving him ſurrounded by a ſtrong guard, the Abencerrages, and other nobles, entered the caſtle, accompanied by upwards of an hundred ſoldiers. But they found the queen only, with her women, and in the utmoſt conſternation at the ſudden

Granada. sudden revolution, of which she knew not the cause. They asked for the king; and being informed he was in the hall of the lions, entered it furiously, and found him defended by the Zegris and the Gomels, and in less than two hours killed upwards of two hundred of them. Abdali had the good fortune to escape. The bodies of the beheaded Abencerrages were laid upon black cloth, and carried to the city. Muza, brother to Abdali, and who by his great actions had gained the favour of the people, seeing the Abencerrages were revenged, found means to appease them; and having learned that the king had taken refuge in a mosque near the mountain now called Saint Helena, went and brought him back to the castle of the Alhambra. For several days nothing but sighs and groans were heard throughout the city. Abdali shut himself up in the castle, and refused to see the queen. Those who had accused her of adultery, however, persisted in their false accusation, and said, they would maintain, with arms in their hands, against all who should contradict them, that the queen was guilty. The unhappy princess was imprisoned, and the day arriving on which she was to perish by the hands of the executioner, when none among the Moors offering to defend her, she was advised to commit her cause to some Christian knights, who presented themselves at the time appointed, and conquered her false accusers, so that she was immediately set at liberty. The taking of Granada soon followed this combat; Muza and the Abencerrages having, it is said, facilitated the conquest of it by Ferdinand and Isabella.

From the Alhambra you enter the Generalif by a low gate, which favoured the escape of Abdali when Ferdinand took Granada. Generalif is said to signify, in Arabic, the house of love, of dance, and pleasure. It was built by a prince of the name of Omar, who was so fond of music, that he retired to this palace, entirely to give himself up to that amusement. The Generalif is the most pleasing situation in the environs of Granada. It is built upon a very high mountain, whence waters rush from every side, which escape in torrents, and fall in beautiful cascades in the courts, gardens, and halls of that ancient palace. The gardens form an amphitheatre, and are full of trees, venerable from their antiquity, Two cypresses in particular are noted, called the Cypresses of the queen, because it was near them the perfidious Gomel impeached the virtue of that princess and the honour of the Abencerrages. Of this place, travellers observe, that the writers of romances have never imagined a scene equal to it.

Granada was formerly called *Illiberia*, and founded, if we will believe some writers, by Liberia, a great-grand-daughter of Hercules, daughter of Hispan, and wife to Hesperus, a Grecian prince, and brother to Atalanta. Others, who support their assertions by proofs to the full as satisfactory, maintain that it was founded by Iberus, grandson of Tubal, and that it took the name of Granada, or Garnata, from Nata the daughter of Liberia; this word being composed of *Gar* (which in the language of the time signified grotto) and *Nata*; that is, "the grotto of Nata," because that princess studied astrology and natural history, and delighted in the country. It is certain that such a person as Nata, or Natayda, existed in the first ages of the foundation of Granada; and that in the place where the Alhambra now stands, there was a temple dedicated to Nativala. The date of the foundation of Granada is said to be 2808 years before Christ. We know that in the time of the Romans it was a municipal colony.—A description in Latin of Granada, such as it was in 1560, written by a merchant at Antwerp, named George Hosnahel, who travelled into Spain, is to be found in the work intitled *Civitatis orbis terrarum*, printed at Cologne in 1576. This book also contains a good plan of the city of Granada. Granada || Granado.

GRANADA, or *Grenada*, one of the Caribbee islands. See GRENADA.

GRANADA, a town of America, in the province of Nicaragua, and in the audience of Guatimala, seated on the lake Nicaragua, 70 miles from the South sea. It was taken twice by the French buccaneers, and pillaged. The inhabitants carry on a great trade by means of the lake, which communicates with the North sea. W. Long. 85. 10. N. Lat. 11. 8.

GRANADA, *New*, a province of South America, in Terra Firma, about 75 miles in length, and as much in breadth. It is bounded on the north by Carthagena and St Martha, on the east by Venezuela, on the south by Popayan, and on the west by Darien. It contains mines of gold, copper, and iron; horses, mules, good pastures, corn, and fruits. It belongs to the Spaniards, and Santa-Fe de-Bagota is the capital town.

GRANADILLOES, the name of some islands of the Caribbees, in America, having St Vincent to the north and Granada to the south. They are so inconsiderable that they are quite neglected; but were ceded to England by the treaty of peace in 1763.

GRANADIER, a soldier armed with a sword, a firelock, a bayonet, and a pouch full of hand granadoes. They wear high caps, are generally the tallest and briskest fellows, and are always the first upon all attacks.

Every battalion of foot has generally a company of granadiers belonging to it; or else four or five granadiers belong to each company of the battalion, which, on occasion, are drawn out, and form a company of themselves. These always take the right of the battalion.

GRANADO or GRENADE, in the art of war, a hollow ball or shell of iron or other metal, of about $2\frac{1}{4}$ inches diameter, which being filled with fine powder, is set on fire by means of a small fuse driven into the fuse-hole, made of well-seasoned beech-wood, and thrown by the grenadiers into those places where the men stand thick, particularly into the trenches and other lodgements made by the enemy. As soon as the composition within the fuse gets to the powder in the granado, it bursts into many pieces, greatly to the damage of all who happen to be in its way. Granadoes were invented about the year 1594. The author of the Military Dictionary has the following remark on the use of granadoes. "Grenades have unaccountably sunk into disuse; but I am persuaded there is nothing more proper than to have grenades to throw among the enemy who have jumped into the ditch. During the siege of Cassel under the count de la Lippe, in the campaign of 1762, a young engineer

Granard, Granary.

undertook to carry one of the outworks with a much ſmaller detachment than one which had been repulſed, and ſucceeded with eaſe from the uſe of grenades; which is a proof that they ſhould not be neglected, either in the attack or defence of poſts."—The word Granado takes its riſe from hence, that the ſhell is filled with grains of powder, as a pomegranate is with kernels.

GRANARD, a borough, market, fair, and poſt town in the county of Longford, province of Leinſter; it gives title of earl to the family of Forbes; ſituated 52 miles from Dublin, and about 16 north-eaſt of Longford. N. Lat. 53. 44. W. Long. 7. 30. Here is a remarkable hill or mount, called the *Moat of Granard*, thought to be artificial, and the ſite of a Daniſh caſtle or fort; which commands from its ſummit a moſt extenſive proſpect into ſix or ſeven adjoining counties. In this town have lately been given annual prizes to the beſt performers on the Iriſh harp. Granard has a barrack for a company of foot; and returns two members to parliament; patronage in the families of Macartney and Greville. Fairs held 3d May and 1ſt October. This place takes its name from *Grianard*, or "the height of the ſun," and was formerly the reſidence of the chiefs of North Teffia. It is ſometimes written Grenard.

GRANARY, a building to lay or ſtore corn in, eſpecially that deſigned to be kept a conſiderable time.

Sir Henry Wotton adviſes to make it look towards the north, becauſe that quarter is the cooleſt and moſt temperate. Mr Worlidge obſerves, that the beſt granaries are built of brick, with quarters of timber wrought in the inſide, to which the boards may be nailed, with which the inſide of the granary muſt be lined ſo cloſe to the bricks, that there may not be any room left for vermin to ſhelter themſelves. There may be many ſtories one above another, which ſhould be near the one to the other; becauſe the ſhallower the corn lies, it is the better, and more eaſily turned.

The two great cautions to be obſerved in the erecting of granaries are, to make them ſufficiently ſtrong, and to expoſe them to the moſt drying winds. The ordering of the corn in many parts of England, particularly in Kent, is thus: To ſeparate it from duſt and other impurities after it is thraſhed, they toſs it with ſhovels from one end to the other of a long and large room; the lighter ſubſtances fall down in the middle of the room, and the corn only is carried from ſide to ſide, or end to end of it. After this they ſcreen the corn, and then bringing it into the granaries, it is ſpread about half a foot thick, and turned from time to time about twice in a week; once a-week they alſo repeat the ſcreening it. This ſort of management they continue about two months, and after that they lay it a foot thick for two months more; and in this time they turn it once a-week, or twice if the ſeaſon be damp, and now and then ſcreen it again. After about five or ſix months they raiſe it to two feet thickneſs in the heaps, and then they turn it one or twice in a month, and ſcreen it now and then. After a year, they lay it two and a half or three feet deep, and turn it once in three weeks or a month, and ſcreen it proportionably. When it has lain two years or more, they turn it once in two months, and ſcreen it once a-quarter; and how long ſoever it is kept, the oftener the turning and ſcreening are repeated, the better the grain will be found to be.—It is proper to leave an area of a yard wide on every ſide of the heap of corn, and other empty ſpaces, into which they turn and toſs the corn as often as they find occaſion. In Kent they make two ſquare holes at each end of the floor, and one round in the middle, by means of which they throw the corn out of the upper into the lower rooms, and ſo up again, to turn and air it the better. Their ſcreens are made with two partitions, to ſeparate the duſt from the corn, which falls into a bag, and when ſufficiently full this is thrown away, the pure and good corn remaining behind. Corn has by theſe means been kept in our granaries 30 years; and it is obſerved, that the longer it is kept the more flour it yields in proportion to the corn, and the purer and whiter the bread is, the ſuperfluous humidity only evaporating in the keeping. At Zurich in Switzerland, they keep corn 80 years, or longer, by the ſame ſort of methods. Granary.

The public granaries at Dantzick are ſeven, eight or nine ſtories high, having a funnel in the midſt of each floor to let down the corn from one to another. They are built ſo ſecurely, that though every way ſurrounded with water, the corn contracts no damp, and the veſſels have the convenience of coming up to the walls for their lading. The Ruſſians preſerve their corn in ſubterranean granaries of the figure of a ſugar-loaf, wide below and narrow at top; the ſides are well plaſtered, and the top covered with ſtones. They are very careful to have the corn well dried before it is laid into theſe ſtorehouſes, and often dry it by means of ovens; the ſummer dry weather being too ſhort to effect it ſufficiently.—Dantzick is the grand ſtorehouſe or repoſitory of all the fruitful kingdom of Poland. The wheat, barley, and rye, of a great part of the country, are there laid up in parcels of 20, 30, or 60 laſts in a chamber, according to the ſize of the room; and this they keep turning every day or two, to keep it ſweet and fit for ſhipping. A thunder ſtorm has ſometimes been of very terrible conſequences to theſe ſtores. All the corn of the growth of former years has been found ſo much altered by one night's thunder, that though over night it was dry, fit for ſhipping or keeping, and proper for uſes of any ſort, yet in the morning it was found clammy and ſticking. In this caſe, there is no remedy but the turning of all ſuch corn two or three times a-day for two months or longer; in which time it will ſometimes come to itſelf, though ſometimes not. This effect of thunder and lightning is only obſerved to take place in ſuch corn as is not a year old, or has not ſweated thoroughly in the ſtraw before it was threſhed out. The latter inconvenience is eaſily prevented by a timely care; but as to the former, all that can be done is carefully to examine all ſtores of the laſt year's corn after every thunder ſtorm, that if any of this have been ſo affected, it may be cured in time; for a neglect of turning will certainly utterly deſtroy it.

According to Vitruvius's rules, a granary ſhould always be at the top of a houſe, and have its openings only to the north or eaſt, that the corn may not be expoſed to the damp winds from the ſouth and weſt, which are very deſtructive to it; whereas the contrary ones are very neceſſary and wholeſome to it, ſerving

to

Granary. to cool and dry it from all external humidity, from whatever cauſe. There muſt alſo be openings in the roof to be ſet open in dry weather, partly to let in freſh air, and partly to let out the warm effluvia which are often emitted by the corn. The covering of the roofs ſhould always be of tiles, becauſe in the worſt ſeaſons, when the other openings cannot be ſafe, there will always be a conſiderable inlet for freſh air, and a way out for the vapours by their joinings, which are never cloſe. If there happen to be any windows to the ſouth, great care muſt be taken to ſhut them up in moiſt weather, and in the time of the hot ſouthern winds. There muſt never be a cellar, or any other damp place under a granary, nor ſhould it ever be built over ſtables; for in either of theſe caſes the corn will certainly ſuffer by the vapours, and be made damp, in one, and ill taſted in the other.

M. du Hamel and Dr Hales recommend various contrivances for ventilating or blowing freſh air through corn laid up in granaries or ſhips, in order to preſerve it ſweet and dry, and to prevent its being devoured by weevils or other inſects. This may be done by nailing wooden bars or laths on the floor of the granary about an inch diſtant from each other, when they are covered with hair-cloth only; or at the diſtance of two or three inches, when coarſe wire-work, or baſket-work of oſier is laid under the hair cloth, or when an iron plate full of holes is laid upon them. Theſe laths may be laid acroſs other laths, nailed at the diſtance of 15 inches, and two or more deep, that there may be a free paſſage for the air under them. The under laths muſt come about ſix inches ſhort of the wall of the granary at one end of them; on which end a board is to be ſet edgewiſe, and ſloping againſt the wall: by this diſpoſition a large air-pipe is formed, which having an open communication with all the interſtices between and under the bars, will admit the paſſage of air below forcibly through a hole at the extremity of it, into all the corn in the granary, that will conſequently carry off the moiſt exhalations of the corn. The ventilators for ſupplying freſh air may be fixed againſt the wall, on the inſide or outſide of the granary, or under the floor, or in the ceiling; but wherever they are fixed, the handle of the lever that works them muſt be out of the granary, otherwiſe the perſon who works them would be in danger of ſuffocation, when the corn is fumed with burning brimſtone, as is ſometimes done for deſtroying weevils. Small moveable ventilators will anſwer the purpoſe for ventilating corn in large bins in granaries, and may be eaſily moved from one bin to another. If the granary or corn ſhip be very long, the main air-pipe may paſs lengthwiſe along the middle of it, and convey air, on both ſides, under the corn. In large granaries, large double ventilators laid on each other, may be fixed at the middle and near the top of the granary, that they may be worked by a wind-mill fixed on the roof of the building, or by a water-mill. The air is to be conveyed from the ventilators through a large trunk or trunks, reaching down through the ſeveral floors to the bottom of the granary, with branching trunks to each floor, by means of which the air may be made to paſs into a large trunk along the adjoining croſs walls: from theſe trunks ſeveral leſſer trunks, about four inches wide, are to branch off, at the diſtance of three or four feet from each other, which are to reach through the whole length of the granary, and their farther ends are to be cloſed: ſeams of $\frac{1}{10}$ or $\frac{1}{12}$ of an inch are to be left open at the four joinings of the boards, where they are nailed together, that the air may paſs through them into the corn. In ſome of theſe leſſer trunks there may be ſliding ſhutters, in order to ſtop the paſſage of the air through thoſe trunks which are not covered with corn; or to ventilate one part of the granary more briſkly than others, as there may be occaſion. There muſt alſo be wooden ſhutters, hung on hinges at their upper part, ſo as to ſhut cloſe of themſelves; theſe muſt be fixed to the openings in the walls of the granary on their outſide: by theſe means they will readily open to give a free paſſage for the ventilating air, which aſcends through the corn, to paſs off, but will inſtantly ſhut when the ventilation ceaſes, and thereby prevent any dampneſs of the external air from entering: to prevent this, the ventilation ſhould be made only in the middle of dry days, unleſs the corn, when firſt put in, is cold and damp. Granary.

In leſſer granaries, where the ventilators muſt be worked by hand, if theſe granaries ſtand on ſtaddles, ſo as to have their loweſt floor at ſome diſtance from the ground, the ventilators may be fixed under the loweſt floor, between the ſtaddles, ſo as to be worked by men ſtanding on the ground, without or within the granary. A very commodious and cheap ventilator may be made for ſmall granaries, by making a ventilator of the door of the granary; which may be eaſily done by making a circular ſcreen, of the ſize of a quarter of a circle, behind the door: but in order to this, the door muſt be open, not inwards but outwards of the granary, ſo that as it falls back, it may be worked to and fro in the ſcreen; which muſt be exactly adapted to it in all parts of the circular ſide of the ſcreen, as well as at the top and bottom. But there muſt be a ſtop at about eight or ten inches diſtance from the wall, to prevent the door's falling back farther; that there may be room for a valve in the ſcreen to ſupply it with air; which air will be driven in by the door, through a hole made in the wall near the floor, into the main air-trunk, in which there muſt be another valve over the hole in the wall, to prevent the return of the air.

To deſtroy weevils and other inſects with which GRANARIES *are apt to be infeſted.*—The preſervation of grain from the ravages of inſects may be beſt effected by timely and frequent ſcreening, and ventilation; as little or no inconvenience will follow corn or malt lodged dry, but what evidently reſults from a neglect of theſe precautions. For, whether the obvious damage ariſe from the weevil, the moth, or the beetle, that damage has ceaſed at the time the vermin make their appearance under either of theſe ſpecies, they being, when in this laſt ſtate of exiſtence, only propagators of their reſpective kinds of vermiculi; which, while they continue in that form, do the miſchief.

In this laſt, or inſect ſtate, they eat little, their principal buſineſs being to depoſit their ova (eggs), which unerring inſtinct prompts them to do where large collections of grain furniſh food for their ſucceſſors while in a vermicular ſtate. It is therefore the buſineſs of induſtry to prevent future generations of theſe ravagers, by deſtroying the eggs previous to their hatching; and

Granary || Grand.

this is beſt accompliſhed by frequent ſcreening, and expoſure to draughts of wind or freſh air. By frequently ſtirring the grain, the coheſion of their ova is broken, and the nidus of thoſe minute worms is deſtroyed, which on hatching collect together, and ſpin or weave numerous neſts of a cobweb-like ſubſtance for their ſecurity. To theſe neſts they attach, by an infinity of ſmall threads, many grains of corn together, firſt for their protection, and then for their food. When their habitations are broken and ſeparated by the ſcreen, they fall through its ſmall interſtices, and may be eaſily removed from the granary with the duſt. Thoſe that eſcape an early ſcreening will be deſtroyed by ſubſequent ones, while the grain is but little injured; and the corn will acquire thereby a ſuperior purity. But by inattention to this, and ſometimes by receiving grain already infected into the granary, theſe vermin, particularly the weevil, will in a ſhort time ſpread themſelves in that ſtate everywhere upon its ſurface, and darken even the walls by their number. Under ſuch circumſtances a hen or hens, with new hatched chickens, if turned on the heap, will traverſe, without feeding (or very ſparingly ſo) on the corn, wherever they ſpread; and are ſeemingly inſatiable in the purſuit of theſe inſects. When the numbers are reduced within reach, a hen will fly up againſt the walls, and bruſh them down with her wings, while her chickens ſeize them with the greateſt avidity. This being repeated as often as they want food, the whole ſpecies will in a day or two be deſtroyed. Of the phalæna (moth), and the ſmall beetle, they ſeem equally voracious: on which account they may be deemed the moſt uſeful inſtruments in nature for eradicating theſe noxious and deſtructive vermin.

GRANATE, or GARNET, a ſpecies of mineral belonging to the ſiliceous genus. See MINERALOGY *Index*.

GRANATE-Paſte. See GARNET.

GRAND, a term rather French than Engliſh, though uſed on many occaſions in our language. It has the ſame import with *great*, being formed of the Latin *grandis*. In this ſenſe we ſay, the grand-maſter of an order, the grand-maſter of Malta, of the freemaſons, &c. So alſo the grand-ſignior, the grand-viſir, &c. grand-father, grand-mother, &c.

Among the French there were formerly ſeveral officers thus denominated, which we frequently retain in Engliſh; as grand almoner, grand ecuyer, grand chambellan, grand voyer, &c.

GRAND-Aſſize. See ASSISE.

GRAND Diſtreſs (*diſtrictio magna*), in *Engliſh Law*, a writ of diſtreſs, ſo called on account of its extent, which reaches to all the goods and chattels of the party within the county. This writ lies in two caſes: either when the tenant or defendant is attached and appears not, but makes default; or where the tenant or defendant hath once appeared, and after makes default. On ſuch occaſions, this writ lies by common law, in lieu of a petit cape.

GRAND Guſto, among painters, a term uſed to expreſs that there is ſomething in the picture very great and extraordinary, calculated to ſurpriſe, pleaſe, and inſtruct.—Where this is found, they ſay, the painter was a man of *grand guſto*; and they uſe the words *ſublime* and *marvellous*, when they ſpeak of a picture, in much the ſame ſenſe.

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GRAND Jury, *larceny*, *ſerjeanty*, &c. See JURY, &c.

GRANDEE, is underſtood of a lord of the firſt rank or prime quality.

In Spain, the term *grandees* is uſed abſolutely to denote the prime lords of the court, to whom the king has once given leave to be covered in his preſence: there are ſome grandees for life only; made by the king's ſaying ſimply, Be covered. Others are grandees by deſcent; made by the king's ſaying, Be covered for thyſelf and heirs. Theſe laſt are reputed far above the former.

There are ſome who have three or four grandeeſhips in their family.

1 Double ſignification.

GRANDEUR and SUBLIMITY. Theſe terms have a double ſignification: they commonly ſignify the quality or circumſtance in objects by which the emotions of grandeur and ſublimity are produced; ſometimes the emotions themſelves.

In handling the preſent ſubject, it is neceſſary that the impreſſion made on the mind by the magnitude of an object, abſtracting from its other qualities, ſhould be aſcertained. And becauſe abſtraction is a mental operation of ſome difficulty, the ſafeſt method for judging is, to chooſe a plain object that is neither beautiful nor deformed, if ſuch a one can be found. The plaineſt that occurs, is a huge maſs of rubbiſh, the ruins perhaps of ſome extenſive building; or a large heap of ſtones, ſuch as are collected together for keeping in memory a battle or other remarkable event. Such an object, which in miniature would be perfectly indifferent, makes an impreſſion by its magnitude, and appears agreeable. And ſuppoſing it ſo large as to fill the eye, and to prevent the attention from wandering upon other objects, the impreſſion it makes will be ſo much the deeper. See ATTENTION.

But though a plain object of that kind be agreeable, it is not termed *grand*: it is not entitled to that character, unleſs, together with its ſize, it be poſſeſſed of other qualities that contribute to beauty, ſuch as regularity, proportion, order, or colour: and according to the number of ſuch qualities combined with magnitude, it is more or leſs grand. Thus St Peter's church at Rome, the great pyramid of Egypt, the Alps towering above the clouds, a great arm of the ſea, and above all a clear and ſerene ſky, are grand; becauſe, beſide their ſize, they are beautiful in an eminent degree. On the other hand, an overgrown whale, having a diſagreeable appearance, is not grand. A large building agreeable by its regularity and proportions, is grand; and yet a much larger building deſtitute of regularity, has not the leaſt tincture of grandeur. A ſingle regiment in battle-array, makes a grand appearance; which the ſurrounding crowd does not, though perhaps ten for one in number. And a regiment where the men are all in one livery, and the horſes of one colour, makes a grander appearance, and conſequently ſtrikes more terror, than where there is confuſion of colour and dreſs.

2 Grandeur diſtinguiſhed from beauty.

Thus greatneſs or magnitude is the circumſtance that diſtinguiſhes grandeur from beauty: agreeableneſs is the genus, of which beauty and grandeur are ſpecies.

The emotion of grandeur, duly examined, will be found

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found an additional proof of the foregoing doctrine. That this emotion is pleaſant in a high degree, requires no other evidence but once to have ſeen a grand object: and if an emotion of grandeur be pleaſant, its cauſe or object, as obſerved above, muſt infallibly be agreeable in proportion.

The qualities of grandeur and beauty are not more diſtinct, than the emotions are which theſe qualities produce in a ſpectator. It is obſerved in the article BEAUTY, that all the various emotions of beauty have one common character, that of ſweetneſs and gaiety. The emotion of grandeur has a different character: a large object that is agreeable, occupies the whole attention, and ſwells the heart into a vivid emotion, which, though extremely pleaſant, is rather ſerious than gay. And this affords a good reaſon for diſtinguiſhing in language theſe different emotions. The emotions raiſed by colour, by regularity, by proportion, and by order, have ſuch a reſemblance to each other, as readily to come under one general term, viz. *the emotion of beauty;* but the emotion of grandeur is ſo different from theſe mentioned, as to merit a peculiar name.

3 Demands not ſtrict regularity.

Though regularity, proportion, order, and colour, contribute to grandeur as well as to beauty, yet theſe qualities are not by far ſo eſſential to the former as to the latter. To make out that propoſition, ſome preliminaries are requiſite. In the firſt place, the mind, not being totally occupied with a ſmall object, can give its attention at the ſame time to every minute part; but in a great or extenſive object, the mind, being totally occupied with the capital and ſtriking parts, has no attention left for thoſe that are little or indifferent. In the next place, two ſimilar objects appear not ſimilar when viewed at different diſtances: the ſimilar parts of a very large object, cannot be ſeen but at different diſtances: and for that reaſon, its regularity, and the proportion of its parts, are in ſome meaſure loſt to the eye; neither are the irregularities of a very large object ſo conſpicuous as of one that is ſmall. Hence it is, that a large object is not ſo agreeable by its regularity, as a ſmall object; nor ſo diſagreeable by its irregularities.

Theſe conſiderations make it evident, that grandeur is ſatisfied with a leſs degree of regularity, and of the other qualities mentioned, than is requiſite for beauty; which may be illuſtrated by the following experiment. Approaching to a ſmall conical hill, we take an accurate ſurvey of every part, and are ſenſible of the ſlighteſt deviation from regularity and proportion. Suppoſing the hill to be conſiderably enlarged, ſo as to make us leſs ſenſible of its regularity, it will upon that account appear leſs beautiful. It will not, however, appear leſs agreeable, becauſe ſome ſlight emotion of grandeur comes in place of what is loſt in beauty. And at laſt, when the hill is enlarged to a great mountain, the ſmall degree of beauty that is left, is ſunk in its grandeur. Hence it is, that a towering hill is delightful, if it have but the ſlighteſt reſemblance of a cone; and a chain of mountains not leſs ſo, though deficient in the accuracy of order and proportion. We require a ſmall ſurface to be ſmooth; but in an extenſive plain, conſiderable inequalities are overlooked. In a word, regularity, proportion, order, and colour, contribute to grandeur as well as to beauty; but with a remarkable difference, that in paſſing from ſmall to great, they are not required in the ſame degree of perfection. This remark ſerves to explain the extreme delight we have in viewing the face of nature, when ſufficiently enriched and diverſified with objects. The bulk of the objects in a natural landſcape are beautiful, and ſome of them grand: a flowing river, a ſpreading oak, a round hill, an extended plain, are delightful; and even a rugged rock, or barren heath, though in themſelves diſagreeable, contribute by contraſt to the beauty of the whole: joining to theſe the verdure of the fields, the mixture of light and ſhade, and the ſublime canopy ſpread over all, it will not appear wonderful, that ſo extenſive a group of ſplendid objects ſhould ſwell the heart to its utmoſt bounds, and raiſe the ſtrongeſt emotion of grandeur. The ſpectator is conſcious of an enthuſiaſm which cannot bear confinement, nor the ſtrictneſs of regularity and order: he loves to range at large; and is ſo enchanted with magnificent objects, as to overlook ſlight beauties or deformities.

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5 Sublimity.

The ſame obſervation is applicable in ſome meaſure to works of art. In a ſmall building, the ſlighteſt irregularity is diſagreeable: but in a magnificent palace, or a large Gothic church, irregularities are leſs regarded. In an epic poem, we pardon many negligences that would not be permitted in a ſonnet or epigram. Notwithſtanding ſuch exceptions, it may be juſtly laid down for a rule, That in works of art, order and regularity ought to be governing principles; and hence the obſervation of Longinus, "In works of art we have regard to exact proportion; in thoſe of nature, to grandeur and magnificence."

The ſame reflections are in a good meaſure applicable to ſublimity: particularly that, like grandeur, it is a ſpecies of agreeableneſs; that a beautiful object placed high, appearing more agreeable than formerly, produces in the ſpectator a new emotion, termed *the emotion of ſublimity;* and that the perfection of order, regularity, and proportion, is leſs required in objects placed high, or at a diſtance, than at hand.

The pleaſant emotion raiſed by large objects, has not eſcaped the poets:

————He doth beſtride the narrow world
Like a coloſſus; and we petty men
Walk under his huge legs.

Julius Cæſar, act i. ſc. 3.

Cleopatra. I dreamt there was an emperor Antony:
Oh ſuch another ſleep, that I might ſee
But ſuch another man!
His face was as the heav'ns: and therein ſtuck
A ſun and moon, which kept their courſe, and lighted
The little O o' th' earth.
His legs beſtrid the ocean, his rear'd arm
Creſted the world.

Antony and Cleopatra, act v. ſc. 3.

————Majeſty
Dies not alone; but, like a gulf, doth draw
What's near it with it. It's a maſſy wheel
Fix'd on the ſummit of the higheſt mount;
To whoſe huge ſpokes ten thouſand leſſer things

Are

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Are mortis'd and adjoin'd; which, when it falls,
Each ſmall annexment, petty conſequence,
Attends the boiſt'rous ruin. *Hamlet*, act iii. ſc. 8.

The poets have alſo made good uſe of the emotion produced by the elevated ſituation of an object:

Quod ſi me lyricis vatibus inſeres,
Sublimi feriam ſidera vertice.
HORAT. *Carm.* l. ii. ode 1.

O thou! the earthly author of my blood,
Whoſe youthful ſpirit, in me regenerate,
Doth with a twofold vigour liſt me up,
To reach at victory above my head.
Richard II. act i. ſc. 4.

Northumberland, thou ladder wherewithal
The mounting Bolinbroke aſcends my throne.
Richard II. act v. ſc. 2.

Antony. Why was I rais'd the meteor of the world,
Hung in the ſkies: and blazing as I travell'd,
Till all my fires were ſpent; and then caſt downward,
To be trod out by Cæſar?
DRYDEN, *All for Love*, act i.

The deſcription of Paradiſe in the fourth book of Paradiſe Loſt, is a fine illuſtration of the impreſſion made by elevated objects.

So on he fares, and to the border comes
Of Eden, where delicious Paradiſe,
Now nearer, crowns with her incloſure green,
As with a rural mound, the champain head
Of a ſteep wilderneſs; whoſe hairy ſides
With thicket overgrown, groteſque and wild,
Acceſs deny'd; and over head up grew
Inſuperable height of loftieſt ſhade,
Cedar, and pine, and fir, and branching palm,
A ſilvan ſcene; and as the ranks aſcend,
Shade above ſhade, a woody theatre
Of ſtatelieſt view. Yet higher than their tops
The verd'rous wall of Paradiſe up ſprung;
Which to our general ſire gave proſpect large
Into his nether empire, neighb'ring round.
And higher than that wall a circling row
Of goodlieſt trees, loaden with faireſt fruit,
Bloſſoms and fruits at once of golden hue,
Appear'd, with gay enamell'd colours mix'd.
l. 131.

Though a grand object is agreeable, we muſt not infer that a little object is diſagreeable; which would be unhappy for man, conſidering that he is ſurrounded with ſo many objects of that kind. The ſame holds with reſpect to place: a body placed high is agreeable; but the ſame body placed low, is not by that circumſtance rendered diſagreeable. Littleneſs and loweneſs of place are preciſely ſimilar in the following particular, that they neither give pleaſure nor pain. And in this may viſibly be diſcovered peculiar attention in fitting the internal conſtitution of man to his external circumſtances. Were littleneſs and loweneſs of place agreeable, greatneſs and elevation could not be ſo; were littleneſs and loweneſs of place diſagreeable, they would occaſion uninterrupted uneaſineſs.

The difference between great and little with reſpect to agreeableneſs, is remarkably felt in a ſeries when we paſs gradually from the one extreme to the other. A mental progreſs from the capital to the kingdom, from that to Europe—to the whole earth—to the planetary ſyſtem—to the univerſe, is extremely pleaſant: the heart ſwells, and the mind is dilated at every ſtep. The returning in an oppoſite direction is not poſitively painful, though our pleaſure leſſens at every ſtep, till it vaniſh into indifference: ſuch a progreſs may ſometimes produce pleaſure of a different ſort, which ariſes from taking a narrower and narrower inſpection. The ſame obſervation holds in a progreſs upward and downward. Aſcent is pleaſure becauſe it elevates us; but deſcent is never painful: it is for the moſt part pleaſant from a different cauſe, that it is according to the order of nature. The fall of a ſtone from any height, is extremely agreeable by its accelerated motion. We feel it pleaſant to deſcend from a mountain, becauſe the deſcent is natural and eaſy. Neither is looking downward painful; on the contrary, to look down upon objects, makes part of the pleaſure of elevation: looking down becomes then only painful when the object is ſo far below as to create dizzineſs; and even when that is the caſe, we feel a ſort of pleaſure mixed with the pain: witneſs Shakeſpeare's deſcription of Dover cliffs:

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——————How fearful
And dizzy 'tis, to caſt one's eye ſo low!
The crows and choughs, that wing the midway air,
Show ſcarce ſo groſs as beetles. Half-way down
Hangs one that gathers ſamphire; dreadful trade!
Methinks he ſeems no bigger than his head.
The fiſhermen that walk upon the beach
Appear like mice; and yon tall anchoring bark
Diminiſh'd to her cock; her cock, a buoy
Almoſt too ſmall for ſight. The murm'ring ſurge,
That on th' unnumbered idle pebbles chafes,
Cannot be heard ſo high. I'll look no more,
Leſt my brain turn, and the deficient ſight
Topple down headlong. *King Lear*, act iv. ſc. 6.

A remark is made above, that the emotions of grandeur and ſublimity are nearly allied. And hence it is, that the one term is frequently put for the other: an increaſing ſeries of numbers, for example, producing an emotion ſimilar to that of mounting upward, is commonly termed *an aſcending ſeries:* a ſeries of numbers gradually decreaſing, producing an emotion ſimilar to that of going downward, is commonly termed *a deſcending ſeries:* we talk familiarly of going *up* to the capital, and of going *down* to the country: from a leſſer kingdom we talk of going *up* to a greater; whence the *anabaſis* in the Greek language, when one travels from Greece to Perſia. We diſcover the ſame way of ſpeaking in the language even of Japan; and its univerſality proves it the offſpring of a natural feeling.

6 Grandeur and ſublimity in a figurative ſenſe.

The foregoing obſervation leads us to conſider grandeur and ſublimity in a figurative ſenſe, and as applicable to the fine arts. Hitherto theſe terms have been taken in their proper ſenſe as applicable to objects of ſight only: and it was of importance to beſtow ſome pains upon that article: becauſe, generally ſpeaking, the figurative ſenſe of a word is derived from its proper ſenſe, which holds remarkably at preſent.

Beauty

Grandeur and Sublimity.

Beauty, in its original ſignification, is confined to objects of ſight; but as many other objects, intellectual as well as moral, raiſe emotions reſembling that of beauty, the reſemblance of the effects prompts us to extend the term *beauty* to theſe objects. This equally accounts for the terms *grandeur* and *ſublimity* taken in a figurative ſenſe. Every emotion, from whatever cauſe proceeding, that reſembles an emotion of grandeur or elevation, is called by the ſame name: thus generoſity is ſaid to be an *elevated* emotion, as well as great courage; and that firmneſs of ſoul which is ſuperior to misfortunes obtains the peculiar name of *magnanimity*. On the other hand, every emotion that contracts the mind, and fixeth it upon things trivial or of no importance, is termed *low*, by its reſemblance to an emotion produced by a little or low object of ſight: thus an appetite for trifling amuſements is called a *low taſte*. The ſame terms are applied to characters and actions: we talk familiarly of an *elevated* genius, of a *great* man, and equally ſo of *littleneſs* of mind: ſome actions are *great* and *elevated*, and others are *little* and *grovelling*. Sentiments, and even expreſſions, are characteriſed in the ſame manner: an expreſſion or ſentiment that raiſes the mind is denominated *great* or *elevated;* and hence the SUBLIME in poetry. In ſuch figurative terms, we loſe the diſtinction between *great* and *elevated* in their proper ſenſe; for the reſemblance is not ſo entire as to preſerve theſe terms diſtinct in their figurative application. We carry this figure ſtill farther. Elevation, in its proper ſenſe, imports ſuperiority of place; and lowneſs, inferiority of place: and hence a man of *ſuperior* talents, of *ſuperior* rank; of *inferior* parts, of *inferior* taſte, and ſuch like. The veneration we have for our anceſtors, and for the ancients in general, being ſimilar to the emotion produced by an elevated object of ſight, juſtifies the figurative expreſſion of the ancients being *raiſed* above us, or poſſeſſing a *ſuperior* place. The notes of the gamut, proceeding regularly from the blunter or groſſer ſounds to the more acute and piercing, produce in the hearer a feeling ſomewhat ſimilar to what is produced by mounting upward; and this gives occaſion to the figurative expreſſions, *a high note*, *a low note*.

7 The ſublime in poetry.

8 Real and figurative grandeur intimately connected.

Such is the reſemblance in feeling between real and figurative grandeur, that among the nations on the eaſt coaſt of Africa, who are directed purely by nature, the officers of ſtate are, with reſpect to rank, diſtinguiſhed by the length of the batoon each carries in his hand; and in Japan, princes and great lords ſhow their rank by the length and ſize of their ſedan-poles. Again, it is a rule in painting, that figures of a ſmall ſize are proper for groteſque pieces: but that an hiſtorical ſubject, grand and important, requires figures as great as the life. The reſemblance of theſe feelings is in reality ſo ſtrong, that elevation in a figurative ſenſe is obſerved to have the ſame effect, even externally, with real elevation:

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K. Henry. This day is call'd the feaſt of Criſpian.
He that outlives this day, and comes ſafe home,
Will ſtand a tiptoe when this day is nam'd,
And rouſe him at the name of Criſpian.
Henry V. act iv. ſc. 8.

The reſemblance in feeling between real and figurative grandeur is humorouſly illuſtrated by Addiſon in criticiſing upon Engliſh tragedy *. "The ordinary method of making an hero is to clap a huge plume of feathers upon his head, which riſes ſo high, that there is often a greater length from his chin to the top of his head than to the ſole of his foot. One would believe, that we thought a great man and a tall man the ſame thing. As theſe ſuperfluous ornaments upon the head make a great man, a princeſs generally receives her grandeur from thoſe additional incumbrances that fall into her tail: I mean the broad ſweeping train that follows her in all her motions, and finds conſtant employment for a boy who ſtands behind her to open and ſpread it to advantage." The Scythians, impreſſed with the ſame of Alexander, were aſtoniſhed when they found him a little man.

* *Spectator*, N° 42.

A gradual progreſs from ſmall to great is not leſs remarkable in figurative than in real grandeur or elevation. Every one muſt have obſerved the delightful effect of a number of thoughts or ſentiments, artfully diſpoſed like an aſcending ſeries, and making impreſſions deeper and deeper: ſuch diſpoſition of members in a period is termed a *climax*.

Within certain limits grandeur and ſublimity produce their ſtrongeſt effects, which leſſen by exceſs as well as by defect. This is remarkable in grandeur and ſublimity taken in their proper ſenſe: the grandeſt emotion that can be raiſed by a viſible object is where the object can be taken in at one view; if ſo immenſe as not to be comprehended but in parts, it tends rather to diſtract than ſatisfy the mind (A): in like manner, the ſtrongeſt emotion produced by elevation is where the object is ſeen diſtinctly; a greater elevation leſſens in appearance the object, till it vaniſh out of ſight with its pleaſant emotions. The ſame is equally remarkable in figurative grandeur and elevation; which ſhall be handled together, becauſe, as obſerved above, they are ſcarcely diſtinguiſhable. Sentiments may be ſo ſtrained as to become obſcure, or to exceed the capacity of the human mind: againſt ſuch licence of imagination, every good writer will be upon his guard. And therefore it is of greater importance to obſerve, that even the true ſublime may be carried beyond that pitch which produces the higheſt entertainment. We are undoubtedly ſuſceptible of a greater elevation than can be inſpired by human actions the moſt heroic and magnanimous; witneſs what we feel from Milton's deſcription of ſuperior beings: yet every man muſt be ſenſible of a more conſtant and ſweet elevation when the hiſtory of his own ſpecies is the

9 Figurative grandeur.

(A) It is juſtly obſerved by Addiſon, that perhaps a man would have been more aſtoniſhed with the majeſtic air that appeared in one of Lyſippus's ſtatues of Alexander, though no bigger than the life, than he might have been with Mount Athos, had it been cut into the figure of the hero, according to the propoſal of Phidias, with a river in one hand and a city in the other. *Spectator*, N° 415.

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the ſubject: he enjoys an elevation equal to that of the greateſt hero, of an Alexander or a Cæſar, of a Brutus or an Epaminondas: he accompanies theſe heroes in their ſublimeſt ſentiments and moſt hazardous exploits, with a magnanimity equal to theirs; and finds it no ſtretch to preſerve the ſame tone of mind for hours together without ſinking. The caſe is not the ſame in deſcribing the actions or qualities of ſuperior beings: the reader's imagination cannot keep pace with that of the poet; the mind, unable to ſupport itſelf in a ſtrained elevation, falls as from a height; and the fall is immoderate like the elevation: where that effect is not felt, it muſt be prevented by ſome obſcurity in the conception, which frequently attends the deſcriptions of unknown objects. Hence the St Franciſes, St Dominics, and other tutelary ſaints among the Roman Catholics. A mind unable to raiſe itſelf to the Supreme Being ſelf-exiſtent and eternal, or to ſupport itſelf in a ſtrained elevation, finds itſelf more at eaſe in uſing the interceſſion of ſome ſaint whoſe piety and penances while on earth are ſuppoſed to have mide him a favourite in heaven.

A ſtrained elevation is attended with another inconvenience, that the author is apt to fall ſuddenly as well as the reader; becauſe it is not a little difficult to deſcend, ſweetly and eaſily, from ſuch elevation to the ordinary tone of the ſubject. The following paſſage is a good illuſtration of that obſervation:

Sæpe etiam immenſum cœlo venit agmen aquarum,
Et fœdam glomerant tempeſtatem imbribus atris
Collectæ ex alto nubes. Ruit arduus æther,
Et pluviâ ingenti ſata læta, boumque labores
Diluit. Implentur foſſæ, et cava flumina creſcunt
Cum ſonitu, fervetque fretis ſpirantibus æquor.
Ipſe Pater, media nimborum in nocte, coruſca
Fulmina molitur dextra. Quo maxima motu
Terra tremit: fugere feræ, et mortalia corda
Per gentes humilis ſtravit pavor. Ille flagranti
Aut Atho, aut Rhodopen, aut alta Ceraunia telo
Dejicit: *ingeminant Auſtri, et denſiſſimus imber.*

VIRG. *Georg.* i. 322.

In the deſcription of a ſtorm, to figure Jupiter throwing down huge mountains with his thunderbolts, is hyperbolically ſublime, if we may uſe the expreſſion: the tone of mind produced by that image is ſo diſtant from the tone produced by a thick ſhower of rain, that the ſudden tranſition muſt be unpleaſant.

Objects of ſight that are not remarkably great nor high, ſcarce raiſe any emotion of grandeur or of ſublimity: and the ſame holds in other objects; for we often find the mind rouſed and animated, without being carried to that height. This difference may be diſcerned in many ſorts of muſic, as well as in ſome muſical inſtruments: a kettle-drum rouſes, and a hautboy is animating; but neither of them inſpires an emotion of ſublimity: revenge animates the mind in a conſiderable degree; but it never produceth an emotion that can be termed *grand* or *ſublime;* and perhaps no diſagreeable paſſion ever has that effect.

No deſire is more univerſal than to be exalted and honoured; and upon that account, chiefly, are we ambitious of power, riches, titles, fame, which would ſuddenly loſe their reliſh did they not raiſe us above others, and command ſubmiſſion and deference: and it may be thought, that our attachment to things grand and lofty, proceeds from their connection with our favourite paſſion. This connection has undoubtedly an effect; but that the preference given to things grand and lofty muſt have a deeper root in human nature, will appear from conſidering, that many beſtow their time upon low and trifling amuſements, without having the leaſt tincture of this favourite paſſion: yet theſe very perſons talk the ſame language with the reſt of mankind; and prefer the more elevated pleaſures: they acknowledge a more refined taſte, and are aſhamed of their own as low and grovelling. This ſentiment, conſtant and univerſal, muſt be the work of nature; and it plainly indicates an original attachment in human nature to every object that elevates the mind: ſome men may have a greater reliſh for an object not of the higheſt rank; but they are conſcious of the preference given by mankind in general to things grand and ſublime, and they are ſenſible that their peculiar taſte ought to yield to the general taſte.

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What is ſaid above ſuggeſts a capital rule for reaching the ſublime in ſuch works of art as are ſuſceptible of it; and that is, to preſent thoſe parts or circumſtances only which make the greateſt figure, keeping out of view every thing low or trivial; for the mind, elevated by an important object, cannot, without reluctance, be forced down to beſtow any ſhare of its attention upon trifles. Such judicious ſelection of capital circumſtances, is by an eminent critic ſtyled *grandeur of manner*†. In none of the fine arts is there ſo great ſcope for that rule as in poetry; which, by that means, enjoys a remarkable power of beſtowing upon objects and events an air of grandeur: when we are ſpectators, every minute object preſents itſelf in its order; but in deſcribing at ſecond hand, theſe are laid aſide, and the capital objects are brought cloſe together. A judicious taſte in thus ſelecting the moſt intereſting incidents, to give them an united force, accounts for a fact that may appear ſurpriſing; which is, that we are more moved by ſpirited narrative at ſecond hand, than by being ſpectators of the event itſelf, in all its circumſtances.

10 Grandeur of manner.

† *Spectator*, N° 415.

Longinus ‡ exemplifies the foregoing rule by a compariſon of two paſſages.

‡ *Chap.* 8.

Ye pow'rs, what madneſs! how on ſhips ſo frail
(Tremendous thought!) can thoughtleſs mortals ſail?
For ſtormy ſeas they quit the pleaſing plain,
Plant woods in waves, and dwell amidſt the main.
Far o'er the deep (a trackleſs path) they go,
And wander oceans in purſuit of wo.
No eaſe their hearts, no reſt their eyes can find,
On heaven their looks, and on the waves their mind;
Sunk are their ſpirits, while their arms they rear,
And gods are wearied with their fruitleſs prayer.

ARISTÆUS.

Burſt as a wave that from the cloud impends,
And ſwell'd with tempeſts on the ſhip deſcends.
White are the decks with foam: the winds aloud
Howl o'er the maſts, and ſing through every ſhroud.
Pale, trembling, tir'd, the ſailors freeze with fears,
And inſtant death on every wave appears. HOMER.

In

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In the latter paſſage, the moſt ſtriking circumſtances are ſelected to fill the mind with terror and aſtoniſhment. The former is a collection of minute and low circumſtances, which ſcatter the thought, and make no impreſſion: it is at the ſame time full of verbal antitheſes and low conceit, extremely improper in a ſcene of diſtreſs.

The following deſcription of a battle is remarkably ſublime, by collecting together, in the feweſt words, thoſe circumſtances which make the greateſt figure.

"Like autumn's dark ſtorms pouring from two echoing hills, toward each other approached the heroes; as two dark ſtreams from high rocks meet and roar on the plain, loud, rough, and dark in battle, meet Lochlin and Inisfail. Chief mixes his ſtrokes with chief, and man with man: ſteel ſounds on ſteel, and helmets are cleft on high: blood burſts and ſmokes around: ſtrings murmur on the poliſh'd yew: darts ruſh along the ſky: ſpears fall like ſparks of flame that gild the ſtormy face of night.

"As the noiſe of the troubled ocean when roll the waves on high, as the laſt peal of thundering heaven, ſuch is the noiſe of battle. Though Cormac's hundred bards were there, feeble were the voice of a hundred bards to ſend the deaths to future times; for many were the deaths of the heroes, and wide poured the blood of the valiant." FINGAL.

The following paſſage in the 4th book of the Iliad is a deſcription of a battle wonderfully ardent. "When now gathered on either ſide, the hoſt plunged together in fight; ſhield is harſhly laid to ſhield; ſpears craſh on the brazen corſlets: boſſy buckler with buckler meets; loud tumult rages over all; groans are mixed with boaſts of men; the ſlain and ſlayer join in noiſe; the earth is floating round with blood. As when two ruſhing ſtreams from two mountains come roaring down, and throw together their rapid waters below, they roar along the gulphy vale; the ſtartled ſhepherd hears the ſound as he ſtalks o'er the diſtant hills: ſo, as they mixed in fight, from both armies clamour with loud terror aroſe." But ſuch general deſcriptions are not frequent in Homer. Even his ſingle combats are rare. The fifth book is the longeſt account of a battle that is in the Iliad; and yet contains nothing but a long catalogue of chiefs killing chiefs, not in ſingle combat neither, but at a diſtance with an arrow or a javelin; and theſe chiefs named for the firſt time and the laſt. The ſame ſcene is continued through a great part of the ſixth book. There is at the ſame time a minute deſcription of every wound, which for accuracy may do honour to an anatomiſt, but in an epic poem is tireſome and fatiguing. There is no relief from horrid languor, but the beautiful Greek language and melody of Homer's verſification.

In the twenty-firſt book of the Odyſſey, there is a paſſage which deviates widely from the rule above laid down: it concerns that part of the hiſtory of Penelope and her ſuitors, in which ſhe is made to declare in favour of him who ſhould prove the moſt dexterous in ſhooting with the bow of Ulyſſes:

Now gently winding up the fair aſcent,
By many an eaſy ſtep the matron went:
Then o'er the pavements glides with grace divine
(With poliſh'd oak the level pavements ſhine).
The folding gates a dazzling light diſplay'd,
With pomp of various architrave o'erlaid.
The bolt, obedient to the ſilken ſtring,
Forſakes the ſtaple as ſhe pulls the ring;
The wards reſpondent to the key turn round;
The bars fall back; the flying valves reſound.
Loud as a bull makes hill and valley ring,
So roar'd the lock when it releas'd the ſpring.
She moves majeſtic through the wealthy room,
Where treaſur'd garments caſt a rich perfume:
There, from the column where aloft it hung,
Reach'd, in its ſplendid caſe, the bow unſtrung.

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Virgil ſometimes errs againſt this rule: in the following paſſages minute circumſtances are brought into full view; and what is ſtill worſe, they are deſcribed with all the pomp of poetical diction, *Æneid*, lib. i. l. 214, to 219. lib. vi. l. 176, to 182. lib. vi. l. 212, to 231: and the laſt, which deſcribes a funeral, is the leſs excuſable, as the man whoſe funeral it is makes no figure in the poem.

The ſpeech of Clytemneſtra, deſcending from her chariot, in the Iphigenia of Euripides *, is ſtuffed with a number of common and trivial circumſtances.

* Act iii.

But of all writers, Lucan in this article is the moſt injudicious: the ſea-fight between the Romans and Maſſilians † is deſcribed ſo much in detail, without exhibiting any grand or total view, that the reader is fatigued with endleſs circumſtances, without ever feeling any degree of elevation; and yet there are ſome fine incidents, thoſe, for example, of the two brothers, and of the old man and his ſon, which, taken ſeparately, would affect us greatly. But Lucan, once engaged in a deſcription, knows no end. See other paſſages of the ſame kind, lib. iv. l. 292, to 337. lib. iv. l. 750, to 765. The epiſode of the ſorcereſs Erictho, end of book ſixth, is intolerably minute and prolix.

† Lib. iii. 507.

This rule is alſo applicable to other fine arts. In painting it is eſtabliſhed, that the principal figure muſt be put in the ſtrongeſt light; that the beauty of attitude conſiſts in placing the nobler parts moſt in view, and in ſuppreſſing the ſmaller parts as much as poſſible; that the folds of the drapery muſt be few and large; that foreſhortenings are bad, becauſe they make the parts appear little; and that the muſcles ought to be kept as entire as poſſible, without being divided into ſmall ſections. Every one at preſent ſubſcribes to that rule as applied to gardening, in oppoſition to parterres ſplit into a thouſand ſmall parts in the ſtiffeſt regularity of figure. The moſt eminent architects have governed themſelves by the ſame rule in all their works.

11 General terms ought to be avoided where ſublimity is intended.

Another rule chiefly regards the ſublime, though it is applicable to every ſort of literary performance intended for amuſement: and that is, to avoid as much as poſſible abſtract and general terms. Such terms, ſimilar to mathematical ſigns, are contrived to expreſs our thoughts in a conciſe manner; but images, which are the life of poetry, cannot be raiſed in any perfection but by introducing particular objects. General terms, that comprehend a number of individuals, muſt be excepted from that rule: our kindred, our clan, our country, and words of the like import, though they

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ſcarce raiſe any image, have, however, a wonderful power over the paſſions: the greatneſs of the complex object overbalances the obſcurity of the image.

Grandeur, being an extremely vivid emotion, is not readily produced in perfection but by reiterated impreſſions. The effect of a ſingle impreſſion can be but momentary; and if one feel ſuddenly ſomewhat like a ſwelling or exaltation of mind, the emotion vaniſheth as ſoon as felt. Single thoughts or ſentiments are often cited as examples of the ſublime; but their effect is far inferior to that of a grand ſubject diſplayed in its capital parts. We ſhall give a few examples, that the reader may judge for himſelf. In the famous action of Thermopylæ, where Leonidas the Spartan king, with his choſen band, fighting for their country, were cut off to the laſt man, a ſaying is reported of Dieneces, one of the band, which, expreſſing cheerful and undiſturbed bravery, is well entitled to the firſt place in examples of that kind: talking of the number of their enemies, it was obſerved, that the arrows ſhot by ſuch a multitude would intercept the light of the ſun; "So much the better (ſays he), for we ſhall then fight in the ſhade."

Herodot. lib. 7.

Somerſet. Ah! Warwick, Warwick, wert thou as we are,
We might recover all our loſs again.
The Queen from France hath brought a puiſſant power.
Ev'n now we heard the news. Ah! could'ſt thou fly!
Warwick. Why, then I would not fly.
Third part, Henry VI. act v. ſc. 3.

Such a ſentiment from a man expiring of his wounds, is truly heroic; and muſt elevate the mind to the greateſt height that can be done by a ſingle expreſſion; it will not ſuffer in a compariſon with the famous ſentiment *Qu'il mourut* of Corneille: the latter is a ſentiment of indignation merely, the former of firm and cheerful courage.

To cite in oppoſition many a ſublime paſſage, enriched with the fineſt images, and dreſſed in the moſt nervous expreſſions, would ſcarce be fair. We ſhall produce but one inſtance, from Shakeſpeare, which ſets a few objects before the eye, without much pomp of language: it operates its effect by repreſenting theſe objects in a climax, raiſing the mind higher and higher till it feel the emotion of grandeur in perfection:

The cloud-capt tow'rs, the gorgeous palaces,
The ſolemn temples, the great globe itſelf,
Yea, all which it inherit, ſhall diſſolve, &c.

The cloud-capt tow'rs produce an elevating emotion, heightened by the *gorgeous palaces;* and the mind is carried ſtill higher and higher by the images that follow. Succeſſive images, making thus ſtronger and ſtronger impreſſions, muſt elevate more than any ſingle image can do.

12 Grandeur and ſublimity employed indirectly to ſink the mind.

As, on the one hand, no means directly applied have more influence to raiſe the mind than grandeur and ſublimity; ſo, on the other, no means indirectly applied have more influence to ſink and depreſs it: for in a ſtate of elevation, the artful introduction of an humbling object, makes the fall great in proportion to the elevation. Of this obſervation Shakeſpeare gives a beautiful example in the paſſage laſt quoted:

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The cloud-capt tow'rs, the gorgeous palaces,
The ſolemn temples, the great globe itſelf,
Yea, all which it inherit, ſhall diſſolve,
And like the baſeleſs fabric of a viſion
Leave not a wreck behind—— *Tempeſt*, act iv. ſc. 4.

The elevation of the mind in the former part of this beautiful paſſage, makes the fall great in proportion, when the moſt humbling of all images is introduced, that of an utter diſſolution of the earth and its inhabitants. The mind, when warmed, is more ſuſceptible of impreſſions than in a cool ſtate; and a depreſſing or melancholy object liſtened to, makes the ſtrongeſt impreſſion when it reaches the mind in its higheſt ſtate of elevation or cheerfulneſs.

But a humbling image is not always neceſſary to produce that effect: a remark is made above, that in deſcribing ſuperior beings, the reader's imagination, unable to ſupport itſelf in a ſtrained elevation, falls often as from a height, and ſinks even below its ordinary tone. The following inſtance comes luckily in view; for a better cannot be given: "God ſaid, Let there be light, and there was light." Longinus quotes this paſſage from Moſes as a ſhining example of the ſublime; and it is ſcarce poſſible, in fewer words, to convey ſo clear an image of the infinite power of the Deity: but then it belongs to the preſent ſubject to remark, that the emotion of ſublimity raiſed by this image is but momentary; and that the mind, unable to ſupport itſelf in an elevation ſo much above nature, immediately ſinks down into humility and veneration for a Being ſo far exalted above grovelling mortals. Every one is acquainted with a diſpute about that paſſage between two French critics *, the one poſitively affirming it to be ſublime, the other as poſitively denying. What has been remarked, ſhows, that both of them have reached the truth, but neither of them the whole truth: the primary effect of the paſſage is undoubtedly an emotion of grandeur; which ſo far juſtifies Boileau: but then every one muſt be ſenſible, that the emotion is merely a flaſh, which, vaniſhing inſtantaneouſly, gives way to humility and veneration. That indirect effect of ſublimity juſtifies Huet, on the other hand, who being a man of true piety, and probably not much carried by imagination, felt the humbling paſſions more ſenſibly than his antagoniſt did. And laying aſide difference of character, Huet's opinion may perhaps be defended as the more ſolid; becauſe, in ſuch images, the depreſſing emotions are the more ſenſibly felt, and have the longer endurance.

* *Boileau and Huet.*

13 False ſublime.

The ſtraining an elevated ſubject beyond due bounds, and beyond the reach of an ordinary conception, is not a vice ſo frequent as to require the correction of criticiſm. But falſe ſublime is a rock that writers of more fire than judgment commonly ſplit on; and therefore a collection of examples may be of uſe as a beacon to future adventurers. One ſpecies of falſe ſublime, known by the name of *bombaſt*, is common among writers of a mean genius: it is a ſerious endeavour, by ſtrained deſcription, to raiſe a low or familiar ſubject above its rank; which, inſtead of being ſublime, fails not to be ridiculous. The mind, indeed, is extremely prone, in ſome animating paſſions, to magnify its objects

Grandeur and Sublimity.

jects beyond natural bounds: but ſuch hyperbolical deſcription has its limits; and when carried beyond the impulſe of the propenſity, it degenerates into burleſque. Take the following examples:

Sejanus. ——————Great and high
The world knows only two, that's Rome and I.
My roof receives me not: 'tis air I tread,
And at each ſtep I feel my advanc'd head
Knock out a ſtar in heav'n.
BEN JOHNSON, *Sejanus*, act v.

A writer who has no natural elevation of mind deviates readily into bombaſt: he ſtrains above his natural powers; and the violent effort carries him beyond the bounds of propriety.

Guildford. Give way, and let the guſhing torrent come;
Behold the tears we bring to ſwell the deluge,
Till the flood riſe upon the guilty world,
And make the ruin common.
Lady Jane Grey, act iv. near the end.

Another ſpecies of falſe ſublime is ſtill more faulty than bombaſt: and that is, to force elevation by introducing imaginary beings without preſerving any propriety in their actions; as if it were lawful to aſcribe every extravagance and inconſiſtence to beings of the poet's creation. No writers are more licentious in that article than Johnſon and Dryden.

Methinks I ſee Death and the Furies waiting
What we will do, and all the heaven at leiſure
For the great ſpectacle. Draw then your ſwords:
And if our deſtiny envy our virtue
The honour of the day, yet let us care
To ſell ourſelves at ſuch a price, as may
Undo the world to buy us, and make Fate,
While ſhe tempts ours, to fear her own eſtate.
Catiline, act v.

——————The Furies ſtood on hills
Circling the place, and trembled to ſee men
Do more than they: whilſt Piety left the field,
Griev'd for that ſide, that in ſo bad a cauſe
They knew not what a crime their valour was.
The ſun ſtood ſtill, and was, behind the cloud
The battle made, ſeen ſweating to drive up
His frighted horſe, whom ſtill the noiſe drove backwards.
Ibid. act v.

Oſmyn. While we indulge our common happineſs,
He is forgot by whom we all poſſeſs,
The brave Almanzor, to whoſe arms we owe
All that we did, and all that we ſhall do;
Who like a tempeſt that outrides the wind,
Made a juſt battle ere the bodies join'd.
Abdalla. His victories we ſcarce could keep in view,
Or poliſh 'em ſo faſt as he rough drew.
Abdemelech. Fate after him below with pain did move,
And Victory could ſcarce keep pace above.
Death did at length ſo many ſlain forget,
And loſt the tale, and took 'em by the great.
Conqueſt of Granada, act ii. at beginning.

Grandgor || Granicus.

An actor on the ſtage may be guilty of bombaſt as well as an author in his cloſet: a certain manner of acting, which is grand when ſupported by dignity in the ſentiment and force in the expreſſion, is ridiculous where the ſentiment is mean and the expreſſion flat.

GRANDGOR is uſed in Scotland for the pox. In the Philoſophical Tranſactions, n° 469. ſect. 5. we have a proclamation of King James IV. of Scotland, ordering all who had this diſeaſe, or who had attended others under it, forthwith to repair to an iſland in the frith of Forth. If the grandgor was the pox, and this diſtemper came into Europe at the ſiege of Naples in 1495, it muſt have made a very quick progreſs to cauſe ſuch an alarm at Edinburgh in 1497.

GRANGE, an ancient term for a barn or place wherein to lay up and threſh corn. The word is formed of the Latin *granea*; or of *granum*, "grain, corn," &c. Hence alſo *granger* or *grangier*, "a grange-keeper or farmer."

GRANGE is alſo uſed, in a more extenſive ſenſe, for a whole farm, with all the appendages of ſtables for horſes, ſtalls for cattle, &c. and for an inn.

GRANI, in our ancient writers, muſtachoes or whiſkers of a beard. The word ſeems formed from the ancient Britiſh or Iriſh *greann*, "a beard." It is given for a reaſon why the cup is refuſed to the laity, *Quia barbati, & prolixos habent granos, dum poculum inter epulas ſumunt, prius liquore pilos inficiunt, quam ori infundunt.*

GRANICUS, a ſmall river near the Helleſpont in Leſſer Aſia, remarkable for the firſt victory gained by Alexander the Great over the armies of Darius.—Authors diſagree very much about the number of the Perſians, though all agree that they were vaſtly more numerous than the Greeks. Juſtin and Oroſius tell us, that the Perſian army conſiſted of 600,000 foot and 20,000 horſe; Arian makes the foot amount to 200,000; but Diodorus tells us, that they were not more than 100,000 foot and 10,000 horſe. The Macedonian army did not exceed 30,000 foot and 5000 horſe. The Perſian cavalry lined the banks of the Granicus, in order to oppoſe Alexander wherever he ſhould attempt a paſſage; and the foot were poſted behind the cavalry on an eaſy aſcent. Parmenio would have had Alexander to allow his troops ſome time to refreſh themſelves; but he replied, that after having croſſed the Helleſpont, it would be a diſgrace to him and his troops to be ſtopped by a rivulet. Accordingly a proper place for croſſing the river was no ſooner found, than he commanded a ſtrong detachment of horſe to enter; he himſelf followed with the right wing, which he commanded in perſon; the trumpets in the mean time ſounding, and loud ſhouts of joy being heard through the whole army. The Perſians let fly ſuch ſhowers of arrows againſt the detachment of Macedonian horſe as cauſed ſome confuſion; ſeveral of their horſes being killed or wounded. As they drew near the bank a moſt bloody engagement enſued; the Macedonians attempting to land, and the Perſians puſhing them back into the river. Alexander, who obſerved the confuſion they were in, took the command of them himſelf; and landing in ſpite of all oppoſition, obliged the Perſian cavalry, after an obſtinate

Granicus Grant.

resistance, to give ground. However, Spithrobates, governor of Ionia, and son-in-law to Darius, still maintained his ground, and did all that lay in his power to bring them back to the charge. Alexander advanced full gallop to engage him; neither did he decline the combat, and both were slightly wounded at the first encounter. Spithrobates having thrown his javelin without effect, advanced sword in hand to meet his antagonist, who ran him through with his pike as he raised his arm to discharge a blow with his scimitar. But Rosaces, brother to Spithrobates, at the same time gave Alexander such a furious blow on the head with his battle-ax, that he beat off his plume, and slightly wounded him through the helmet. As he was ready to repeat the blow, Clitus with one stroke of his scimitar cut off Rosaces's head, and thus in all probability saved the life of his sovereign. The Macedonians then, animated by the example of their king, attacked the Persians with new vigour, who soon after betook themselves to flight. Alexander did not pursue them; but immediately charged the enemy's foot with all his forces, who had now passed the river. The Persians, disheartened at the defeat of their cavalry, made no great resistance. The Greek mercenaries retired in good order to a neighbouring hill, whence they sent deputies to Alexander, desiring leave to march off unmolested. But he, instead of coming to a parley with them, rushed furiously into the middle of this small body; where his horse was killed under him, and he himself in great danger of being cut in pieces. The Greeks defended themselves with incredible valour for a long time, but were at last almost entirely cut off. In this battle the Persians are said to have lost 20,000 foot and 2500 horse, and the Macedonians only 55 foot and 60 horse.

GRANITE, a compound rock which is considered as one of the oldest of which the earth is composed. See GEOLOGY and MINERALOGY *Index*.

GRANITE, a kind of rock, belonging to the compound stones. It is composed of feld-spar, quartz, and mica, in variable proportions. See MINERALOGY and GEOLOGY *Index*.

GRANITILLO, or GRANITEL, a name given by some mineralogists to a particular species or variety of granite.

GRANIVOROUS, an appellation given to animals which feed on corn or seeds. These are principally of the bird kind.

GRANT, in *Law*, a conveyance in writing of such things as cannot pass or be conveyed by word only; such are rents, reversions, services, &c.

GRANT, *Francis*, Lord Cullen, an eminent lawyer and judge in Scotland, was descended from a younger branch of the family of the Grants of Grant in that kingdom, and was born about the year 1660. When he commenced advocate, he made a distinguished figure at the revolution, by opposing the opinion of the old lawyers, who warmly argued on the inability of the convention of estates to make any disposition of the crown. The abilities which he discovered in favour of the revolution introduced him to extensive practice; in which he acquired so much reputation, that when the union between the two kingdoms was in agitation, Queen Anne, without solicitation, created him a baronet, with a view of securing his interest in that measure; and upon the same principle, she soon after created him a judge, or one of the lords of session. From this time, according to the custom of Scotland, he was styled, from the name of his estate, Lord Cullen: and the same good qualities that recommended him to this honourable office, were very conspicuous in the discharge of it; which he continued for 20 years with the highest reputation, when a period was put to his life by an illness which lasted but three days. He died March 16th, 1726. His character is drawn to great advantage in the Biographia Britannica; where it is observed, among other remarks to his honour, "That as an advocate he was indefatigable in the management of business; but at the same time that he spared no pains, he would use no craft. He had so high an idea of the dignity of his profession, that he held it equally criminal to neglect any honest means of coming at justice, or to make use of any arts to elude it. In respect to fortune, though he was modest and frugal, and had a large practice, yet he was far from being avaricious. His private charities were very considerable, and grew in the same proportion with his profits. He was, besides, very scrupulous in many points; he would not suffer a just cause to be lost through a client's want of money. He was such an enemy to oppression, that he never denied his assistance to such as laboured under it; and with respect to the clergy of all professions (in Scotland), his conscience obliged him to serve them without a fee. When this merit had raised him to the bench, he thought himself accountable to God and man for his conduct in that high office: and that deep sense of his duty, at the same time that it kept him strictly to it, encouraged and supported him in the performance. Whenever he sat as lord ordinary, the paper of causes was remarkably full; for his reputation being equally established for knowledge and integrity, there were none, who had a good opinion of their own pretensions, but were desirous of bringing them before him, and not many who did not sit down satisfied with his decision. This prevailed more especially after it was found that few of his sentences were reversed; and when they were, it was commonly owing to himself: for if, upon mature reflection, or upon new reasons offered at the re-hearing, he saw any just ground for altering his judgment, he made no scruple of declaring it; being persuaded that it was more manly, as well as more just, to follow truth, than to support opinion: and his conduct in this respect had a right effect; for instead of lessening, it raised his reputation. He would not, however, with all this great stock of knowledge, experience, and probity, trust himself in matters of blood, or venture to decide in criminal cases on the lives of his fellow-creatures; which was the reason that, though often solicited, he could never be prevailed upon to accept of a seat in the justiciary court.—In his private character he was as amiable as he was respectable in his public. He was charitable without ostentation, disinterested in his friendships, and beneficent to all who had any thing to do with him. He was not only strictly just; but so free from any species of avarice, that his lady, who was a woman of great prudence and discretion, finding him more intent on the business committed to him by others than on his own, took upon herself the care of placing out his money;

Grant.

Grantham, Granville.

ney; and to prevent his poſtponing, as he was apt to do, ſuch kind of affairs, when ſecurities offered, ſhe cauſed the circumſtances of them to be ſtated in the form of caſes, and ſo procured his opinion upon his own concerns as if they had been thoſe of a client. He was ſo true a lover of learning, and was ſo much addicted to his ſtudies, that, notwithſtanding the multiplicity of his buſineſs while at the bar, and his great attention to his charge when a judge, he nevertheleſs found time to write various treatiſes on very different and important ſubjects: Some political, which were remarkably well timed, and highly ſerviceable to the government: others of a moſt extenſive nature, ſuch as his eſſays on law, religion, and education, which were dedicated to George II. when prince of Wales; by whoſe command, his then ſecretary, Mr Samuel Molyneaux, wrote him a letter of thanks, in which were many gracious expreſſions, as well in relation to the piece as to its author. He compoſed, beſides theſe, many diſcourſes on literary ſubjects, for the exerciſe of his own thoughts, and for the better diſcovery of truth: which went no farther than his own cloſet, and from a principle of modeſty were not communicated even to his moſt intimate friends."

GRANTHAM, a town of Lincolnſhire, 110 miles from London, ſituated on the river Witham. It is ſuppoſed to have been a Roman town by the remains of a caſtle which have been formerly dug up here. It is governed by an alderman and 12 juſtices of the peace, a recorder, a coroner, &c. Here is a fine large church with a ſtone ſpire, one of the loftieſt in England, being 288 feet high, and, by the deception of the ſight, ſeems to ſtand awry, which, by the church being ſituated ſo low, appears to a very great diſadvantage. Here is a good free-ſchool, where Sir Iſaac Newton received his firſt education, beſides two charity-ſchools.

GRANVILLE, George, Lord Lanſdowne, was deſcended from a very ancient family, derived from Rollo the firſt duke of Normandy. At eleven years of age he was ſent to Trinity College in Cambridge, where he remained five years: but at the age of 13 was admitted to the degree of maſter of arts; having, before he was 12, ſpoken a copy of verſes of his own compoſition to the duchefs of York at his college, when ſhe paid a viſit to the Univerſity of Cambridge. In 1696, his comedy called the *She-gallants* was acted at the theatre-royal in Lincoln's-inn-fields, as his tragedy called *Heroic Love* was in the year 1698. In 1702 he tranſlated into Engliſh the *ſecond Olynthian of Demoſthenes*. He was member for the county of Cornwall in the parliament which met in 1710; was afterwards ſecretary of war, comptroller of the houſehold, then treaſurer, and ſworn one of the privy council. The year following, he was created Baron Lanſdowne. On the acceſſion of King George I. in 1714, he was removed from his treaſurer's place; and the next year entered his proteſt againſt the bills for attainting Lord Bolingbroke and the duke of Ormond. He entered deeply into the ſcheme for raiſing an inſurrection in the weſt of England; and being ſeized as a ſuſpected perſon, was committed to the Tower, where he continued two years. In 1719, he made a ſpeech in the houſe of lords, againſt the bill to prevent occaſional conformity. In 1722, he withdrew to France, and continued abroad almoſt ten years. At his return in 1732, he publiſhed a fine edition of his works in 2 vols quarto. He died in 1735, leaving no male iſſue.

Granville || Grates.

GRANVILLE, a ſea-port town of France, in Lower Normandy, partly ſeated on a rock and partly on a plain. It gave title to an Engliſh earl, now extinct. W. Long. 1. 32. N. Lat. 48. 58.

GRANULATED, ſomething that has undergone granulation, or has been reduced to grains.

GRANULATION, in *Chemiſtry*, an operation by which metallic ſubſtances are reduced into ſmall grains, or roundiſh particles; the uſe of which is, to facilitate their combination with other ſubſtances.—This operation is very ſimple; it conſiſts only in pouring a melted metal ſlowly into a veſſel filled with water, which is in the mean time to be agitated with a broom. Lead or tin may be granulated by pouring them when melted into a box; the internal ſurface of which is to be rubbed with powdered chalk, and the box ſtrongly ſhaken till the lead has become ſolid. Metals are granulated, becauſe their ductility renders them incapable of being pounded, and becauſe filing is long and tedious, and might render the metal impure by an admixture of iron from the file.

GRAPE, the fruit of the vine. See Vine and Wine. See alſo Currant and Raisin.

Grape-Shot, in artillery, is a combination of ſmall ſhot, put into a thick canvas bag, and corded ſtrongly together, ſo as to form a kind of cylinder, whoſe diameter is equal to that of the ball adapted to the cannon. The number of ſhot in a grape varies according to the ſervice or ſize of the guns: in ſea-ſervice nine is always the number; but by land it is increaſed to any number or ſize, from an ounce and a quarter in weight to three or four pounds. In ſea-ſervice the bottoms and pins are made of iron, whereas thoſe uſed by land are of wood.

GRAPES, in the manege, a term uſed to ſignify the arreſts or mangy tumours that happen in the horſe's legs.

GRAPHOMETER, a mathematical inſtrument, otherwiſe called a *ſemicircle;* the uſe of which is to obſerve any angle whoſe vertex is at the centre of the inſtrument in any plane (though it is moſt commonly horizontal, or nearly ſo), and to find how many degrees it contains. See Mensuration.

GRAPNEL, or Grappling, a ſort of ſmall anchor, fitted with four or five flukes or claws, and commonly uſed to ride a boat or other ſmall veſſel.

Fire-Grappling, an inſtrument nearly reſembling the former, but differing in the conſtruction of its flukes, which are furniſhed with ſtrong barbs on their points. Theſe machines are uſually fixed on the yard-arms of a ſhip, in order to grapple any adverſary whom ſhe intends to board. They are, however, more particularly uſeful in *Fire Ships* for the purpoſes deſcribed in that article.

GRASS, in *Botany*, a plant having ſimple leaves, a ſtem generally jointed and tubular, a huſky calyx (called *gluma*), and the ſeed ſingle. For the claſſification of graſſes, ſee Botany *Index;* and for an account of the culture, ſee Agriculture *Index*.

GRASSHOPPER, a ſpecies of gryllus. See Gryllus, Entomology *Index*.

GRATES for Fires, are compoſed of ribs of iron placed

Gratian || Gratitude.

placed at ſmall diſtances from one another, ſo that the air may have ſufficient acceſs to the fuel, and the accumulation of the aſhes, which would choke the fire, may be prevented.—Grates ſeem peculiarly adapted to the uſe of pit-coal, which requires a greater quantity of air to make it burn freely than other kinds of fuel. The hearths of the Britons ſeem to have been fixed in the centre of their halls, as is yet practiſed in ſome parts of Scotland, where the fire is nearly in the middle of the houſe, and the family ſit all around it. Their fire-place was perhaps nothing more than a large ſtone, depreſſed a little below the level of the ground, and thereby adapted to receive the aſhes. About a century ago, it was only the floor of the room, with the addition of a bauk or hob of clay. But it was now changed among the gentlemen for a portable fire-pan, raiſed upon low ſupporters, and fitted with a circular grating of bars. Such were in uſe among the Gauls in the firſt century, and among the Welſh in the tenth.

GRATIAN, the ſon of Valentinian I. by his firſt wife, was declared Auguſtus by his father at the city of Amiens in 365, and ſucceeded him in 367; a prince equally extolled for his wit, eloquence, modeſty, chaſtity, and zeal againſt heretics. He aſſociated Theodoſius with him in the empire, and advanced the poet Auſonius to the conſulate. He made a great ſlaughter of the Germans at Straſburg *, and hence was ſurnamed *Alemannicus*. He was the firſt emperor who refuſed the title of *Pontifex Maximus*, upon the ſcore of its being a Pagan dignity. He was aſſaſſinated by Andragathius in 375, in the 24th year of his age.

* See *Argentora.*

GRATIAN, a famous Benedictine monk, in the 12th century, was born at Chiuſi in Tuſcany, and employed above 24 years in compoſing a work, entitled *Decretum*, or *Concordantia Diſcordantium Canonum*, becauſe he there endeavoured to reconcile the canons which ſeemed contradictory to each other. This work was firſt printed at Mentz in 1472. As he is frequently miſtaken, in taking one canon of one council, or one paſſage of one father for another, and has often cited falſe decretals, ſeveral authors have endeavoured to correct his faults; and chiefly Anthony Auguſtine, in his excellent work entitled *De emendatione Gratiani.* To the decretals of Gratian, the popes principally owed the great authority they exerciſed in the 13th and following centuries.

GRATINGS, in a ſhip, are ſmall edges of ſawed plank, framed one into another like a lattice or priſon grate, lying on the upper deck, between the mainmaſt and foremaſt, ſerving for a defence in a cloſe fight, and alſo for the coolneſs, light, and conveniency of the ſhip's company.

GRATIOLA, HEDGE HYSSOP; a genus of plants belonging to the diandria claſs. See BOTANY *Index*.

GRATITUDE, in *Ethics*, a virtue diſpoſing the mind to an inward ſenſe and outward acknowledgment of benefits received.

Examples of ingratitude, Mr Paley obſerves, check and diſcourage voluntary beneficence; hence the cultivation of a grateful temper is a conſideration of public importance. A ſecond reaſon for cultivating in ourſelves that temper is: That the ſame principle which is touched with the kindneſs of a human benefactor, is capable of being affected by the divine goodneſs, and and of becoming, under the influence of that affection, a ſource of the pureſt and moſt exalted virtue. The love of God is the ſublimeſt gratitude. It is a miſtake, therefore, to imagine, that this virtue is omitted in the Scriptures; for every precept which commands us "to love God, becauſe he firſt loved us," preſuppoſes the principle of gratitude, and directs it to its proper object. Gratitude.

It is impoſſible to particulariſe the ſeveral expreſſions of gratitude, which vary with the character and ſituation of the benefactor, and with the opportunities of the perſon obliged; for this variety admits of no bounds. It may be obſerved, however, that on one part gratitude can never oblige a man to do what is wrong, and what by conſequence he is previouſly obliged not to do: On the other part, it argues a total want of every generous principle, as well as of moral probity, to take advantage of that aſcendency, which the conferring of benefits juſtly creates, to draw or drive thoſe whom we have obliged into mean or diſhoneſt compliances.

The following pleaſing example of genuine gratitude is extracted from *Hackwel's Apol.* lib. xiv. c. 10. p 436. —Francis Freſcobald, a Florentine merchant deſcended of a noble family in Italy, had gained a plentiful fortune, of which he was liberal-handed to all in neceſſity; which being well known to others, though concealed by himſelf, a young ſtranger applied to him for charity. Signior Freſcobald, ſeeing ſomething in his countenance more than ordinary, overlooked his tattered clothes; and compaſſionating his circumſtances, aſked him "What he was, and of what country?" "I am (anſwered the young man) a native of England; my name is Thomas Cromwell, and my father-in-law is a poor ſheer-man. I left my country to ſeek my fortune; came with the French army that were routed at Gatylion, where I was a page to a footman, and carried his pike and burgonet after him." Freſcobald commiſerating his neceſſities, and having a particular reſpect for the Engliſh nation, clothed him genteelly; took him into his houſe till he had recovered ſtrength by better diet; and, at his taking leave, mounted him upon a good horſe, with 16 ducats of gold in his pockets. Cromwell expreſſed his thankfulneſs in a very ſenſible manner, and returned by land towards England; where, being arrived, he was preferred into the ſervice of Cardinal Wolſey. After the cardinal's death, he worked himſelf ſo effectually into the favour of King Henry VIII. that his majeſty made him a baron, viſcount, earl of Eſſex, and at laſt made him lord high chancellor of England. In the mean time, Signior Freſcobald, by repeated loſſes at ſea and land, was reduced to poverty; and calling to mind (without ever thinking of Cromwell), that ſome Engliſh merchants were indebted to him in the ſum of 15,000 ducats, he came to London to procure payment. Travelling in purſuit of this affair, he fortunately met with the lord chancellor as he was riding to court; who thinking him to be the ſame gentleman that had done him ſuch great kindneſs in Italy, he immediately alighted, embraced him, and with tears of joy aſked him, "If he was not Signior Francis Freſcobald, a Florentine merchant?" "Yes, Sir (ſaid he) and your moſt humble ſervant." "My ſervant! (ſaid the chancellor) No; you are my ſpecial friend, that relieved me in

Gratitude.

in my wants, laid the foundation of my greatneſs, and, as ſuch, I receive you; and, ſince the affairs of my ſovereign will not now permit a longer conference, I beg you will oblige me this day with your company at my houſe to dinner with me." Signior Freſcobald was ſurpriſed and aſtoniſhed with admiration who this great man ſhould be that acknowledged ſuch obligations, and ſo paſſionately expreſſed a kindneſs for him; but, contemplating a while his voice, his mien, and carriage, he concludes it to be Cromwell, whom he had relieved at Florence; and therefore not a little overjoyed, goes to his houſe, and attended his coming. His lordſhip came ſoon after; and immediately taking his friend by the hand, turns to the lord high admiral and other noblemen in his company, ſaying, "Don't your lordſhips wonder that I am ſo glad to ſee this gentleman? This is he who firſt contributed to my advancement." He then told them the whole ſtory; and, holding him ſtill by the hand, led him into the dining-room, and placed him next himſelf at table. The company being gone, the chancellor made uſe of this opportunity to know what affair had brought him into England. Freſcobald in few words gave him the true ſtate of his circumſtances: To which Cromwell replied, "I am ſorry for your misfortunes, and I will make them as eaſy to you as I can; but, becauſe men ought to be juſt before they are kind, it is fit I ſhould repay the debt I owe you." Then leading him into his cloſet, he locked the door; and opening a coffer, firſt took out 16 ducats, delivering them to Freſcobald, and ſaid, "My friend, here is the money you lent me at Florence, with ten pieces you laid out for my apparel, and ten more you paid for my horſe; but, conſidering you are a merchant, and might have made ſome advantage by this money in the way of trade, take theſe four bags, in every one of which is 400 ducats, and enjoy them as the free gift of your friend." Theſe the modeſty of Freſcobald would have refuſed, but the other forced them upon him. He next cauſed him to give him the names of all his debtors, and the ſums they owed: which account he tranſmitted to one of his ſervants, with a charge to find out the men, and oblige them to pay him in 15 days under the penalty of his diſpleaſure; and the ſervant ſo well diſcharged his duty, that in a ſhort time the entire ſum was paid. All this time Signior Freſcobald lodged in the chancellor's houſe, where he was entertained according to his merits, with repeated perſuaſions for his continuance in England, and an offer of the loan of 60,000 ducats for four years if he would trade here: but he deſired to return to Florence, which he did, with extraordinary favours from the lord Cromwell.

There is a ſpecies of grateful remorſe, which ſometimes has been known to operate forcibly on the minds of the moſt hardened in impudence. Of this Mr Andrews, who makes the remark, gives an inſtance in the following anecdote, ſaid to have been a favourite one with the late Dr Campbell. "Towards the beginning of this century, an actor, celebrated for mimicry, was to have been employed by a comic author, to take off the perſon, the manner, and the ſingularly awkward delivery of the celebrated Dr Woodward, who was intended to be introduced on the ſtage in a laughable character, (viz. in that of *Dr Foſſile*, in Three Hours after Marriage). The mimic dreſſed himſelf as a country man, and waited on the doctor with a long catalogue of ailments, which he ſaid attended on his wife. The phyſician heard with amazement diſeaſes and pains of the moſt oppoſite nature, repeated and redoubled on the wretched patient. For, ſince the actor's greateſt wiſh was to keep Dr Woodward in his company as long as poſſible, that he might make the more obſervations on his geſtures, he loaded his poor imaginary ſpouſe with every infirmity which had any probable chance of prolonging the interview. At length, being become completely maſter of his errand, he drew from his purſe a guinea, and, with a ſcrape, made an uncouth offer of it. 'Put up thy money, poor fellow (cried the doctor); thou haſt need of all thy caſh and all thy patience too, with ſuch a bundle of diſeaſes tied to thy back.' The actor returned to his employer, and recounted the whole converſation, with ſuch true feeling of the phyſician's character, that the author ſcreamed with approbation. His raptures were ſoon checked; for the mimic told him, with the emphaſis of ſenſibility, that he would ſooner die than proſtitute his talents to the rendering ſuch genuine humanity a public laughing-ſtock. The player's name was *Griffin*.

Gratz || Grave.

GRATZ, a ſtrong town of Germany, and capital of Styria, with a caſtle ſeated on a rock, and an univerſity. The Jeſuits had a college here; and there are a great number of handſome palaces, and a fine arſenal. The caſtle ſtands on a very lofty hill, and communicates with the river by means of a deep well. The empreſs-dowager was obliged to retire hither during the war of 1741 and 1742. It is ſeated on the river Muer, in E. Long. 16. 25. N. Lat. 47. 4.

GRATIUS, a Latin poet, contemporary with Ovid, the author of a poem entitled *Cynegeticon*, or the *Manner of hunting with dogs*; the beſt edition of which is that of Leyden, 12mo, with the learned notes of Janus Ulitius.

GRAVE, in *Grammar*, a ſpecies of accent oppoſite to acute. The grave accent is expreſſed thus (`); and ſhows, that the voice is to be depreſſed, and the ſyllable over which it is place pronounced in a low deep tone.

GRAVE, in *Muſic*, is applied to a ſound which is in a low or deep tone. The thicker the chord or ſtring, the more grave the tone or note, and the ſmaller the acuter. Notes are ſuppoſed to be the more grave, in proportion as the vibrations of the chord are leſs quick.

GRAVE, in the Italian muſic, ſerves to denote the ſloweſt movement.

GRAVE is alſo uſed for a tomb, wherein a perſon defunct is interred.

Graves, among the Jews, were generally out of the city, though we meet with inſtances of their interring the dead in towns. Frequent mention is made of graves upon mountains, in highways, in gardens, and private houſes. So that nothing on this head ſeems to have been determined. The ſame may be obſerved with reſpect to the Greeks. The Thebans had a law that every perſon who built a houſe ſhould provide a burial-ground. Men who had diſtinguiſhed themſelves were frequently buried in the public forum. The moſt general cuſtom was, however, to bury out of the city, chiefly by the highway ſide. The Romans were forbidden by the law of the 12 tables to bury or burn the

Grave || Grave-ſande.

the dead in the city; but ſome we find had their ſepulchres in Rome, though they paid a fine for the indulgence.

GRAVE, a very ſtrong town of the Netherlands, in Dutch Brabant, ſeated on the river Maeſe, beyond which there is a fort. E. Long. 5. 41. N. Lat. 51. 46.

GRAVEL, in *Natural Hiſtory* and *Gardening*, a congeries of pebbles, which, mixed with a ſtiff loam, makes laſting and elegant gravel-walks; an ornament peculiar to our gardens, and which gives them an advantage over thoſe of other nations.

GRAVEL. See MEDICINE *Index*.

GRAVEL-Walks. To make theſe properly, the bottom ſhould be laid with lime-rubbiſh, large flint-ſtones, or any other hard matter, for eight or ten inches thick, to keep weeds from growing through, and over this the gravel is to be laid ſix or eight inches thick. This ſhould be laid rounding up in the middle, by which means the larger ſtones will run off to the ſides, and may be raked away; for the gravel ſhould never be ſcreened before it is laid on. It is a common miſtake to lay theſe walks too round, which not only makes them uneaſy to walk upon, but takes off from their apparent breadth. One inch in five feet is a ſufficient proportion for the riſe in the middle; ſo that a walk of 20 feet wide ſhould be four inches higher at the middle than at the edges, and ſo in proportion. As ſoon as the gravel is laid, it ſhould be raked, and the large ſtones thrown back again: then the whole ſhould be rolled both lengthwiſe and croſswiſe; and the perſon who draws the roller ſhould wear ſhoes with flat heels, that he may make no holes; becauſe holes made in a new walk are not eaſily remedied. The walks ſhould always be rolled three or four times in very hard ſhowers, after which they will bind more firmly than otherwiſe they could ever be made to do.

Gravel with ſome loam among it, binds more firmly than the rawer kinds; and when gravel is naturally very harſh and ſharp, it is proper to add a mixture of loam to it. The beſt gravel for walks is ſuch as abounds with ſmooth round pebbles, which, being mixed with a little loam, are bound ſo firmly together, that they are never afterwards injured either by wet or dry weather. Theſe are not ſo liable to be turned up by the feet in walking, as the more irregularly ſhaped pebbles, and remain much more firmly in their places after rolling.

GRAVELINES, a ſtrong ſea-port town of the Netherlands, in French Flanders, with a caſtle and harbour, ſeated in a marſhy country on the river Aa, near the ſea, in E. Long. 2. 13. N. Lat. 50. 59.

GRAVELLY LAND, or SOIL, that abounding with gravel or ſand, which eaſily admits of heat and moiſture; and the more ſtony ſuch lands are, the more barren they prove.

GRAVENAC, a town of Germany, in the circle of Suabia, and capital of a county of the ſame name. E. Long. 8. 15. N. Lat. 48. 22.

GRAVER, in the art of engraving, a tool by which all the lines, ſcratches, and ſhades, are cut in copper, &c. See ENGRAVING.

GRAVESANDE, WILLIAM JAMES, was born of an ancient and honourable family at Delft in Holland. in 1688. He ſtudied the civil law at Leyden, but mathematical learning was his favourite amuſement. When he had taken his doctor's degree in 1707, he ſettled at the Hague, and practiſed at the bar, in which ſituation he cultivated an acquaintance with learned men; with a ſociety of whom, he publiſhed a periodical review entitled *Le Journal Literaire*, which was continued without interruption from the year 1713 to the year 1722, when he died. The moſt conſiderable of his works are, "A treatiſe on perſpective; An introduction to the Newtonian philoſophy, or a treatiſe on the elements of phyſics confirmed by experiments; A treatiſe on the elements of algebra, for the uſe of young ſtudents;" and "A courſe of logic and metaphyſics." He had intended to have preſented the public with a ſyſtem of morality, but his death prevented the execution. The miniſters of the republic conſulted him on all occaſions wherein his talents were requiſite; and his ſkill in calculation was often of ſervice to them; as was his addreſs in deciphering, for detecting the ſecret correſpondence of their enemies. As profeſſor of mathematics and aſtronomy at Leyden, none ever applied the powers of nature with more ſucceſs, or to more uſeful purpoſes.

Graveſend.

GRAVESEND, a town of Kent in England, ſituated on the banks of the Thames. It is 25 miles from London; and has a blockhouſe well mounted with cannon, to command the ſhips and river, directly oppoſite to Tilbury fort in Eſſex. The town was plundered and burnt by the French and Spaniards in the reign of Richard II. to compenſate which, the king, at the requeſt of the abbot of St Mary-le-Grace of Tower-hill, to whom he had granted a manor there called *Parrocks*, veſted it and Milton with the ſole privilege of carrying paſſengers by water from hence to London at 4s. the whole fare, or 2d. a-head; which was confirmed by Henry VIII.; but now the fare is 9d. a-head in the tilt-boat, and 1s. in the wherry. The former muſt not take in above 40 paſſengers, the latter no more than 8. Coaches ply here at the landing of people from London, &c. to carry them to Rocheſter, at 1s. 6d. each. This town and Milton were incorporated by Queen Elizabeth by the name of the *portreeve* (now the mayor), jurats, and inhabitants of Graveſend and Milton: And as Graveſend is the place where moſt paſſengers through Kent from foreign parts take boat for London, that queen, in order to ſhow the grandeur of the metropolis of her kingdom, ordered the lord mayor, aldermen, and city companies, to receive all ambaſſadors and eminent ſtrangers here in their formalities, and to attend them to London in barges if by water; or if they choſe to come by land, they were to meet them on horſeback on Blackheath in their livery gowns. The towns for ſeveral miles round are ſupplied from hence with garden ſtuffs; of which great quantities are alſo ſent to London, where the aſparagus of Graveſend is preferred to that of Batterſea. All outward-bound ſhips are obliged to anchor in this road till they have been viſited by the cuſtomhouſe officers; and for this purpoſe a centinel at the blockhouſe fires a muſket: but the homeward-bound all paſs by without notice, unleſs it be to put waiters on board, if they are not ſupplied before. As the outward-bound generally take in proviſions here, the place is full of ſeamen, who are all in a hurry. The whole town being burnt down in 1727, 5000l. was

Gravina || Gray.

was granted by the parliament in 1731 for rebuilding its church, as one of the 50 new ones. In 1624, one Mr Pinnock gave 21 dwelling-houſes here, beſides one for a maſter weaver, to employ the poor; and here is a charity-ſchool for 24 boys, who are both taught and clothed. The town-houſe was erected in 1764; and in 1772 an act of parliament empowered the inhabitants to pave and light their ſtreets.

GRAVINA, a town of Italy, in the kingdom of Naples, and Terra di Bari, with a biſhop's ſee, and the title of a duchy. E. Long. 17. N. Lat. 41.

GRAVITATION, in *Natural Philoſophy*, is ſometimes diſtinguiſhed from *gravity*. Thus M. Maupertuis takes gravity for that force whereby a body would fall to the earth; but gravitation for the ſame diminiſhed by the centrifugal force. See *Newtonian Philoſophy*.

GRAVITY, or Gravitation (for the words are moſt commonly uſed ſynonymouſly), ſignifies either the force by which bodies are preſſed towards the ſurface of the earth, or the manifeſt effect of that force; in which laſt ſenſe the word has the ſame ſignification with *weight* or *heavineſs*.

Concerning gravity in the firſt ſenſe of the word, or that active power by which all bodies are impelled towards the earth, there have been great diſputes. Many eminent philoſophers, and among the reſt Sir Iſaac Newton himſelf, have conſidered it as the firſt of all ſecond cauſes; an incorporeal or ſpiritual ſubſtance, which never can be perceived any other way than by its effects; an univerſal property of matter, &c. Others have attempted to explain the phenomena of gravitation by the action of a very ſubtle ethereal fluid; and to this explanation Sir Iſaac, in the latter part of his life, ſeems not to have been averſe. He hath even given a conjecture concerning the manner in which this fluid might occaſion theſe phenomena. But for a full account of the diſcoveries of this great philoſopher concerning the laws of gravitation, the conjectures made by him and others concerning its cauſe, the various objections that have been made to his doctrine, and the ſtate of the diſpute at preſent, ſee the articles *Newtonian Philoſophy* and Astronomy.

Specific Gravity denotes the weight belonging to an equal bulk of every different ſubſtance. Thus the exact weight of a cubic inch of gold, compared with a cubic inch of water, tin, lead, &c. is called its *ſpecific gravity*. See Hydrostatics.

GRAY, or Grey, a mixed colour partaking of the two extremes, black and white. See Dyeing *Index*.

In the manege they make ſeveral ſorts of grays; as the branded or blackened gray, which has ſpots quite black diſperſed here and there. The dappled gray, which has ſpots of a darker colour than the reſt of the body. The light or ſilver gray, wherein there is but a ſmall mixture of black hairs. The ſad or iron gray, which has but a ſmall mixture of white. And the browniſh or ſandy-coloured gray, where there are bay-coloured hairs mixed with the black.

GRAY, a town of France, in the department of Upper Saone, and capital of the bailiwick of Amont. It is a trading place, and ſeated on the river Saone, in E. Long. 5. 41. N. Lat. 47. 30.

GRAY, *Lady Jane*. See GREY.

GRAY, *Thomas*, an admired Engliſh poet, was the youngeſt and only ſurviving ſon of a reputable citizen of London, and was born in Cornhill in 1716. He was educated at Eton, where he contracted a friendſhip with Mr Horace Walpole, and with Mr Richard Weſt ſon of the lord chancellor of Ireland. Mr Weſt and Mr Gray were both intended for the bar: but the former died early in life, and the latter was diverted from that purſuit by an invitation to accompany Mr Walpole in his travels; which he accepted without any determined plan for his future life. During Mr Gray's travels, he wrote a variety of letters to Mr Weſt and to his parents, which are printed with his poems; and when he returned, finding himſelf in narrow circumſtances, yet with a mind indiſpoſed for active employment, he retired to Cambridge, and devoted himſelf to ſtudy. Soon after his return, his friend Weſt died; and the melancholy impreſſed on him by this event may be traced in his admired "Elegy written in a country churchyard;" which is thought to have been begun, if not finiſhed, at this time; though the concluſion, as it ſtands at preſent, is certainly different from what it was in the firſt manuſcript copy. The firſt impulſe of his ſorrow for the death of his friend gave birth to a very tender ſonnet in Engliſh, on the Petrarchian model; and alſo to a ſublime apoſtrophe in hexameters, written in the genuine ſtrain of claſſical majeſty, with which he intended to begin one of his books *De Principiis cogitandi*.

Gray.

From the winter of the year 1742, to the day of his death, his principal reſidence was at Cambridge: from which he was ſeldom abſent any conſiderable time, except between the years 1759 and 1762; when on the opening of the Britiſh Muſeum, he took lodgings in Southampton-row, in order to have recourſe to the Harleian and other manuſcripts there depoſited, from which he made ſeveral curious extracts, amounting in all to a tolerable ſized folio, at preſent in the hands of Mr Walpole.

About the year 1747, Mr Maſon, the editor of Mr Gray's poems, was introduced to him. The former had written, a year or two before, ſome imitations of Milton's juvenile poems, viz. A Monody on the death of Mr Pope, and two pieces entitled *Il Bellicoſo* and *Il Pacifico* on the peace of Aix-la-Chapelle; and the latter reviſed them at the requeſt of a friend. This laid the foundation of an intimacy which continued without interruption to the death of Mr Gray.

About the year 1750, Mr Gray had put his laſt hand to his celebrated Elegy written in a country church-yard, and had communicated it to his friend Mr Walpole, whoſe good taſte was too much charmed with it to ſuffer him to withhold the ſight of it from his acquaintance. Accordingly it was ſhown about for ſome time in manuſcript, and received with all the applauſe it ſo juſtly merited. At laſt the publiſher of one of the magazines having obtained a ſurreptitious copy of it, Mr Gray wrote to Mr Walpole, deſiring that he would put his own manuſcript into the hands of Mr Dodſley, and order him to print it immediately. This was the moſt popular of all our author's publications. It ran through eleven editions in a very ſhort ſpace of time; was finely tranſlated into Latin by Meſſrs Anſty and Roberts; and in the ſame year by Mr Lloyd.

From July 1759 to the year 1762, he generally reſided

Gray. ſided in London, with a view, as we have already obſerved, of having recourſe to the Britiſh Muſeum. In July 1768, his grace the duke of Grafton wrote him a polite letter, informing him, that his majeſty had been pleaſed to offer to him the profeſſorſhip of Modern Hiſtory in the univerſity of Cambridge, then vacant by the death of Mr Laurence Brocket. This place was valuable in itſelf, the ſalary being 400l. a-year; but what rendered it particularly acceptable to Mr Gray was its being given him without any ſolicitation. He was indeed remarkably diſintereſted in all his purſuits. Though his income, before this addition, was very ſmall, he never read or wrote with a view of making his labours uſeful to himſelf. He may be ſaid to have been of thoſe few perſonages in the annals of literature, eſpecially in the poetical claſs, who are devoid of ſelf-intereſt, and at the ſame time attentive to economy; and alſo was among mankind in general one of thoſe very few economiſts, who poſſeſs that talent, untinctured with the ſlighteſt ſtain of avarice. When his circumſtances were at the loweſt, he gave away ſuch ſums in private charity, as would have done credit to an ampler purſe. But what chiefly deterred him from ſeeking any advantage by his literary purſuits, was a certain degree of pride, which led him to deſpiſe the idea of being thought an author by profeſſion.

However, it is probable, that early in life he had an intention of publiſhing an edition of Strabo; for his papers contain a great number of notes and geographical diſquiſitions on that author, particularly with reſpect to that part of Aſia which comprehends Perſia and India. The indefatigable pains which he took with the writings of Plato, and the quantity of critical as well as explanatory obſervations which he has left upon almoſt every part of his works, plainly indicate, that no man in Europe was better prepared to republiſh and illuſtrate that philoſopher than Mr Gray. Another work, on which he beſtowed uncommon labour, was the Anthologia. In an interleaved copy of that collection of Greek epigrams, he has tranſcribed ſeveral additional ones, which he ſelected in his extenſive reading; has inſerted a great number of critical notes and emendations, and ſubjoined a copious index. But whether he intended this performance for the preſs or not, is uncertain. The only work which he meditated upon with this direct view from the beginning was a hiſtory of Engliſh poetry, upon a plan ſketched out by Mr Pope. He has mentioned this himſelf in an advertiſement to thoſe three fine imitations of Norſe and Welch poetry, which he gave the world in the laſt edition of his poems. But after he had made ſome conſiderable preparations for the execution of this deſign, and Mr Maſon had offered him his aſſiſtance, he was informed, that Mr Warton, of Trinity College, Oxford, was engaged in a work of the ſame kind. The undertaking was therefore relinquiſhed, by mutual conſent; and ſoon after, on that gentleman's deſiring a ſight of the plan, our author readily ſent him a copy of it.

Among other ſciences, Mr Gray had acquired a great knowledge of Gothic architecture. He had ſeen and accurately ſtudied in his youth, while abroad, the Roman proportions on the ſpot, both in ancient times, and in the works of Palladio. In his later years he applied himſelf to conſider thoſe ſtupendous ſtructures of more modern date that adorn our own country; which, if they have not the ſame grace, have undoubtedly equal dignity. He endeavoured to trace this mode of building from the time it commenced through its various changes, till it arrived at its perfection in the reign of Henry VIII. and ended in that of Elizabeth. For this purpoſe, he did not ſo much depend upon written accounts, as that internal evidence which the buildings themſelves give of their reſpective antiquity; ſince they conſtantly furniſh to the well-informed eye, arms, ornaments, and other marks, by which their ſeveral ages may be aſcertained. On this account he applied himſelf to the ſtudy of heraldry as a preparatory ſcience; and has left behind him a number of genealogical papers, more than ſufficient to prove him a complete maſter of it. By theſe means he arrived at ſo very extraordinary a pitch of ſagacity, as to be enabled to pronounce, at firſt ſight, on the preciſe time when every particular part of any of our cathedrals was erected. But the favourite ſtudy of Mr Gray for the laſt ten years of his life was natural hiſtory, which he then rather reſumed than began; as by the inſtructions of his uncle Antrobus, he was a conſiderable botaniſt at 15. The marginal notes which he has left on Linnæus and other writers on the vegetable, animal, and foſſil kingdoms, are very numerous: but the moſt conſiderable are on Hudſon's Flora Anglica, and the tenth edition of the *Syſtema Naturæ;* which latter he interleaved and filled almoſt entirely. While employed on zoology, he read Ariſtotle's treatiſe on that ſubject with great care, and explained many difficult paſſages of that obſcure ancient by the lights he had received from modern naturaliſts. In a word, excepting pure mathematics, and the ſtudies dependent on that ſcience, there was hardly any part of human learning in which he had not acquired a competent ſkill, and in moſt of them a conſummate maſtery. To this account of his literary character we may add, that he had a fine taſte in painting, prints, gardening, and muſic; and was moreover a man of good breeding, virtue, and humanity. Gray

He died in 1771: and an edition of his poems, with memoirs of his life and writings, were publiſhed in 4to, in 1775, by Mr Maſon. This gentleman, however, inſtead of employing his own pen in drawing Mr Gray's character, has adopted one drawn by the reverend Mr Temple, rector of Mamhead in Devonſhire, in a letter to Mr Boſwell; to whom the public are indebted for communicating it. "Perhaps (ſays Mr Temple) he was the moſt learned man in Europe. He was equally acquainted with the elegant and profound parts of ſcience, and that not ſuperficially but thoroughly. He knew every branch of hiſtory, both natural and civil; had read all the original hiſtorians of England, France, and Italy: and was a great antiquarian. Criticiſm, metaphyſics, morals, politics, made a principal part of his plan of ſtudy; voyages and travels of all ſorts were his favourite amuſement; and he had a fine taſte in painting, prints, architecture, and gardening. With ſuch a fund of knowledge, his converſation muſt have been equally inſtructing and entertaining; but he was alſo a good man, a well-bred man, a man of virtue and humanity. There is no character without ſome ſpeck, ſome imperfection; and I think the greateſt defect in his

Grayling || Greaves.

his was an affectation in delicacy, or rather effeminacy, and a viſible faſtidiouſneſs, or contempt and diſdain of his inferiors in ſcience. He alſo had, in ſome degree, that weakneſs which diſguſted Voltaire ſo much in Mr Congreve: though he ſeemed to value others chiefly according to the progreſs they had made in knowledge, yet he could not bear to be conſidered himſelf merely as a man of letters; and though without birth, or fortune, or ſtation, his deſire was to be looked upon as a private independent gentleman, who read for his amuſement. Perhaps it may be ſaid, What ſignifies ſo much knowledge, when it produces ſo little? Is it worth taking ſo much pains to leave no memorial but a few poems? But let it be conſidered, that Mr Gray was, to others, at leaſt innocently employed; to himſelf, certainly beneficially. His time paſſed agreeably; he was every day making ſome new acquiſition in ſcience; his mind was enlarged, his heart ſoftened, and his virtue ſtrengthened; the world and mankind were ſhown to him without a maſk; and he was taught to conſider every thing as trifling, and unworthy the attention of a wiſe man, except the purſuit of knowledge, and the practice of virtue in that ſtate wherein God hath placed us."

GRAYLING. See SALMO, ICHTHYOLOGY *Index*.

In angling for this fiſh the hook muſt be armed upon the ſhanks with a very narrow plate of lead, which ſhould be ſlendereſt at the bent of the hook, that the bait (which is to be a large graſhopper, the uppermoſt wing of which muſt be pulled off) may come over to it the more eaſily. At the point let there be a cod-bait in a continual motion. The jag-tail, which is a worm of a pale fleſh-colour, with a yellow tag on its tail, is an excellent bait for the grayling in March and April.

GREASE, a ſwelling and gourdineſs of the legs of a horſe. See FARRIERY, N° 482.

GREAT, a term of compariſon, denoting a thing to have more extenſion than ſome other to which it is referred. Thus we ſay, a *great* ſpace, a *great* diſtance, a *great* figure, a *great* body, &c.

GREAT is likewiſe uſed figuratively in matters of morality, &c. to ſignify ample, noble, elevated, extraordinary, important, &c. Thus we ſay, Shakeſpeare was a *great* genius, Da Vinci a *great* painter, Galileo a *great* philoſopher, Boſſu a *great* critic, &c.

GREAT is alſo a title or quality appropriated to certain princes and other illuſtrious perſonages. Thus we ſay, the *great* Turk, the *great* Mogul, the *great* cham of Tartary, the *great* duke of Florence, &c.

GREAT is alſo a ſurname beſtowed on ſeveral kings and emperors. Thus we ſay, Alexander the *great*; Cyrus the *great*; Charles the *great*, or Charlemagne; Henry the *great* of France, &c.

GREAT is alſo applied to ſeveral officers who have pre-eminence over others. Thus we ſay, the lord *great* chamberlain; the *great* marſhal of Poland, &c.

GREATER TONE, in *Muſic*. See TONE.

GREAVES, JOHN, an eminent phyſician and antiquary, was the eldeſt ſon of John Greaves rector of Colemore, near Alresford in Hampſhire, and born in 1602. He was educated at Baliol College in Oxford, from which he removed to Merton. He was afterwards, on the foot of his great merit, choſen geometry profeſſor of Greſham college. His ardent thirſt of knowledge ſoon carried him into ſeveral parts of Europe, where he eagerly ſeized every opportunity of improving it. His next voyage was into the eaſtern countries; where nothing remarkable in the heavens, earth, or even ſubterraneous places, ſeems to have eſcaped his nice obſervation. He, with indefatigable induſtry, and even at the peril of his life, collected a conſiderable number of Arabic, Perſic, and Greek manuſcripts, for Archbiſhop Laud. Of theſe he well knew the value, as he was a maſter of the languages in which they were written. He alſo collected for that prelate many oriental gems and coins. He took a more accurate ſurvey of the pyramids than any traveller who went before him. On his return from the Eaſt, he viſited ſeveral parts of Italy a ſecond time. During his ſtay at Rome, he made a particular inquiry into the true ſtate of the ancient weights and meaſures. Soon after he had finiſhed his ſecond voyage, he was choſen Savilian profeſſor of aſtronomy at Oxford. He was eminently qualified for this profeſſorſhip, as the works of ancient and modern aſtronomers were familiar to him. His books relating to oriental learning, his *Pyramidographia*, or a deſcription of the pyramids in Egypt, his *Epochæ Celebriores*, and other curious and uſeful pieces, of which Mr Ward has given us a catalogue, ſhow him to have been a great man. Thoſe which he intended to publiſh would have ſhown him to be a greater; but he was ſtopped in his great career by death in 1652.

Grebe, Greece.

GREBE. See COLYMBUS, ORNITHOLOGY *Index*.

GREECE, the preſent Romelia, and in many reſpects one of the moſt deſervedly celebrated countries in the world, was anciently bounded on the north by Macedonia and the river Strymon; on the weſt by the Ionian ſea; on the north by the Mediterranean; on the eaſt by the Egean ſea and Archipelago. It extended from the Strymon, by which it was parted from Thrace, to the promontory of Tenaurus, the ſouthmoſt point of the Peloponneſus, now the Morea, about 6° 20′ of latitude, or nearly 440 Engliſh miles, and in breadth from eaſt to weſt about 359 miles.

The general names by which the inhabitants of this country were known to the ancients were thoſe of *Graioi*, or *Graicoi*, from whence the name of *Greece* is plainly derived. Theſe names are thought to come from Græcus, the father, or (according to ſome) the ſon, of Theſſalus, who gave name to Theſſaly; but ſome modern critics chooſe to derive it from *Ragau*, the ſame with *Reu*, the ſon of Peleg, by the tranſpoſition of a letter to ſoften the ſound.—Theſe names were afterwards changed for *Achæi* and *Hellenes*; the firſt, as is ſuppoſed from *Achæus*, the ſon of Xuthus, the ſon of Hellen, and father of Ion; or, according to the fable, the ſon of Jupiter: the other from Hellen, above-mentioned, the ſon of Deucalion, and father of Dorus, from whom came the *Dores*, afterwards a famous nation among the Greeks. Another name by which the Greeks were known in ſome parts of the country, was that of *Pelaſgi*, which the Arcadians, the moſt ancient people in Greece, deduced from their pretended founder *Pelaſgus*, who is ſaid to have got ſuch footing in Peloponneſus, that the whole peninſula from him was called *Pelaſgia*. But the moſt ancient name of all is univerſally allowed to have been that of Iones, which the Greeks themſelves derived from Ion the ſon of Xuthus;

Greece. Xuthus; or, as the fable hath it, of Apollo, by Creuſa the daughter of Erichtheus the grandſon of Deucalion. Joſephus, however, affirms, that their original is of much older date; and that Javan, the ſon of Japhet, and grandſon of Noah, was the firſt who peopled theſe countries; which Bochart hath alſo rendered very probable. It is true, indeed, that among the Greeks themſelves, only the Athenians, and ſuch colonies as ſprung from them, were called *Iones:* but it is alſo plain beyond exception, that other nations gave this name to all the inhabitants of Greece.

The inhabitants of Greece in the firſt ages, even by the confeſſion of their own hiſtorians, appear to have been ſavages ſcarce a degree removed from brutes. They lived indifferently on every fruit, herb, or root that came in their way: and lay either in the open fields, or at beſt ſheltered themſelves in dens, caves, and hollow trees: the country itſelf in the mean time remaining one continued uncultivated deſert. The firſt improvement they made in their way of living, was the exchanging of their old food for the more wholeſome acorns, building huts for themſelves to ſleep in, and covering their bodies with the ſkins of beaſts. For all this, it ſeems, they were beholden to Pelaſgus above-mentioned (ſuppoſed by ſome to be Peleg ſpoken of in Scripture), and who was highly reverenced by them on that account.—This reformation in their way of life, however, it ſeems wrought none in their manners. On the contrary, they who had nothing to fight for but a hole to ſleep in, began now to envy and rob one another of theſe ſlender acquiſitions. This, in proceſs of time, put them under a neceſſity of joining themſelves into companies under ſome head, that they might either more ſafely plunder their neighbours, or preſerve what they had got. Laws they had none, except that of the ſword: ſo that thoſe only lived in ſafety who inhabited the moſt barren and craggy places; and hence Greece for a long time had no ſettled inhabitants, the weakeſt being always turned out by the ſtrongeſt. Their gigantic ſize and ſtrength, if we may believe Plutarch, added ſo much to their inſolence and cruelty, that they ſeemed to glory in committing the greateſt acts of violence and barbarity on thoſe that unhappily fell into their hands.

The next advance towards civilization, was their forming themſelves into regular ſocieties, to cultivate the lands, and build themſelves towns and cities for their ſafety. Their original barbarity and mutual violences againſt each other naturally prevented them from uniting as one nation, or even into any conſiderable community: and hence the great number of ſtates into which Greece was originally divided. The moſt remarkable of theſe ſmall principalities mentioned in hiſtory are the following: In Peloponneſus were thoſe of Sicyon, Argos, and Meſſenia, Achaia Propria, Arcadia, and Laconia. In Græcia Propria (that part of Greece which lay without Peloponneſus), were thoſe of Attica, Megara, Bœotia, Lucris, Epichnemidia, Doris, Phocis, Locris, Ozolæa, and Ætolia. In Epirus were the Moloſſi, Amphilochi, Caſſiopæi, Dræopes, Chaoces, Theſprotii, Almeni, and Acarnani. In Theſſaly were thoſe of Theſſaliotis, Eſtiotis, Pelaſgiotis, Magneſia and Phthia.—All theſe have at one time or other been ſeverally governed by kings of their own, though we only find the names of many of them mentioned in the hiſtories of the more conſiderable kingdoms of Sparta, Attica, Thebes, &c.—The erection of theſe kingdoms, however, for ſome time, did not much alter the caſe; the inhabitants of the new kingdoms plundered and deſtroyed one another without mercy. Attica was the only place in any degree free from theſe incurſions, becauſe it was naturally deſtitute of every thing that could invite a plundering enemy; but thoſe cities fared much worſe which were ſituated on the ſea-coaſts; becauſe they were in continual danger of being plundered either by ſea or land: for pirates at that time did not leſs infeſt all thoſe ſeas than robbers did the land. And this was one main cauſe why moſt of the ancient cities of Greece were ſituated at ſome conſiderable diſtance from the ſhore; but even in theſe, as all their ſafety conſiſted in the reſiſtance they could make againſt an invader, their inhabitants were under the neceſſity of going conſtantly armed, and being ever on their guard. Greece.

Another miſchief ariſing from theſe continual piracies and robberies was, that they occaſioned the far greater part of the lands to lie uncultivated, ſo that the people only planted and ſowed as much as was barely neceſſary for their preſent ſupport; and where there was ſuch an univerſal neglect of agriculture, there could be as little room for any diſcoveries in other uſeful arts and trades. Hence, when other nations, as the Jews, Egyptians, Midianites, Phœnicians, &c. had improved themſelves to a very high degree, the Greeks ſeem to have been utter ſtrangers to every uſeful art.

During this period of ſavage barbarity, the moſt renowned Grecian heroes, as Hercules, Theſeus, &c. performed their exploits; which, however exaggerated by poetic fiction, no doubt had a foundation in truth. Some indeed are of opinion that the Grecian heroes are entirely fictitious, and their exploits derived from thoſe of the Hebrew worthies, ſuch as Samſon, Gideon, &c. Yet, conſidering the extreme degree of barbarity which at that time prevailed throughout Greece, it ſeems not at all improbable that ſome perſons of extraordinary ſtrength and courage might undertake the cauſe of the oppreſſed, and travel about like the more modern knights-errant in queſt of adventures.

The firſt expedition in which we find the Greeks united, was that againſt Troy, the particulars of which are recited under the article TROY. Their ſucceſs here (which happened about 1184 B. C.) coſt them very dear; vaſt numbers of their braveſt warriors being ſlain; great numbers of the ſurvivors being caſt away in their return; and many of thoſe who had the good luck to get back again, being ſoon after murdered, or driven out of their country. It is probable, however, that their having ſtaid for ſuch a long time in Aſia, might contribute to civilize the Greeks ſomewhat ſooner than what they otherwiſe would have been; and accordingly from this time, we find their hiſtory ſomewhat leſs obſcure, and as it were beginning to emerge out of darkneſs. The continual wars, indeed, in which they were engaged among themſelves, no doubt, for a long time, prevented them from making any conſiderable advances in thoſe arts in which they afterwards made ſo great progreſs. Theſe wars, which

Greece. which indeed never ceaſed as long as the Greeks preſerved their liberty, rendered them brave, and ſkilled in the military art above all other nations; but at the ſame time they effectually prevented them from making permanent conqueſts, and confined them within the bounds of their own country; while the different ſtates were one way or other ſo equally balanced, that ſcarce one of them was able perfectly to ſubdue another. The Spartans, however, having with great difficulty, reduced the kingdome of Meſſene, and added its territories to their own, became the leading people in Greece. Their ſuperiority was long diſputed by Athens; but the Peloponneſian war at laſt determined that point in favour of the Spartans, when the city of Athens was taken, and its walls demoliſhed by Lyſander the Spartan general. See ATTICA, N° 164. —By the battle of Leuctra, the Spartans loſt that ſuperiority which they had maintained for 500 years, and which now devolved on the Thebans. After the death of Epaminondas, the celebrated Theban general, however, as no perſon was found poſſeſſed of his abilities, the Thebans were again obliged to yield the ſuperiority to the Spartans. But by this time the Greeks had become acquainted with the luxuries and elegancies of life; and all the rigour of their original laws could not prevent them from valuing theſe as highly as other people. This did not indeed abate their valour, but it heightened their mutual animoſities; at the ſame time that, for the ſake of a more eaſy and comfortable life, they became more diſpoſed to ſubmit to a maſter. The Perſians, whoſe power they had long dreaded, and who were unable to reſiſt them by force of arms, at laſt found out (by the advice of Alcibiades) the proper method of reducing the Grecian power; namely, by aſſiſting them by turns, and ſupplying one ſtate with money to fight againſt another till they ſhould be all ſo much reduced, that they might become an eaſy prey. Thus the Greeks were weakened, though the Perſians did not reap any benefit from their weakneſs. Philip of Macedon entered into the ſame political views; and partly by intrigue, partly by force, got himſelf declared generaliſſimo of Greece. His ſucceſſor Alexander the Great completed their ſubjection; and by deſtroying the city of Thebes, and exterminating its inhabitants, ſtruck ſuch a terror throughout Greece, that he was as fully obeyed by all the ſtates as by any of the reſt of his ſubjects. During his abſence in Perſia, however, they attempted to ſhake off the Macedonian yoke, but were quelled by his general Antipater. The news of Alexander's death was to them a matter of the utmoſt joy; but their mutual animoſities prevented them from joining in any ſolid plan for the recovery of their liberties, and hence they continued to be oppreſſed by Alexander's ſucceſſors, or other tyrants, till Aratus, an Achæan, about 268 B. C. formed a deſign of ſetting his country free from theſe oppreſſors. He perſuaded a number of the ſmall republics to enter into a league for their own defence, which was called the *Achæan league*; and notwithſtanding that the republics, taken ſingly, had very little ſtrength, they not only maintained their independency, but ſoon became formidable when united. This aſſociation continued to become daily more and more powerful; but received a ſevere check from Cleomenes, king of Sparta, which obliged them to call in Antigonus to their aſſiſtance. Greece. This prince overcame Cleomenes, at the battle of Sellaſia, and afterwards made himſelf maſter of Sparta. Thus he became a more formidable enemy than the one he had conquered, and the recovery of the Grecian liberties was incomplete.

Soon after this, the Greeks began to feel the weight of a power more formidable than any which they had yet experienced; namely, that of the Romans. That inſidious and haughty republic firſt intermeddled with the Grecian affairs, under pretence of ſetting them at liberty from the oppreſſion of Philip of Macedon. This, by a proper union among themſelves, they might have accompliſhed: but in this they acted as though they had been infatuated; receiving with the utmoſt joy the decree of the Roman conſul, who declared them free; without conſidering, that he who had thus given them liberty, might take it away at his pleaſure. This leſſon, however, they were ſoon taught, by the total reduction of their country to a Roman province; yet this can ſcarce be called a misfortune, when we look back to their hiſtory, and conſider their outrages upon one another: nor can we ſympathize with them for the loſs of that liberty which they only made uſe of to fill their country with ſlaughter and bloodſhed. After their conqueſt by the Romans, they made no united effort to recover their liberty. They continued in quiet ſubjection till the beginning of the 15th century. About that time, they began to ſuffer under the tyranny of the Turks, and their ſufferings were completed by the taking of Conſtantinople in 1453. Since that time they have groaned under the yoke of a moſt deſpotic government; ſo that all traces of their former valour, ingenuity, and learning, are now in a manner totally extinct.

Modern Greece comprehends Macedonia; Albania, now called *Arnaut*; Epirus; Theſſaly, now *Jana*; Achaia, now *Livadia*; the Peloponneſus, now *Morea*; together with the iſlands on its coaſt, and in the Archipelago. The continent of Greece is ſeated betwixt the 36th and 43d degrees of north latitude; and between the 19th and 27th degrees of longitude, eaſt of London. To the north, it is bounded by Bulgaria and Servia, from which it is divided by a ridge of mountains; to the ſouth by the Mediterranean ſea; to the eaſt by Romania and the Archipelago; and to the weſt by the Adriatic or gulf of Venice. Its length is ſaid to be about 400 miles, and its utmoſt breadth about 350 miles. The air is extremely temperate and healthy: and the ſoil fruitful, though badly cultivated; yielding corn, wine, delicious fruits, and abounding with cattle, fowls, and veniſon. As to religion, Chriſtianity was planted in Greece ſoon after the death of our Saviour, and flouriſhed there for many ages in great purity; but ſince the Greeks became ſubject to the Turkiſh yoke, they have ſunk into the moſt deplorable ignorance, in conſequence of the ſlavery and thraldom under which they groan, and their religion is now greatly corrupted. It is indeed little better than a heap of ridiculous ceremonies and abſurdities. The head of the Greek church is the patriarch of Conſtantinople; who is choſen by the neighbouring archbiſhops and metropolitans, and confirmed by the emperor or grand viſir. He is a perſon of great dignity, being the head and director of the eaſtern church.

The

Greece. The other patriarchs are thoſe of Jeruſalem, Antioch, and Alexandria. Mr Tournefort tells us, that the patriarchates are now generally ſet to ſale, and beſtowed upon thoſe who are the higheſt bidders. The patriarchs, metropolitans, archbiſhops, and biſhops, are always choſen from among the Caloyers or Greek monks. Before the patriarchs receive their patents and the caftan, which is a veſt of linſey-woolſey, or ſome other ſtuff, preſented by the grand ſignior to ambaſſadors, and other perſons newly inveſted with ſome conſiderable dignity, they are obliged to make large preſents to the vizir, &c. The income of the patriarch of Conſtantinople is ſaid to amount to no leſs than one hundred and twenty thouſand guilders, of which he pays the one-half by way of annual tribute to the Ottoman Porte, adding ſix thouſand guilders beſides as a preſent at the feaſt of Bairam. The next perſon to a biſhop among the clergy is an archimandrite, who is the director of one or more convents, which are called *mandren;* then come the abbot, the arch-prieſt, the prieſt, the deacon, the under-deacon, the chanter, and the lecturer. The ſecular clergy are ſubjected to no rules, and never riſe higher than high-prieſt. They are allowed to marry once; but it muſt be with a virgin, and before they are ordained. They have neither glebe nor tythes, but depend upon the perquiſites that ariſe from their office; and they ſeldom preach but in Lent. The Greeks have few nunneries; but a great many convents of monks, who are all prieſts, and, ſtudents excepted, obliged to follow ſome handicraft employment, and lead a very auſtere life. The Greeks deny the ſupremacy of the pope, and abhor the worſhip of images; but have a multitude of pictures of ſaints in their churches, whom they pray to as mediators. Their faſts are very ſevere. They believe alſo in the doctrine of tranſubſtantiation, and that the Holy Ghoſt does not proceed from the Son. They admit not of purgatory, ſays Mr Thevenot: but yet they allow a third place, where they ſay the bleſſed remain, in expectation of the day of judgment. At maſs they conſecrate with leavened bread; and communicate under both kinds, as well laics as prieſts, and as well women and children as men. When they carry the ſacrament to the ſick, they do not proſtrate themſelves before it, nor expoſe it to be adored: neither do they carry it in proceſſion, or have any particular feaſt in honour of it. Baptiſm is performed among them by plunging the whole body of the child thrice into water. Immediately after baptiſm, they give it confirmation and the communion; and ſeven days after that, it undergoes the ceremony of ablution. When a prieſt is married, among other ceremonies, the bridegroom and bride drink each two glaſſes of wine; then the glaſs is given to the prieſt, who merrily drinks off the reſt of the wine, and breaking the glaſs, ſays, So may the bridegroom break the virginity of the bride. As to the character of the modern Greeks, they are ſaid to be very covetous, hypocritical, treacherous, great pederaſts, and at the ſame time revengeful to the higheſt degree; but very ſuperſtitious. They are ſo much deſpiſed by the Turks, that theſe do not value even a Greek who turns Mahometan. The Turks are remarkable for their taciturnity; they never uſe any unneceſſary words; but the Greeks, on the contrary, are very talkative and lively. The Turks generally practiſe what their religion enjoins, but the Greeks do not; and their miſery puts them upon a thouſand mean ſhifts and ſcandalous practices, authoriſed by bad example, and perpetuated from father to ſon. The Greek women have fine features and beautiful complexions: their countenances ſtill very much reſemble thoſe of the ancient Greek ſtatues. Greek.

GREEK, or GRECIAN, any thing belonging to ancient Greece.

The Greek language, as preſerved in the writings of the celebrated authors of antiquity, as Homer, Heſiod, Demoſthenes, Ariſtotle, Plato, Xenophon, &c. has a great variety of terms and expreſſions, ſuitable to the genius and occaſions of a polite and learned people, who had a taſte for arts and ſciences. In it, proper names are ſignificative; which is the reaſon that the modern languages borrow ſo many terms from it. When any new invention, inſtrument, machine, or the like, is diſcovered, recourſe is generally had to the Greek for a name to it; the facility wherewith words are there compounded, affording ſuch as will be expreſſive of its uſe: ſuch are, barometer, hygrometer, microſcope, teleſcope, thermometer, &c. But of all ſciences, medicine moſt abounds with ſuch terms; as diaphoretic, diagnoſis, diarrhœa, hæmorrhagy, hydrophobia, phthiſis, atrophy, &c. Beſides the copiouſneſs and ſignificancy of the Greek, wherein it excels moſt, if not all, other languages, it has alſo three numbers, viz. a ſingular, dual, and plural: alſo abundance of tenſes in its verbs, which makes a variety in diſcourſe, prevents a certain dryneſs that always accompanies too great an uniformity, and renders that language peculiarly proper for all kinds of verſe. The uſe of the participles, of the aoriſt and preterite, together with the compound words already mentioned, give it a peculiar force and brevity, without taking any thing from its perſpicuity.

It is no eaſy matter to aſſign the preciſe difference between the modern and ancient Greek; which conſiſts in the terminations of the nouns, pronouns, verbs, &c. not unlike what obtains between ſome of the dialects of the Italian or Spaniſh. There are alſo in the modern Greek many new words, not to be met with in the ancient. We may therefore diſtinguiſh three ages of the Greek tongue: the firſt of which ends at the time when Conſtantinople became the capital of the Roman empire; the ſecond laſted from that period to the taking of Conſtantinople by the Turks; and the third from that time to this.

Greek Bible. See BIBLE.

Greek Church, is that part of the Chriſtian church which is eſtabliſhed in Greece; extending likewiſe to ſome other parts of Turkey. See GREECE.—It is thus called in Europe, Aſia, and Africa, in contradiſtinction from the Latin or Romiſh church; as alſo the Eaſtern church, in diſtinction from the Weſtern.

The Romaniſts call the Greek church the *Greek ſchiſm;* becauſe the Greeks do not allow the authority of the pope, but depend wholly, as to matters of religion, on their own patriarchs. They have treated them as ſchiſmatics ever ſince the revolt, as they call it, of the patriarch Photius

Greek Monks and *Nuns*, of whatever order, conſider St Baſil as their founder and common father, and eſteem

Greek, Green-houſe.

eſteem it the higheſt crime to deviate in the leaſt from his conſtitutions. There are ſeveral beautiful convents with churches, in which the monks perform divine ſervice day and night. Some of the monks are cœnobites, or live together, wear the ſame habit, eat at the ſame table, and perform the ſame exerciſes and employments.

Greek Orders, in *Architecture*, are the Doric, Ionic, and Corinthian; in contradiſtinction to the two Latin orders, the Tuſcan and Compoſite. See Order.

GREEN, one of the original priſmatic colours, exhibited by the refraction of the rays of light. See Chromatics and Colour.

Green, among painters and dyers. See *Colour-Making*, N° 27. and Dyeing, N° 367.

Green-Cloth, a board or court of juſtice held in the compting-houſe of the king's houſehold, compoſed of the lord ſteward and officers under him, who ſit daily. To this court is committed the charge and overſight of the king's houſehold in matters of juſtice and government, with a power to correct all offenders, and to maintain the peace of the verge, or juriſdiction of the court-royal; which is every way about 200 yards from the laſt gate of the palace where his majeſty reſides.

It takes its name, *board of green cloth*; from a green cloth ſpread over the board where they ſit.

Without a warrant firſt obtained from this court, none of the king's ſervants can be arreſted for debt.

Clerks of the Green Cloth were two officers of the board of green cloth, who appointed the diet of the king and his houſehold; and kept all records, legers, and papers relating thereto; made up bills, parcels, and debentures for ſalaries, and proviſions and neceſſaries for the officers of the buttery, pantry, cellar, &c. They alſo waited upon foreign princes when entertained by his majeſty. But this has been lately aboliſhed.

Green-Finch, the Engliſh name of the greeniſh fringilla, with the wings and tail variegated with yellow. See Fringilla, Ornithology *Index*.

Green-Houſe, or *Conſervatory*, a houſe in a garden, contrived for ſheltering and preſerving the moſt curious and tender exotic plants, which in our climate will not bear to be expoſed to the open air, eſpecially during the winter ſeaſon. Theſe are generally large and beautiful ſtructures, equally ornamental and uſeful.

The length of green-houſes muſt be proportioned to the number of plants intended to be preſerved in them, and cannot therefore be reduced to rule; but their depth ſhould never be greater than their height in the clear; which, in ſmall or middling houſes, may be 16 or 18 feet, but in large ones from 20 to 24 feet; and the length of the windows ſhould reach from about one foot and a half above the pavement, and within the ſame diſtance of the ceiling, which will admit of a corniche round the building over the heads of the windows. Their breadth cannot be in proportion to their length; for if in the largeſt buildings they are more than ſeven or ſeven feet and a half broad, they will be extremely heavy and inconvenient. The piers between the windows muſt be as narrow as may be to ſupport the building; for which reaſon they ſhould either be of ſtone or of hard burnt bricks. If the piers are made of ſtone, they ſhould be 30 inches wide in front, and ſloped off behind to about 18 inches, by which means there will be no corners to take off the rays of the ſun. If they are of brick, they will require to be at leaſt three feet in front, but they ſhould be in the ſame manner ſloped off behind. Over the green-houſe may be rooms for drying and preſerving ſeeds, roots, &c. and behind it a place for tools and other purpoſes; and both theſe behind, and the rooms above, will be of great uſe in keeping off the froſts, ſo that the wall between theſe need not be of more than two bricks and a half in thickneſs. Green-houſe.

The floor of the green-houſe, which ſhould be laid either with Bremen ſquares, Purbeck ſtone, or flat tiles, muſt be raiſed two feet above the ſurface of the adjoining ground, or if the ſituation be damp, at leaſt three feet; and if the whole is arched with low brick arches under the floor, they will be of great ſervice in preventing damps: and under the floor, about two feet from the front, it will be very adviſeable to make a flue of ten inches wide and two feet deep: this ſhould be carried the whole length of the houſe, and then returned back along the hinder part, and there be carried up into funnels adjoining to the tool-houſe, by which the ſmoke may be carried off. The fire-place may be contrived at one end of the houſe, and the door at which the fuel is put in, as alſo the aſh-grate, may be contrived to open into the tool-houſe, and the fuel being laid in the ſame place, the whole will be out of ſight. Bradley adviſes, that the front of green-houſes, in the colder parts of England, be built in a ſweep or ſemicircle, ſo that one part or other of it may receive the ſun's rays all day. The uſe of fires muſt, however, be very ſparing in this place; and it is not one winter in three or four that will require them in any part, only when the weather is very ſevere, and the froſt cannot well be kept out any other way, this is an expedient that is good to have in readineſs, as it may ſave a whole houſe of plants. Withinſide of the windows, in front of the green-houſe, there ſhould be good ſtrong ſhutters, made with hinges, to fold back cloſe to the piers, that they may not obſtruct the rays of the ſun. The back part of the houſe ſhould be either laid over with ſtucco or plaſtered with mortar, and whitewaſhed, in order to prevent the froſty air from penetrating through the walls. When the green-houſe is wainſcotted, the walls ſhould be plaſtered with lime and hair behind the wainſcot, to keep out the cold; and the wainſcot, as well as the ceiling, and every part within the houſe, ſhould be painted white, for the reflection of the ſun's rays. There muſt be a number of treſſels with forms of wood upon them, to ſupport the pots of plants; the talleſt to be placed hindmoſt, the loweſt within four feet of the windows: and the rows of plants ſhould riſe gradually, ſo that the heads of the ſecond row ſhould be entirely above the firſt; and behind them there ſhould be a ſpace of at leaſt five feet, for the conveniency of watering the plants, and for a free circulation of air. It has been obſerved, that the placing of the euphorbium, cereuſes, and other ſucculent plants among orange-trees, and other common green-houſe plants, is always deſtructive of them, by making them receive an improper ſort of effluvia, which plants of that kind imbibe very freely. They ſhould therefore be placed in two wings built

Green-Sickneſs, Greenland.

built at each end of the green-houſe; which, if well contrived, will be a great beauty as well as uſe to the building. Theſe wings may be made capable of a great warmth alſo by more flues, and may be made to contain a hot-bed of tanner's bark for the raiſing many of the tender plants, natives of warm climates.

Whilſt the front of the green-houſe is exactly ſouth, one of the wings may be made to face the ſouth-eaſt and the other the ſouth-weſt. By this diſpoſition the heat of the ſun is reflected from one part of the building to the other all day, and the front of the main green-houſe is guarded from the cold winds. Theſe two wings may be ſo contrived as to maintain plants of different degrees of hardineſs, which may be eaſily effected by the ſituation and extent of the fire-place, and the manner of conducting the flues: the wing facing the ſouth-eaſt is evidently the moſt proper for the warmeſt ſtove; this may be divided in the middle by a partition of glaſs, with glaſs-doors opening from one diviſion to the other. In each of theſe there ſhould be a fire-place, with flues carried up againſt the back-wall, through which the ſmoke ſhould be made to paſs as many times the length of the houſe as the height will admit of the number of flues; for the longer the ſmoke is in paſſing, the more heat will be given to the houſe with a leſs quantity of fuel. The other wing, facing the ſouth-weſt, ſhould be divided and furniſhed with flues in the ſame manner; and thus different degrees of heat may be obtained, according to the ſeaſons and the particular ſorts of plants that are to be preſerved. If there are no ſheds behind theſe wings, the walls ſhould not be leſs than three bricks thick; and the back part, having ſloping roofs, which are covered with tiles or ſlates, ſhould be lined with reeds, &c. under the covering. The ſloping glaſſes of theſe houſes ſhould be made to ſlide and take off, ſo that they may be drawn down more or leſs in warm weather to admit air to the plants; and the upright glaſſes in front may be ſo contrived as that every other may open as doors upon hinges, and the alternate glaſſes may be divided into two: the upper part of each ſhould be ſo contrived as to be drawn down like ſaſhes, ſo that either of them may be uſed to admit air in a greater or leſs quantity as there may be occaſion.

As to the management of the plants in the green-houſe, Mortimer recommends the opening of the mould about them from time to time, and ſprinkling a little freſh mould in them, and a little warm dung on that; as alſo to water them when the leaves begin to wither and curl, and not oftener, which would make them fade and be ſickly; and to take off ſuch leaves as wither and grow dry.

Green-Sickneſs. See Chlorosis, Medicine *Index*.

Green-Silver, the name of an ancient cuſtom within the manor of Writtel in the county of Eſſex in England; which is, that every tenant whoſe fore-door opens to Greenbury, ſhall pay an halfpenny yearly to the lord, by the name of *green-ſilver*.

Green-Wax, is uſed where eſtates are delivered to the ſheriffs out of the exchequer, under the ſeal of that court, made in green wax, to be levied in the ſeveral counties. This word is mentioned the 43d ſtat. Ed. III. c. 9. and 7 Hen. IV. c. 4.

GREENLAND, a general name by which are denoted the moſt eaſterly parts of America, ſtretching towards the north pole, and likewiſe ſome iſlands to the northward of the continent of Europe, lying in very high latitudes. Greenland.

1 West Greenland deſcribde.

This country is divided into Weſt and Eaſt Greenland.—Weſt Greenland is now determined by our lateſt maps to be a part of the continent of America, though upon what authority is not very clear. That part of it which the Europeans have any knowledge of is bounded on the weſt by Baffin's bay, on the ſouth by Davis's ſtraits, and on the eaſt by the northern part of the Atlantic ocean. It is a very mountainous country, and ſome parts of it ſo high that they may be diſcerned 30 leagues off at ſea. The inland mountains, hills, and rocks, are covered with perpetual ſnow; but the low lands on the ſea-ſide are clothed with verdure in the ſummer ſeaſon. The coaſt abounds with inlets, bays, and large rivers; and is ſurrounded with a vaſt number of iſlands of different dimenſions. In a great many places, however, on the eaſtern coaſt eſpecially, the ſhore is inacceſſible by reaſon of the floating mountains of ice. The principal river, called *Baal*, falls into the ſea in the 64th degree of latitude, where the firſt Daniſh lodge was built in 1721; and has been navigated above 40 miles up the country.

2 Peopled by a colony from Iceland.

Weſt Greenland was firſt peopled by Europeans in the eighth century. At that time a company of Icelanders, headed by one Ericke Raude, were by accident driven on that coaſt. On his return he repreſented the country in ſuch a favourable light, that ſome families again followed him thither, where they ſoon became a thriving colony, and beſtowed on their new habitation the name of *Groenland* or *Greenland*, on account of its verdant appearance. This colony was converted to Chriſtianity by a miſſionary from Norway, ſent thither by the celebrated Olaf, the firſt Norwegian monarch who embraced the true religion. The Greenland ſettlement continued to increaſe and thrive under his protection; and in a little time the country was provided with many towns, churches, convents, biſhops, &c. under the juriſdiction of the archbiſhop of Drontheim. A conſiderable commerce was carried on between Greenland and Norway; and a regular intercourſe maintained between the two countries till the year 1406, when the laſt biſhop was ſent over. From that time all correſpondence was cut off, and all knowledge of Greenland has been buried in oblivion.

3 All correſpondence with it ſuddenly cut off.

This ſtrange and abrupt ceſſation of all trade and intercourſe has been attributed to various cauſes; but the moſt probable is the following: The colony, from its firſt ſettlement, had been haraſſed by the natives, a barbarous and ſavage people, agreeing in cuſtoms, garb, language, and appearance, with the Eſquimaux found about Hudſon's bay. This nation, called *Schrellings*, at length prevailed againſt the Iceland ſettlers who inhabited the weſtern diſtrict, and exterminated them in the 14th century: inſomuch, that when their brethren of the eaſtern diſtrict came to their aſſiſtance, they found nothing alive but ſome cattle and flocks of ſheep running wild about the country. Perhaps they themſelves afterwards experienced the ſame fate, and were totally deſtroyed by theſe Schrellings, whoſe deſcendants ſtill inhabit the weſtern parts of Greenland, and from tradition confirm this conjecture. They affirm that the houſes and villages, whoſe ruins ſtill appear, were inhabited by a nation of ſtrangers, whom their

4 Colony ſuppoſed to be exterminated.

anceſtors

Greenland

ancestors destroyed. There are reasons, however, for believing that there may be still some descendants of the ancient Iceland colony remaining in the eastern district, though they cannot be visited by land, on account of the stupendous mountains, perpetually covered with snow, which divide the two parts of Greenland; while they have been rendered inaccessible by sea, by the vast quantity of ice driven from Spitzbergen, or East Greenland. One would imagine that there must have been some considerable alteration in the northern parts of the world since the 15th century, so that the coast of Greenland is now become almost totally inaccessible, though formerly visited with very little difficulty. It is also natural to ask, By what means the people of the eastern colony surmounted the above-mentioned obstacles when they went to the assistance of their western friends; how they returned to their own country; and in what manner historians learned the success of their expedition? Concerning all this we have very little satisfactory information.

5 Account of the colony.

All that can be learned from the most authentic records is, that Greenland was divided into two districts, called *West Bygd* and *East Bygd*: that the western division contained four parishes and 100 villages: that the eastern district was still more flourishing, as being nearer to Iceland, sooner settled, and more frequented by shipping from Norway. There are also many accounts, though most of them romantic and slightly attested, which render it probable that part of the eastern colony still subsists, who, at some time or other, may have given the imperfect relation above-mentioned. This colony, in ancient times, certainly comprehended twelve extensive parishes, one hundred and ninety villages, a bishop's see, and two monasteries. The present inhabitants of the western district are entirely ignorant of this part, from which they are divided by rocks, mountains, and deserts, and still more effectually by their apprehensions: for they believe the eastern Greenlanders to be a cruel, barbarous nation, that destroy and eat all strangers who fall into their hands. About a century after all intercourse between Norway and Greenland had ceased, several ships were sent successively by the kings of Denmark in order to discover the eastern district; but all of them miscarried.

6 Attempts to rediscover the country.

Among these adventurers, Mogens Heinson, after having surmounted many difficulties and dangers, got sight of the land; which, however, he could not approach. At his return, he pretended that the ship was arrested in the middle of her course by certain rocks of loadstone at the bottom of the sea. The same year, 1576, in which this attempt was made, has been rendered remarkable by the voyage of Captain Martin Frobisher, sent upon the same errand by Queen Elizabeth. He likewise descried the land; but could not reach it, and therefore returned to England; yet not before he had sailed sixty leagues in the strait which still retains his name, and landed on several islands, where he had some communication with the natives. He had likewise taken possession of the country in the name of Queen Elizabeth; and brought away some pieces of heavy black stone, from which the refiners of London extracted a certain proportion of gold. In the ensuing spring he undertook a second voyage, at the head of a small squadron, equipped at the expence of the public; entered the straits a second time; discovered upon an island a gold and silver mine; bestowed names upon different bays, islands, and headlands; and brought away a lading of ore, together with two natives, a male and a female, whom the English kidnapped. Greenland.

Such was the success of this voyage, that another armament was fitted out under the auspices of Admiral Frobisher, consisting of 15 sail, including a considerable number of soldiers, miners, smelters, carpenters, and bakers, to remain all the winter near the mines in a wooden fort, the different pieces of which they carried out in the transports. They met with boisterous weather, impenetrable fogs, and violent currents upon the coast of Greenland, which retarded their operations until the season was far advanced. Part of their wooden fort was lost at sea; and they had neither provision nor fuel sufficient for the winter. The admiral therefore determined to return with as much ore as he could procure: of this they obtained large quantities out of a new mine, to which they gave the name of the Countess of Sussex. They likewise built a house of stone and lime, provided with ovens; and here, with a view to conciliate the affection of the natives, they left a quantity of small morrice-bells, knives, beads, looking glasses, leaden pictures, and other toys, together with several loaves of bread. They buried the timber of the fort where it could be easily found next year; and sowed corn, pease, and other grain, by way of experiment, to know what the country would produce. Having taken these precautions, they sailed from thence in the beginning of September; and after a month's stormy passage, arrived in England: but this noble design was never prosecuted.

Christiern IV. king of Denmark, being desirous of discovering the old Greenland settlement, sent three ships thither, under the command of Captain Godske Lindenow; who is said to have reached the east coast of Greenland, where he traded with the savage inhabitants, such as they are still found in the western district, but saw no signs of a civilized people. Had he actually landed in the eastern division, he must have perceived some remains of the ancient colony, even in the ruins of their convents and villages. Lindenow kidnapped two of the natives, who were conveyed to Copenhagen; and the same cruel fraud (A) was practised

(A) Nothing can be more inhuman and repugnant to the dictates of common justice than this practice of tearing away poor creatures from their country, their families, and connections; unless we suppose them altogether destitute of natural affection: and that this was not the case with those poor Greenlanders, some of whom were brought alive to Copenhagen, appears from the whole tenor of their conduct, upon their first capture, and during their confinement in Denmark. When first captivated, they rent the air with their cries and lamentations: they even leaped into the sea; and, when taken on board, for some time refused all sustenance. Their eyes were continually turned towards their dear country, and their faces always bathed in tears. Even the

Greenland. tiſed by other two ſhips which ſailed into Davis's ſtraits, where they diſcovered divers fine harbours, and delightful meadows covered with verdure. In ſome places they are ſaid to have found a conſiderable quantity of ore, every hundred pounds of which yielded twenty-ſix ounces of ſilver. The ſame Admiral Lindenow made another voyage to the coaſt of Greenland in the year 1606, directing his courſe to the weſtward of Cape Farewell. He coaſted along the ſtraits of Davis; and having made ſome obſervations on the face of the country, the harbours, and iſlands, returned to Denmark. Carſten Richards, being detached with two ſhips on the ſame diſcovery, deſcried the high land on the eaſtern ſide of Greenland; but was hindered by the ice from approaching the ſhore.

Other expeditions of the ſame nature have been planned and executed with the ſame bad ſucceſs, under the auſpices of a Daniſh company of merchants. Two ſhips returned from the weſtern part of Greenland loaded with a kind of yellow ſand, ſuppoſed to contain a large proportion of gold. This being aſſayed by the goldſmiths of Copenhagen, was condemned as uſeleſs, and thrown overboard; but from a ſmall quantity of this ſand, which was reſerved as a curioſity, an expert chemiſt afterwards extracted a quantity of pure gold. The captain, who brought home this adventure, was ſo chagrined at his diſappointment, that he died of grief, without having left any directions concerning the place where the ſand had been diſcovered. In the year 1654, Henry Moller, a rich Dane, equipped a veſſel under the command of David de Nelles, who ſailed to the weſt coaſt of Greenland, from which he carried off three women of the country. Other efforts have been made, under the encouragement of the Daniſh king, for the diſcovery and recovery of the old Iceland colony in Greenland; but all of them miſcarried, and people began to look upon ſuch expeditions as wild and chimerical. At length the Greenland company at Bergen in Norway, tranſported a colony to the weſtern coaſt, about the 64th degree of latitude; and theſe Norwegians ſailed in the year 1712, accompanied by the Reverend Hans Egede, to whoſe care, ability, and preciſion, we owe the beſt and moſt authentic account of modern Greenland.—This gentleman endeavoured to reach the eaſtern diſtrict, by coaſting ſouthwards, and advanced as far as the States promontory; but the ſeaſon of the year, and continual ſtorms, obliged him to return; and as he could not even find the ſtrait of Frobiſher, he concluded that no ſuch place ever exiſted. In the year 1724, a ſhip, being equipped by the company, ſailed on this diſcovery, with a view to land on the eaſt ſide oppoſite to Iceland; but the vaſt ſhoals of ice, which Greenland. barricadoed that part of the coaſt, rendered this ſcheme impracticable. His Daniſh majeſty, in the year 1728, cauſed horſes to be tranſported to Greenland, in hope that the ſettlers might by their means travel over land to the eaſtern diſtrict; but the icy mountains were found impaſſable. Finally, Lieutenant Richards, in a ſhip which had wintered near the new Daniſh colony, attempted, in his return to Denmark, to land on the eaſtern ſhore; but all his endeavours proved abortive.

Mr Egede is of opinion, that the only practicable method of reaching that part of the country, will be to coaſt north about in ſmall veſſels, between the great flakes of ice and the ſhore; as the Greenlanders have declared, that the currents continually ruſhing from the bays and inlets, and running ſouth-weſtwards along the ſhore, hinder the ice from adhering to the land; ſo that there is always a channel open, through which veſſels of ſmall burden might paſs, eſpecially if lodges were built at convenient diſtances on the ſhore, for the convenience and direction of the adventurers.

7 Mr Egede's account of the country.

That part of the country which is now viſited and ſettled by the Danes and Norwegians, lies between the 64th and 68th degrees of north latitude; and thus far it is ſaid the climate is temperate. In the ſummer, which continues from the end of May to the middle of September, the weather is warm and comfortable, while the wind blows eaſterly; though even at this time ſtorms frequently happen, which rage with incredible violence; and the ſea-coaſts are infeſted with fogs that are equally diſagreeable and unhealthy.—Near the ſhore, and in the bays and inlets, the low land is clothed with the moſt charming verdure; but the inland mountains are perpetually covered with ice and ſnow. To the northward of the 68th degree of latitude the cold is prodigiouſly intenſe; and towards the end of Auguſt all the coaſt is covered with ice, which never thaws till April or May, and ſometimes not till the latter end of June. Nothing can exhibit a more dreadful, and at the ſame time a more dazzling, appearance, than thoſe prodigious maſſes of ice that ſurround the whole coaſt in various forms, reflecting a multitude of colours from the ſun-beams, and calling to mind the enchanted ſcenes of romance. Such proſpects they yield in calm weather; but when the wind begins to blow, and the waves to riſe in vaſt billows, the violent ſhocks of thoſe pieces of ice daſhing againſt one another, fill the mind with horror.—Greenland is ſeldom viſited with thunder and lightning, but the *Aurora Borealis* is very frequent and bright. At the time of new and full moon, the tide riſes and falls upon this coaſt

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the countenance of his Daniſh majeſty, and the careſſes of the court and people, could not alleviate their grief. One of them was perceived to ſhed tears always when he ſaw an infant in the mother's arms; a circumſtance from whence it was naturally concluded, that he had left his wife with a young child in Greenland. Two of them went to ſea in their little canoes in hope of reaching Greenland; but one of them was retaken. Other two made the ſame attempt: but were driven by a ſtorm on the coaſt of Schonen, where they were apprehended by the peaſants, and reconveyed to Copenhagen. One of them afterwards died of a fever, caught in fiſhing pearl, during the winter, for the governor of Kolding. The reſt lived ſome years in Denmark; but at length, ſeeing no proſpect of being able to reviſit their native country, they ſunk into a kind of melancholy diſorder, and expired.

Greenland. coaſt about three fathoms; and it is remarkable, that the ſprings and fountains on ſhore riſe and fall with the flux and reflux of the ocean.

The ſoil of Greenland varies like that of all other mountainous countries. The hills are very barren, being indeed frozen throughout the whole year; but the valleys and low grounds, eſpecially near the ſea, are rich and fruitful. The ancient Norwegian chronicles inform us, that Greenland formerly produced a great number of cattle; and that conſiderable quantities of butter and cheeſe were exported to Norway; and, on account of their peculiar excellency, ſet apart for the king's uſe. The ſame hiſtories inform us, that ſome parts of the country yielded excellent wheat; and that large oaks were found here, which carried acorns as big as apples. Some of theſe oaks ſtill remain in the ſouthern parts, and in many places the marks of ploughed land are eaſily perceived. At preſent, however, the country is deſtitute of corn and cattle, though in many places it produces excellent paſture; and, if properly cultivated, would probably yield grain alſo. Mr Egede ſowed ſome barley in a bay adjoining to the Daniſh colony. It ſprang up ſo faſt, that by the latter end of July it was in the full ear; but being nipped by a night-froſt, it never arrived at maturity. This ſeed was brought from Bergen, where the ſummer is of greater heat and duration than in Greenland; but in all probability the corn which grows in the northern parts of Norway would alſo thrive here. Turnips and coleworts of an excellent taſte and flavour are alſo produced here. The ſides of the mountains near the bays are clothed with wild thyme, which diffuſes its fragrance to a great diſtance. The herb tormentil is very common in this country, and likewiſe many others not deſcribed by the botaniſts. Among the fruits of Greenland we number juniper-berries, blue-berries, bil-berries, and bramble-berries.

Greenland is thought to contain many mines of metal, though none of them are wrought. To the ſouthward of the Daniſh colony are ſome appearances of a mine of copper. Mr Egede once received a lump of ore from one of the natives; and here he found calamine of a yellow colour. He once ſent a conſiderable quantity of ſand of a yellow colour, intermixed with ſtreaks of vermilion, to the Bergen company. They probably found their account in this preſent; for they deſired him by a letter to procure as much of that ſand as poſſible: but he was never able to find the place where he ſaw the firſt ſpecimen. It was one of the ſmalleſt among a great number of iſlands; and the mark he had ſet up was blown down by a violent ſtorm. Poſſibly this might be the ſame mineral of which Captain Frobiſher brought ſo much to England. This country produces rock-cryſtals both red and white, and whole mountains of the aſbeſtos or incombuſtible flax. Around the colony, which is known by the name of *Good Hope*, they find a kind of baſtard marble of various colours, which the natives form into bowls, lamps, pots, &c. All that has been ſaid of the fertility of Greenland, however, muſt be underſtood only of that part which lies between the 60th and 65th degrees of latitude. The moſt northern parts are totally deſtitute of herbs and plants. The wretched inhabitants cannot find graſs in ſufficient quantities to ſtuff into their ſhoes to keep their feet warm, but are Greenland. obliged to buy it from thoſe who inhabit the more ſouthern parts.

The animals which abound moſt in Greenland are, rein-deer, foxes, hares, dogs, and white bears. The hares are of a white colour, and very fat; the foxes are of different colours, white, grayiſh, and bluiſh; and ſmaller than thoſe of Denmark and Norway. The natives keep a great number of dogs, which are large, white, or ſpeckled, and rough, with ears ſtanding upright, as is the caſe with all the dogs peculiar to cold climates. They are timorous and ſtupid; and neither bay nor bark, but ſometimes howl diſmally. In the northern parts the natives yoke them in ſledges; which, though heavy laden, they will draw on the ice at the rate of 70 miles in a ſhort winter's day. Theſe poor animals are very ill rewarded for their ſervice; being left to provide for themſelves, except when their maſters happen to catch a great number of ſeals. On theſe occaſions the dogs are regaled with the blood and entrails; at other times they ſubſiſt, like wild beaſts, upon muſcles and berries. Here alſo are found great numbers of ravens, eagles of a prodigious ſize, falcons, and other birds of prey; and likewiſe a kind of linnet, which warbles very melodiouſly. Whales, ſword-fiſh, porpoiſes, &c. abound on the coaſts; alſo holybut, turbot, cod, haddock, &c.

8 Account of the inhabitants.

The people who now inhabit the weſtern coaſt of Greenland, and who, without doubt, are the deſcendants of the ancient *Schrælings*, who exterminated the firſt Iceland colony, bear a near reſemblance to the Samoiedes and Laplanders in their perſons, complexions, and way of life. They are ſhort, brawny, and inclined to corpulency; with broad faces, flat noſes, thick lips, black hair and eyes, and a yellowiſh tawny complexion. They are for the moſt part vigorous and healthy, but remarkably ſhort-lived; few of them reaching the grand climacteric; and many dying in their infancy, and in the prime of youth. They are ſubject to a weakneſs in the eyes, occaſioned by the piercing winds and the glare of the ſnow in the winter time. The leproſy is known among them, but is not contagious. Thoſe that dwell in the northern parts are miſerably tormented with dyſenteries, rheums, and pulmonary diſorders, boils, and epilepſy. The ſmall-pox being imported among them from Copenhagen in the year 1734, made terrible havock among theſe poor people, who are utterly deſtitute of any knowledge of the medicinal art, and depend entirely for aſſiſtance upon their *angekuts* or conjurers. In their diſpoſitions the Greenlanders are cold, phlegmatic, indolent, and ſlow of apprehenſion: but very quiet, orderly, and good-natured. They live peaceably together; and have every thing in common, without ſtrife, envying, or animoſity. They are civil and hoſpitable, but ſlovenly to a degree almoſt beyond the Hottentots themſelves. They never waſh themſelves with water; but lick their paws like the cat, and then rub their faces with them. They eat after their dogs without waſhing their diſhes; devour the lice which devour them; and even lick the ſweat, which they ſcrape off from their faces with their knives. The women waſh themſelves with their own urine, which they imagine makes their hair grow; and in the winter-time go out immediately after, to let the liquor freeze upon their ſkin.

Greenland. They will often eat their victuals off the dirty ground, without any veſſel to hold them in; and devour rotten fleſh with the greateſt avidity. In times of ſcarcity they will ſubſiſt on pieces of old ſkin, reeds, ſea-weed, and a root called *tugloronet*, dreſſed with train-oil and fat. The dung of rein deer taken from the inteſtines, the entrails of partridges, and all ſorts of offals, are counted dainties among theſe ſavages; and of the ſcrapings of ſeal ſkins they make delicate pan-cakes. At firſt they could not taſte the Daniſh proviſions without abhorrence; but now they are become extremely fond of bread and butter, though they ſtill retain an averſion to tobacco and ſpirituous liquors; in which particular they differ from almoſt all ſavages on the face of the earth.

The Greenlanders commonly content themſelves with one wife; who is condemned, as among other ſavage nations, to do all the drudgery, and may be corrected, or even divorced, by the huſband at pleaſure. Heroes, however, and extraordinary perſonages, are indulged with a plurality of wives. Their young women are generally chaſte and baſhful; but at ſome of their feaſts, in the midſt of their jollity, a man retires with his neighbour's wife behind a curtain made of ſkins; and all the gueſts, thus coupled, retire in their turns. The women think themſelves happy if an angekut or prophet will thus honour them with his careſſes. Theſe people never marry within the prohibited degrees of conſanguinity, nor is it counted decent in a couple to marry who have been educated in the ſame family.—They have a number of ridiculous and ſuperſtitious cuſtoms; among which the two following are the moſt remarkable. While a woman is in labour the goſſips hold a chamber-pot over her head, as a charm to haſten the delivery. When the child is a year old, the mother licks and ſlabbers it all over, to render it, as ſhe imagines, more ſtrong and hardy.

9 Language, religion, &c.

All the Greenlanders hitherto known ſpeak the ſame language, though different dialects prevail in different parts of the country. It abounds with double conſonants; and is ſo guttural, that the pronunciation of many words is not to be learned except by thoſe who have been accuſtomed to it from their infancy. The letters C, D, F, Q, and X, are not known in their alphabet. Like the North Americans, and inhabitants of Kamtſchatka, they have a great number of long polyſyllables. Their words, nouns as well as verbs, are inflected at the end by varying the termination, without the help of articles: but their language being found defective, they have adopted a good many words from the Norwegian dialect. Notwithſtanding the endeavours of the Daniſh miſſionaries, they have no great reaſon to boaſt of the proſelytes they have made of the natives of Greenland. Theſe ſavages pay great deference and reſpect to the Danes, whom indeed they obey as their maſters, and hear the truths of the Chriſtian religion expounded without doubting the veracity of their teachers; but at the ſame time they liſten with the moſt mortifying indifference, without being in the leaſt influenced by what they have heard. They believe in the immortality of the ſoul, and the exiſtence of a ſpirit whom they call *Torngarſuk*; but of whom they have formed the moſt ridiculous notions. The angekuts, who are ſuppoſed to be his immediate miniſters, differ concerning the principles of his exiſtence; ſome affirming that he is without form or ſhape; others, that he has the ſhape of a bear; others, that he has a large human body with only one arm; while others affirm that he is no larger than a man's finger, with many other abſurdities of a ſimilar kind. They have alſo a peculiar kind of mythology, by which they believe all the elements to be full of ſpirits, from among which every one of their prophets is ſupplied with a familiar which they name *Torngack*, and who is always ready when ſummoned to his aſſiſtance. Greenland.

The Greenlanders are employed all the year round either in fiſhing or hunting. At ſea they purſue the whales, morſes, ſeals, fiſh for eating, and ſea fowl. On ſhore they hunt the rein-deer in different parts of the country. They drive theſe animals, which feed in large herds, into a narrow circle or defile, where they are eaſily ſlain with arrows. Their bow is made of fir-tree, wound about with the twiſted ſinews of animals; the ſtring is compoſed of the ſame ſtuff, or of ſeal ſkin: the arrow is a full fathom in length, pointed with a bearded iron, or a ſharp bone; but thoſe with which they kill birds are blunt, that they may not tear the fleſh. Sea-fowls they kill with lances, which they throw to a great diſtance with ſurpriſing dexterity. Their manner of catching whales is quite different from that practiſed by the Europeans. About 50 perſons, men and women, ſet out in one long boat, which is called a *kone-boat*, from *kone*, a "woman," becauſe is is rowed by females only. When they find a whale, they ſtrike him with harpoons, to which are faſtened with long lines ſome ſeal ſkins blown up like bladders. Theſe, by floating on the ſurface, not only diſcover the back of the whale, but hinder him from diving under water for any length of time. They continue to purſue him until he loſes ſtrength, when they pierce him with ſpears and lances till he expires. On this occaſion they are clad in their ſpring coats, conſiſting of one piece, with gloves, boots, caps made of ſeal-ſkin ſo cloſely laced and ſewed that they keep out water. Thus accoutred, they leap into the ſea; and begin to ſlice off the fat, even under water, before the whale is dead.—They have many different ways of killing ſeals; namely, by ſtriking them with a ſmall harpoon equipped alſo with an air-bag; by watching them when they come to breathe at the air-holes in the ice, and ſtriking them with ſpears; by approaching them in the diſguiſe of their own ſpecies, that is, covered with a ſeal-ſkin, creeping upon the ice, and moving the head from ſide to ſide as the ſeals are accuſtomed to do. By this ſtratagem the Greenlander moves towards the unſuſpecting ſeal, and kills him with a ſpear. The Greenlanders angle with lines made of whale-bone cut very ſmall, by means of which they ſucceed wonderfully. The Greenland canoe, like that uſed in Nova Zembla and Hudſon's bay, is about three fathoms in length, pointed at both ends, and three quarters of a yard in breadth. It is compoſed of thin rafts faſtened together with the ſinews of animals. It is covered with dreſſed ſeal-ſkins both below and above, in ſuch a manner that only a circular hole is left in the middle, large enough to admit the body of one man. Into this the Greenlander thruſts himſelf up to the waiſt, and faſtens the ſkin ſo tight

about

Greenland. about him that no water can enter. Thus ſecured, and armed with a paddle broad at both ends, he will venture out to ſea in the moſt ſtormy weather to catch ſeals and ſea-fowl; and if he is overſet, he can eaſily raiſe himſelf by means of his paddle. A Greenlander in one of theſe canoes, which was brought with him to Copenhagen, outſtripped a pinnace of 16 oars, manned with choice mariners.—The koneboat is made of the ſame materials, but more durable; and ſo large, that it will contain 50 perſons with all their tackle, baggage, and proviſions. She is fitted with a maſt, which carries a triangular ſail made of the membranes and entrails of ſeals, and is managed without the help of braces and bowlings. Theſe kones are flat bottomed, and ſometimes 60 feet in length. The men think it beneath them to take charge of them; and therefore they are left to the conduct of the women, who indeed are obliged to do all the drudgery, including even the building and repairing their houſes, while the men employ themſelves wholly in preparing their hunting implements and fiſhing tackle.

This country is but thinly inhabited. In the winter time the people dwell in huts built of ſtone or turf: on the one ſide are the windows, covered with the ſkins of ſeals or rein-deer. Several families live in one of theſe houſes, poſſeſſing each a ſeparate apartment, before which is a hearth with a great lamp placed on a trevit, over which hangs their kettle: above is a rack or ſhelf on which their wet clothes are dried. They burn train oil in their lamps; and inſtead of wick, they uſe a kind of moſs, which fully anſwers the purpoſe. Theſe fires are not only ſufficient to boil their victuals; but likewiſe to produce ſuch a heat, that the whole houſe is like a bagnio. The door is very low, that as little cold air as poſſible may be admitted. The houſe within is lined with old ſkins, and ſurrounded with benches for the convenience of ſtrangers. In the ſummer-time they dwell in tents made of long poles fixed in a conical form, covered in the inſide with deer ſkins, and on the outſide with ſeal ſkins, dreſſed ſo that the rain cannot pierce them.

10 East Greenland.

East Greenland was for a long time conſidered as a part of the continent of Weſt Greenland, but is now diſcovered to be an aſſemblage of iſlands lying between 76° 46′ and 80° 30′ of north latitude, and between 9° and 20° of eaſt longitude, It was diſcovered by Sir Hugh Willoughby in the year 1553, who called it *Groenland*; ſuppoſing it to be a part of the weſtern continent. In 1595, it was again viſited by William Barentz and John Cornelius, two Dutchmen, who pretended to be the original diſcoverers, and called the country *Spitzbergen*, or Sharp Mountains, from the many ſharp pointed and rocky mountains with which it abounds. They alleged that the coaſt diſcovered by Sir Hugh Willoughby was ſome other country; which accordingly the Hollanders delineated on their maps and charts by the name of *Willoughby Land*; whereas in fact no ſuch land ever exiſted; and long before the voyage of theſe Dutchmen, Stephen Barrows, an Engliſh ſhipmaſter, had coaſted along a deſolate country from N. Lat. 78° to 80° 11′, which was undoubtedly Spitzbergen. The ſea in the neighbourhood of the iſlands of Spitzbergen abounds very much with whales, and is the common reſort of the whale-fiſhing ſhips from different countries, and the country itſelf is frequently viſited by theſe ſhips; but till the voyage of the Hon. Capt. Phipps (afterwards Lord Mulgrave), by order of his majeſty, the ſituation of it was erroneouſly laid down. It was imagined that the land ſtretched to the northward as far as 82° of north latitude; but Capt. Phipps found the moſt northerly point of land, called *Seven Iſlands*, not to exceed 80° 30′ of latitude. Towards the eaſt he ſaw other lands lying at a diſtance, ſo that Spitzbergen plainly appeared to be ſurrounded by water on that ſide, and not joined to the continent of Aſia, as former navigators had ſuppoſed. The north and weſt coaſts alſo he explored, but was prevented by the ice from ſailing ſo far to the northward as he wiſhed. The coaſt appeared neither habitable nor acceſſible. It is formed of high, barren, black rocks, without the leaſt marks of vegetation; in many places bare and pointed; in others covered with ſnow, appearing even above the clouds. The valleys between the high cliffs were filled with ſnow and ice. "This proſpect," ſays Capt. Phipps, "would have ſuggeſted the idea of perpetual winter, had not the mildneſs of the weather, the ſmooth water, bright ſunſhine, and conſtant day-light, given a cheerfulneſs and novelty to the whole of this romantic ſcene." The current ran along this coaſt half a knot an hour north. The height of one mountain ſeen here was found by geometrical menſuration to be at one time 1503½ feet, at another 1503$\frac{8}{10}$ feet. By a barometer conſtructed after De Luc's method, the height was found to be 1588½ feet. On this occaſion Capt. Phipps has the following remarks. "I can account for the great difference between the geometrical meaſure and the barometrical according to M. de Luc's calculation, which amounts to 84.7 feet. I have no reaſon to doubt the accuracy of Dr Irving's obſervations, which were made with great care. As to the geometrical meaſure, the agreement of ſo many triangles, each of which muſt have diſcovered even the ſmalleſt error, is the moſt ſatisfactory proof of its correctneſs. Since my return I have tried both the theodolite and barometer, to diſcover whether there was any fault in either; and find them, upon trial, as I had always done before, very accurate."

There is good anchorage in Schmeerenburgh harbour, lying in N. Lat. 74° 44′, E. Long. 9° 50′ 45″, in 13 fathoms, ſandy bottom, not far from the ſhore, and well ſheltered from all winds. Cloſe to this harbour is an iſland called *Amſterdam Iſland*, where the Dutch uſed formerly to boil their whale-oil; and the remains of ſome conveniency erected by them for that purpoſe are ſtill viſible. The Dutch ſhips, excepting in time of war, ſtill reſort to this place for the later ſeaſon of the whale-fiſhery.—The rocks about this place are chiefly a kind of marble or limeſtone. No appearances of metals were obſerved, nor any ſigns of ancient or modern volcanoes. No inſects, or any ſpecies of reptiles, were ſeen, not even the common earth-worm. There were no ſprings or rivers; but great plenty of water was produced from the ſnow which melted on the mountains.

The moſt remarkable views which theſe dreary regions preſent are thoſe called *Icebergs*. They are large bodies of ice filling the valleys between the high mountains.

Greenland, Greenock.

mountains. Their face towards the ſea is nearly perpendicular, and of a very lively light-green colour. One was about 300 feet high, with a caſcade of water iſſuing from it. The black mountains on each ſide, the white ſnow, and greeniſh coloured ice, compoſed a very beautiful and romantic picture. Large pieces frequently broke off from the icebergs, and fell with great noiſe into the water. One piece was obſerved to have floated out into the bay, and grounded in 24 fathoms; it was 50 feet high above the ſurface of the water, and of the ſame beautiful colour with the iceberg from which it had ſeparated.

Theſe iſlands are totally uninhabited, though it doth not appear but that human creatures could ſubſiſt on them, notwithſtanding their vicinity to the pole.—Eight Engliſh ſailors, who were accidentally left here by a whale-fiſhing ſhip, ſurvived the winter, and were brought home next ſeaſon. The Dutch then attempted to ſettle a colony on Amſterdam iſland above mentioned; but all the people periſhed, not through the ſeverity of the climate, but of the ſcurvy, owing to the want of thoſe remedies which are now happily diſcovered, and which are found to be ſo effectual in preventing and curing that dreadful diſeaſe.—The late account alſo of ſix Ruſſian ſailors who ſtaid four years in this inhoſpitable country, affords a deciſive proof, that a colony might be ſettled on Eaſt Greenland, provided the doing ſo could anſwer any good purpoſe.

Greenland Company. A joint ſtock of 40,000l. was by ſtatute to be raiſed by ſubſcribers, who were incorporated for 14 years from the firſt of October 1693, and the company to uſe the trade of catching whales, &c. into and from Greenland, and the Greenland ſeas; they may make bye-laws for the government of the perſons employed in their ſhips, &c. Stat. 4 and 5 W. III. cap. 17. This company was farther encouraged by parliament in 1696; but partly by unſkilful management, and partly by real loſſes, it was under the neceſſity of entirely breaking up, before the expiration of the term aſſigned to it, ending in 1707. But any perſon who will adventure to Greenland for whale-fiſhing, ſhall have all privileges granted to the Greenland company, by 1 Anne, cap. 16. and thus the trade was again laid open. Any ſubjects may import whale-fins, oil, &c. of fiſh caught in the Greenland ſeas, without paying any cuſtoms, &c. ſtat. 10 Geo. I. cap. 16. And ſhips employed in the Greenland-fiſhery are to be of ſuch burden, provided with boats, ſo many men, fiſhing-lines, harping irons, &c. and be licenſed to proceed; and on their return ſhall be paid 20s. per ton bounty, for whale-fins, &c. imported; 6 Geo. II. cap. 33. The bounty was afterwards increaſed; but has been lately diminiſhed, and ſince this diminution, the trade has increaſed. See *Whale-Fishery*.

GREENOCK, a ſea-port town of Scotland, and one of the ports of the city of Glaſgow. It is diſtant 22 miles from that city. The frith of Clyde here expands into a fine baſon four miles wide, and is landlocked on all ſides.

Greenock is divided into what are called the old and new pariſhes. Certain lands were diſjoined from Innerkip and Houſton, in the year 1636, by virtue of a petition from the proprietors to the lords of commiſſion for plantation of kirks, &c. which received the name of Greenock when erected into a pariſh. There are different opinions entertained reſpecting the origin of the name, but the moſt probable opinion is, that it is derived from the Gaelic *Grianeg*, which ſignifies the *bay of the ſun*. It lies in the north-weſt part of the county of Renfrew, in the preſbytery of Paiſley, and ſynod of Glaſgow and Ayr, with the frith of Clyde on the north. Greenock.

The pariſh of Greenock is hilly, with the exception of a ſmall ſtrip of level ground of various breadths, ſtretching along the ſhore. It abounds with peat for fuel to the inhabitants, vaſt quantities of which they can afford to diſpoſe of to the neighbouring towns and villages.

The ſoil upon the ſhore is full of gravel, light and ſandy, which needs much rain to produce even a tolerable crop. It produces, however, large quantities of excellent potatoes, and by the aſſiſtance of ſea ware, much good barley and oats.

As far as is yet known, the pariſh of Greenock produces no minerals which are in the leaſt remarkable. Freeſtone is the moſt common to be met with, while limeſtone, which has been but lately diſcovered, has been found in very ſmall quantities. No traces of coal have yet been met with, and the hills contain no metallic ſubſtances, except iron-ſtone of a poor quality, and a little copper, which is rarely found in freeſtone.

In deſcending from the hills, there are ſome rivulets which form beautiful caſcades, and appear like wreathes of ſnow, when ſeen from the ſhore. The chief of them bears the name of Wallace, the celebrated champion of the liberties of Scotland.

On the weſt ſide of the bay of Greenock and Crawfurdſdike, formerly denominated the bay of St Lawrence, from a chapel in the vicinity conſecrated to that ſaint, lies the new town of Greenock. In the beginning of the 18th century it conſiſted only of one row of houſes covered with thatch, and had no veſtige of a harbour for veſſels; but at preſent it extends along the Clyde rather more than an Engliſh mile, but not more than a furlong in breadth. Before the year 1745, a new pariſh was erected in Greenock, by the permiſſion of Sir John Shaw, who gave up to the heritors and elders the right of patronage.

Both the pariſhes did not contain more than 4000 perſons about the year 1745, and in 10 years after, they had ſuffered a diminution of 142 perſons, as appears from the return tranſmitted to Dr Webſter. The increaſe of population has been rapid ſince that time, being now eſtimated at upwards of 15,000 ſouls.

People of opulence in Greenock, and even thoſe whoſe circumſtances are much more circumſcribed, have the valuable character of being uncommonly generous and liberal, which diſpoſitions it is ſaid, have been more tried than thoſe of almoſt any other claſs of people in Scotland. The annual amount of charitable donations for the relief of the poor is not leſs than 1200l. ſterling. The Merchants Houſe Society was erected in 1787, for admiſſion into which every member pays 5l. 5s.; and 5s. a year afterwards. The funds are not to be touched till they amount to 1000l. at which time the intereſt may be diſtributed among decayed members. There are in Greenock a chapel of eaſe, a Gaelic chapel,

Greenwich. chapel, a Burgher and Antiburgher meeting-houſe, beſides the two pariſh churches.

The town of Greenock is governed by a council of nine fewers, of whom two are bailies. It is a burgh of barony, erected by Sir John Shaw in the year 1757, who was at that time ſuperior. The inhabitants of Greenock petitioned the Scotch parliament in 1700, for a fund to build a harbour, which was abſolutely and unaccountably refuſed. This made them enter into a contract with Sir John Shaw, paying a voluntary aſſeſſment of ſixteen pence on each ſack of malt brewed into ale within the limits of the town. In the year 1740 the whole debt was extinguiſhed, and a ſurplus remained of 27,000 merks.

In Greenock there are ſeveral duck manufactories, three ſoap and candle works, one ſaddle and ſhoe manufactory, and two ſugar-houſes, all carried on for exportation to a great extent.

In the year 1784, after peace with America, 436 veſſels Britiſh and foreign, including outward and homeward bound, carrying 14,911 tons, were entered at the port of Greenock; and in 1791, there were 1962 veſſels, the tonnage of which amounted to 31,704. From January 1790 to 1791, there were imported of grain, 87,395 quarters, 81,074 cwt. of ſugar, 1,757,504lbs. of cotton, 221,649 gallons of rum, and 744 tons of different wines.

GREENWICH, a town of the county of Kent, in England, pleaſantly ſituated on the bank of the Thames, about five miles eaſt from London. Here was formerly a royal palace, built by Humphry duke of Glouceſter, enlarged by Henry VII. and completed by Henry VIII. The latter often choſe this town for his place of reſidence; as did alſo the queens Mary and Elizabeth, who were born in it. The ſame Duke Humphry began a tower on the top of the ſteep hill in the park, which was finiſhed by Henry VII. but afterwards demoliſhed, and a royal obſervatory erected in its place by Charles II. furniſhed with mathematical inſtruments for aſtronomical obſervations, and a deep dry well for obſerving the ſtars in the day-time. The palace being afterwards much neglected, King Charles II. (who had enlarged the park, walled it about and planted it), pulled it down, and began another, of which he lived to ſee the firſt wing magnificently finiſhed. But King William III. in 1694, granted it, with nine acres of ground thereto belonging, to be converted into a royal hoſpital for old and diſabled ſeamen, the widows and children of thoſe who loſt their lives in the ſervice, and for the encouragement of navigation. This wing, which coſt King Charles 36,000l. is now the firſt wing of the hoſpital towards London. The front to the Thames conſiſts of two ranges of ſtone buildings, with the ranger's houſe in the centre of the area, but detached from any part of the hoſpital. Theſe buildings perfectly correſpond with each other, and have their tops crowned with a ſtone balluſtrade. The buildings which are facing the area, correſpond with them, though in a finer and more elegant ſtyle; and have domes at their ends, which are 120 feet high, ſupported on coupled columns. Under one of theſe is the hall, which is finely painted by Sir James Thornhill, and contains many royal portraits; and under the other the chapel, which by accident was deſtroyed by fire. This fire broke out in the hoſpital on the ſecond of January 1779, and totally conſumed the dome at the S. E. quarter of the building, with the chapel which was the moſt elegant in the world, the great dining hall, and eight wards, containing the lodgings of near 600 penſioners. The dome was rebuilt about the year 1785; but the reparation of the whole damage is not yet completed. On the ſides of the gate which opens to theſe buildings from the park, are placed a large terreſtrial and celeſtial globe, in which the ſtars are gilt; and in the centre of the area is a ſtatue of George II. About 2000 old diſabled ſeamen are maintained in this hoſpital. Beſides private benefactions, to the amount of near 60,000l. (which appear in tables hung up at the entrance of the hall,) the parliament, in the year 1732, ſettled upon it the earl of Derwentwater's eſtate, to the value of 6000l. per annum. All ſtrangers who ſee it, pay twopence each; and this income is applied to the ſupport of the mathematical ſchool for the ſons of ſailors. For the better ſupport of which, every ſeaman in the royal navy, and in the merchant ſervice, pays ſixpence a month, ſtopped out of their pay, and delivered in at the ſix-penny receiver's office in Tower-hill. On this account, a ſeaman, who can produce an authentic certificate of his being diſabled, and rendered unfit for ſervice, by defending any ſhip belonging to his majeſty's Britiſh ſubjects, or in taking any ſhip from the enemy, may be admitted into this hoſpital, and receive the ſame benefit from it as if he had been in his majeſty's immediate ſervice. Beſides the ſeamen and widows above-mentioned, about 100 boys, the ſons of ſeamen, are bred up for the ſervice of the royal navy; but there are no out-penſioners as at Chelſea. Each of the mariners has a weekly allowance of ſeven loaves, weighing 16 ounces each; three pounds of beef, two of mutton, a pint of peaſe, a pound and a quarter of cheeſe, two ounces of butter, fourteen quarts of beer, and one ſhilling a-week tobacco-money; the tobacco-money of the boatſwain is two ſhillings and ſixpence a-week each, that of their mates one ſhilling and ſixpence, and that of the other officers in proportion to their rank: beſides which, each common penſioner receives once in two years, a ſuit of blue clothes, a hat, three pairs of ſtockings, two pairs of ſhoes, five neck-cloths, three ſhirts, and two night-caps. Out of all that is given for ſhowing the hall, only three-pence in the ſhilling is allowed to the perſon that ſhows them; the reſt makes an excellent fund for the yearly maintenance of not leſs than 20 poor boys, who are the ſons of mariners that have been either ſlain or diſabled in the ſervice of their country. The park is well ſtocked with deer, and affords as much variety, in proportion to its ſize, as any in the kingdom; but the views from the Obſervatory and the One-tree hill are beautiful beyond imagination, particularly the former. The projection of theſe hills is ſo bold, that you do not look down upon a gradually falling ſlope or flat incloſures, but at once upon the tops of branching trees, which grow in knots and clumps out of deep hollows and embrowned dells. The cattle which feed on the lawns, which appear in breaks among them, ſeem moving in a region of fairy land. A thouſand natural openings among the branches of the trees break upon little picturesque views of the ſwelling turf, which, when illumined by the ſun, have an effect pleaſing beyond the

Greenwich

power

Greenwich || Gregory.

power of fancy to paint. This is the fore-ground of the landſcape: a little farther, the eye falls on that noble ſtructure the hoſpital, in the midſt of an amphitheatre of wood; then the two reaches of the river make that beautiful ſerpentine which forms the Iſle of Dogs, and preſent the floating millions of the Thames. To the left appears a fine tract of country, leading to the capital, which there finiſhes the proſpect. The pariſh-church of Greenwich, rebuilt by the commiſſioners for erecting the 50 new churches, is a very handſome ſtructure, dedicated to St Alphage, archbiſhop of Canterbury, who is ſaid to have been ſlain by the Danes in the year 1012, on the ſpot where the church now ſtands. There is a college at the end of the town, fronting the Thames, for the maintenance of 20 decayed old houſe-keepers, 12 out of Greenwich, and eight who are to be alternately choſen from Snottiſham and Caſtle-Riſing in Norfolk. This is called *the duke of Norfolk's College*, though it was founded and endowed in 1613 by Henry earl of Northampton, the duke of Norfolk's brother, and by him committed to the care of the Mercers company. To this college belongs a chapel, in which the earl's body is laid; which, as well as his monument, was removed hither a few years ago from the chapel of Dover caſtle. The penſioners, beſides meat, drink, and lodging, are allowed one ſhilling and ſixpence a-week, with a gown every year, linen once in two years, and hats once in four years. In 1560, Mr Lambard, author of the Perambulation of Kent, alſo built an hoſpital, called Queen Elizabeth's college, ſaid to be the firſt erected by an Engliſh Proteſtant. There are likewiſe two charity-ſchools in this pariſh. The river Thames is here very broad, and the channel deep; and at ſome very high tides the water is ſalt. This is the chief harbour for the king's yachts. The town contains about 1500 houſes; and a market on Wedneſday and Saturday was erected here in 1737, the direction of which is in the governors of the royal hoſpital, to which the profits ariſing from it were to be appropriated.

GREGARIOUS, among zoologiſts, a term applied to ſuch animals as do not live ſolitary, but aſſociate in herds or flocks.

GREGORIAN CALENDAR, that which ſhows the new and full moon, with the time of Eaſter, and the moveable feaſts depending thereon, by means of epacts, diſpoſed through the ſeveral months of the Gregorian year. See CHRONOLOGY, N° 26.

Gregorian Teleſcope. See OPTICS *Index*.

Gregorian Year. See CHRONOLOGY, N° 26.

GREGORY the Great, was born at Rome of a patrician family. He diſcovered ſuch abilities in the exerciſe of the ſenatorial employments, that the emperor Juſtin the younger appointed him prefect of Rome. Pope Pelaſgius II. ſent him nuncio to Conſtantinople, to demand ſuccours againſt the Lombards. When he thought of enjoying a ſolitary life, he was elected pope by the clergy, the ſenate, and the people of Rome. Beſides his learning and diligence in inſtructing the church, both by writing and preaching, he had a very happy talent in winning over princes in favour of the temporal as well as ſpiritual intereſt of religion. He undertook the converſion of the Engliſh, and ſent over ſome monks of his order, under the direction of Auguſtin their abbot. His morality with reſpect to the chaſtity of churchmen was very rigid, aſſerting that a man who had ever known a woman ought not to be admitted to the prieſthood; and he always cauſed the candidates for it to be examined upon that point. He likewiſe vigorouſly exerted himſelf againſt ſuch as were found guilty of calumny. However, he flattered the emperor Phocas, while his hands were yet reeking with the blood of Mauritius, and of his three children, who had been butchered in his ſight. He likewiſe flattered Brunehaut, a very wicked queen of France. He is accuſed of deſtroying the noble monuments of ancient Roman magnificence, that thoſe who viſited the city might not attend more to the triumphal arches than to holy things; and burnt a multitude of heathen books, Livy in particular. He died in 604. Gregory.

GREGORY of Nazianzen, ſurnamed the *Divine*, was one of the moſt illuſtrious ornaments of the Greek church in the fourth age. He was made biſhop of Conſtantinople in 379; but finding his election conteſted by Timotheus archbiſhop of Alexandria, he voluntarily reſigned his dignity about 382, in the general council of Conſtantinople. His works are extant, in two volumes, printed at Paris in 1609. His ſtyle is ſaid to be equal to that of the moſt celebrated orators of ancient Greece.

GREGORY, *Theodorus*, ſurnamed *Thaumaturgus* on account of his miracles, was the ſcholar of Origen; and was elected biſhop of Neocæſarea, the place of his birth, about the year 240, during his abſence. He aſſiſted at the council of Antioch, in 255, againſt Paulus Samoſetanus; and died in 270. He had the ſatisfaction of leaving only ſeventeen idolaters in his dioceſe, where there were but ſeventeen Chriſtians when he was ordained. There is ſtill extant of his, A gratulatory oration to Origen, A canonical epiſtle, and ſome other works.

GREGORY, biſhop of Nyſſa, one of the fathers of the church, and author of the Nicene creed, was born in Cappadocia, about the year 331. He was choſen biſhop of Nyſſa in 372, and baniſhed by the emperor Valens for adhering to the council of Nice. He was nevertheleſs afterwards employed by the biſhops in ſeveral important affairs, and died in 396. He wrote Commentaries on the Scriptures; Sermons on the myſteries; Moral diſcourſes; Dogmatical treatiſes; Panegyrics on the ſaints; ſome letters on church diſcipline; and other works. His ſtyle is very allegorical and affected.

GREGORY *of Tours*, or *Georgius Florentius Gregorius*, one of the moſt illuſtrious biſhops and celebrated writers of the ſixth century, was deſcended from a noble family in Auvergne. He was educated by his uncle Gallus, biſhop of Clermont; and diſtinguiſhed himſelf ſo much by his learning and virtue, that in 573 he was choſen biſhop of Tours. He afterwards went to Rome to viſit the tomb of the apoſtles, where he contracted a friendſhip with Gregory the Great, and died in 595. This author was extremely credulous with regard to miracles. He wrote, 1. The hiſtory of France. 2. The lives of the ſaints; and other works. The beſt edition is that publiſhed by Father Rumart, 1699.

GREGORY, *David*, the ſon of the reverend John Gregory, miniſter of Drumoak, in the county of Aberdeen.

Gregory. deen. He was born about the year 1628, educated by his father for buſineſs, and bound apprentice to a mercantile houſe in Holland. But as his love of letters exceeded his deſire for money, he relinquiſhed commerce in the year 1655, and on the death of an elder brother he ſucceeded to the eſtate of Kinnairdie, about 40 miles from Aberdeen, where he reſided many years, and had no fewer than 32 children born to him by two wives. Three of his ſons became eminent for their extenſive literature, and were at one time profeſſors of mathematics in the univerſities of Oxford, Edinburgh, and St Andrews.

The neighbouring gentlemen made a jeſt of Mr Gregory for his ignorance of what was doing on his own farm, but eſteemed him highly as a man of letters. Having ſtudied phyſic merely for amuſement, he practiſed gratis among the poor; and his knowledge of it being ſo extenſive, he was employed by the nobility and gentry in the neighbourhood, but he would take no fees. Having much buſineſs during the day, he went very early to bed, roſe to his ſtudies about two or three in the morning, and then ſlept an hour or two before breakfaſt.

In the country where he dwelt he was the firſt perſon who had a barometer, to the changes in which, according to the changes in the weather, he paid great attention, and was once in great danger of being tried by the preſbytery for witchcraft or conjuration. He was waited upon by a deputation of miniſters, who inquired into the truth of certain reports which had come to their ears, whom he ſo far ſatisfied as to induce them to wave a proſecution againſt a man who, by the extenſive knowledge of medicine which he poſſeſſed, was a public bleſſing to the country.

About the beginning of laſt century he removed to Aberdeen, and during Queen Anne's war he turned his attention to the improvement of artillery, to make great guns more deſtructive, and executed a model of his intended engine. We are informed by Dr Reid, that he knew a clock-maker who had been employed in making this model; but as he made ſo many different pieces without knowing their deſign, or the method of uniting them, he could give no conſiſtent account of the whole. Mr Gregory being ſatisfied with his invention by various experiments, he deſired his ſon to ſhow it to Sir Iſaac Newton, concealing the name of the inventor; but Sir Iſaac was much diſpleaſed with it, and declared that the inventor was more entitled to puniſhment than reward, as it was ſolely calculated for deſtruction, and might come to be known to the enemy. That great man urged the neceſſity of deſtroying it, and it is probable that Mr Gregory's ſon, the Savilian profeſſor, followed his advice, for the model was never found.

When the rebellion broke out in 1715, the old gentleman went a ſecond time to Holland, and returned when it was over to Aberdeen, where he died about 1720, in the 93d year of his age, leaving behind him a hiſtory of his own times, which was never publiſhed.

GREGORY, *James*, one of the moſt eminent mathematicians of the 17th century, was a ſon of the Rev. Mr John Gregory miniſter of Drumoak in the county of Aberdeen, and was born at Aberdeen in 1638. His mother was a daughter of Mr David Anderſon of Finzaugh, a gentleman who poſſeſſed a ſingular turn for mathematical and mechanical knowledge. This mathematical genius was hereditary in the family of the Anderſons, and from them ſeems to have been tranſmitted to their deſcendants of the name of Gregory. Alexander Anderſon, couſin-german of the above-mentioned David, was profeſſor of mathematics at Paris in the beginning of the 17th century, and publiſhed there in 1612, *Supplementum, Apollonii redivivi, &c.* The mother of James Gregory inherited the genius of her family; and obſerving in her ſon, while yet a child, a ſtrong propenſity to mathematics, ſhe inſtructed him herſelf in the elements of that ſcience. He received his education in the languages at the grammar-ſchool of Aberdeen, and went through the uſual courſe of academical ſtudies in the Mariſchal college.

Gregory. Memoirs of the Gregories, prefixed to the *Works of Dr James Gregory.*

At the age of 24 he publiſhed his treatiſe, entitled *Optica Promota, ſeu abdita radiorum reflexorum et refractorum myſteria, geometricè enucleata; cui ſubnectitur appendix ſubtiliſſimorum aſtronomiæ problematon reſolutionem exhibens*, London 1663: a work of great genius, in which he gave the world an invention of his own, and one of the moſt valuable of the modern diſcoveries, the conſtruction of the reflecting teleſcope. This diſcovery immediately attracted the attention of the mathematicians, both of our own and of foreign countries, who were ſoon convinced of its great importance to the ſciences of optics and aſtronomy. The manner of placing the two ſpecula upon the ſame axis appearing to Sir Iſaac Newton to be attended with the diſadvantage of loſing the central rays of the larger ſpeculum, he propoſed an improvement on the inſtrument, by giving an oblique poſition to the ſmaller ſpeculum, and placing the eye-glaſs in the ſide of the tube. But it is worth remarking, that the Newtonian conſtruction of that inſtrument was long abandoned for the original or Gregorian, which is at this day univerſally employed where the inſtrument is of a moderate ſize; though Mr Herſchel has preferred the Newtonian form for the conſtruction of thoſe immenſe teleſcopes, which of late years he has ſo ſucceſsfully employed in obſerving the heavens.

The univerſity of Padua being at that time in high reputation for mathematical ſtudies, James Gregory went thither ſoon after the publication of his firſt work; and fixing his reſidence there for ſome years, he publiſhed, in 1667, *Vera Circuli et Hyperboles quadratura;* in which he propounded another diſcovery of his own, the invention of an infinitely converging ſeries for the areas of the circle and hyperbole. To this treatiſe, when republiſhed in 1668, he added a new work, entitled, *Geometriæ pars univerſalis, inſerviens quantitatum curvarum tranſmutationi et menſuræ;* in which he is allowed to have ſhown, for the firſt time, a method for the tranſmutation of curves. Theſe works engaged the notice, and procured Mr Gregory the correſpondence, of the greateſt mathematicians of the age, Newton, Huygens, Halley, and Wallis; and their author being ſoon after choſen a fellow of the royal ſociety of London, contributed to enrich the Philoſophical Tranſactions at that time by many excellent papers. Through this channel, in particular, he carried on a diſpute with Mr Huygens, upon the occaſion of his treatiſe on the quadrature of the circle and hyperbole, to which

Ibid.

Gregory. which that able mathematician had ſtarted ſome objections. Of this controverſy, it is unneceſſary to enter into particulars. It is ſufficient to ſay, that, in the opinion of Leibnitz, who allows Mr Gregory the higheſt merit for his genius and diſcoveries, Mr Huygens has pointed out, though not errors, ſome conſiderable deficiencies in the treatiſe above mentioned, and ſhown a much ſimpler method of attaining the end in view.

In 1668, Mr James Gregory publiſhed at London another work, entitled *Exercitationes Geometricæ*, which contributed ſtill to extend his reputation. About this time he was elected profeſſor of mathematics in the univerſity of St Andrew's; an office which he held for ſix years. During his reſidence there, he married, in 1669, Mary, the daughter of George Jameſon the celebrated painter, whom Mr Walpole has termed the Vandyke of Scotland, and who was fellow-diſciple with that great artiſt in the ſchool of Rubens at Antwerp.

In 1674, he was called to Edinburgh, to fill the chair of mathematics in that univerſity. This place he had held for little more than a year, when, in October 1675, being employed in ſhowing the ſatellites of Jupiter through a teleſcope to ſome of his pupils, he was ſuddenly ſtruck with total blindneſs, and died a few days after, at the early age of 37.

He was a man of an acute and penetrating genius. His temper ſeems to have been warm, as appears from the conduct of his diſpute with Mr Huygens; and, conſcious perhaps of his own merits as a diſcoverer, he ſeems to have been jealous of loſing any portion of his reputation by the improvements of others upon his inventions.

GREGORY, *David*, Savilian profeſſor of aſtronomy at Oxford, whom Dr Smith has termed *ſubtiliſſimi ingenii mathematicus*, was the eldeſt ſon of Mr Gregory of Kinnairdy, brother of the above-mentioned Mr James Gregory. He was born at Aberdeen in 1661, and received the earlier parts of his education in that city. He completed his ſtudies at Edinburgh; and, being poſſeſſed of the mathematical papers of his uncle, ſoon diſtinguiſhed himſelf likewiſe as the heir of his genius. In the 23d year of his age, he was elected profeſſor of mathematics in the univerſity of Edinburgh; and publiſhed, in the ſame year, *Exercitatio Geometrica de dimenſione figurarum, ſive ſpecimen methodi generalis dimetiendi quaſvis figuras*, Edinburgh, 1684, 4to. He ſaw very early the excellence of the Newtonian philoſophy; and had the merit of being the firſt who introduced it into the ſchools by his public lectures at Edinburgh. "He had (ſays Mr Whiſton *) already cauſed ſeveral of his ſcholars to keep acts, as we call them, upon ſeveral branches of the Newtonian philoſophy; while we at Cambridge, poor wretches, were ignominiouſly ſtudying the fictitious hypotheſes of the Carteſian." Gregory.

Ibid.

* *Memoirs of his own Life*, i. 32.

In 1691, on the report of Dr Bernard's intention of reſigning the Savilian profeſſorſhip of aſtronomy at Oxford, David Gregory went to London; and being patroniſed by Sir Iſaac Newton, and warmly befriended by Mr Flamſtead the aſtronomer royal, he obtained the vacant profeſſorſhip, for which Dr Halley was a competitor. This rivalſhip, however, inſtead of animoſity, laid the foundation of friendſhip between theſe eminent men; and Halley ſoon after became the colleague of Gregory, by obtaining the profeſſorſhip of geometry in the ſame univerſity. Soon after his arrival in London, Mr Gregory had been elected a fellow of the royal ſociety; and, previouſly to his election into the Savilian profeſſorſhip, had the degree of doctor of phyſic conferred on him by the univerſity of Oxford (A).

In 1693, he publiſhed in the Philoſophical Tranſactions a reſolution of the Florentine problem *de Teſtudine veliformi quadribili*; and he continued to communicate to the public, from time to time, many ingenious mathematical papers by the ſame channel. In 1695, he printed at Oxford *Catoptricæ et Dioptricæ Sphericæ Elementa*; a work which, as he informs us in his preface, contains the ſubſtance of ſome of his public lectures read, eleven years before, at Edinburgh. This valuable treatiſe was republiſhed firſt with additions by Dr William Brown, with the recommendation of Mr Jones and Dr Deſaguliers; and afterwards by the latter of theſe gentlemen, with an appendix containing an account of the Gregorian and Newtonian teleſcopes, together with Mr Hadley's tables for the conſtruction of both thoſe inſtruments. It is not unworthy of remark, that, in the end of this treatiſe, there is an obſervation which ſhows, that what is generally believed to be a diſcovery of a much later date, the conſtruction of achromatic teleſcopes, which has been carried to great perfection by Mr Dollond and Mr Ramſden, had ſuggeſted itſelf to the mind of David Gregory, from the reflection on the admirable contrivance of nature in combining the different humours of the eye. The paſſage is as follows: "Quod ſi ob difficultates phyſicas in ſpeculis idoneis torno elaborandis et poliendis, etiamnum lentibus uti oporteat, fortaſſis media diverſæ denſitatis ad lentem objectivam componendam adhibere utile foret, ut à natura factum obſervamus in oculi fabrica, ubi criſtallinus humor (fere ejuſdem cum vitro virtutis ad radios lucis refringendos) aqueo et vitreo (aquæ quoad refractionem haud abſimilibus) conjungitur, ad imaginem quam diſtinctè fieri poterit, à natura nihil fruſtra moliente, in oculi fundo depingendam." *Catopt. et Diopt. Sphær. Elem. Oxon.* 1695, p. 98.

In 1702 our author publiſhed at Oxford, *Aſtronomiæ Phyſicæ*

(A) On obtaining the above profeſſorſhip, he was ſucceeded in the mathematical chair at Edinburgh by his brother James, likewiſe an eminent mathematician; who held that office for 33 years, and retiring in 1725 was ſucceeded by the celebrated Maclaurin. A daughter of this profeſſor James Gregory, a young lady of great beauty and accompliſhments, was the victim of an unfortunate attachment, which furniſhed the ſubject of Mallet's well-known ballad of William and Margaret.

Another brother, Charles, was created profeſſor of mathematics at St Andrew's by Queen Anne in 1707. This office he held with reputation and ability for 32 years; and, reſigning in 1739, was ſucceeded by his ſon, who eminently inherited the talents of his family, and died in 1763.

Gregory. *Physicæ et Geometricæ Elementa;* a work which is accounted his maſterpiece. It is founded on the Newtonian doctrines, and was eſteemed by Sir Iſaac Newton himſelf as a moſt excellent explanation and defence of his philoſophy. In the following year he gave to the world an edition in folio of the works of Euclid in Greek and Latin; in proſecution of a deſign of his predeceſſor Dr Bernard, of printing the works of all the ancient mathematicians. In this work, although it contains all the treatiſes attributed to Euclid, Dr Gregory has been careful to point out ſuch as he found reaſon, from internal evidence, to believe to be the productions of ſome inferior geometrician. In proſecution of Dr Bernard's plan, Dr Gregory engaged, ſoon after, with his colleague Halley, in the publication of the Conics of Apollonius; but he had proceeded but a little way in this undertaking when he died, in the 49th year of his age, at Maidenhead in Berkſhire, A. D. 1710. To the genius and abilities of David Gregory, the moſt celebrated mathematicians of the age, Sir Iſaac Newton, Dr Halley, and Dr Keill, have given ample teſtimonies. Indeed it appears that he enjoyed, in a high degree, the confidence and friendſhip of Sir Iſaac Newton. This philoſopher entruſted him with a manuſcript copy of his *Principia*, for the purpoſe of making obſervations on that work. Of theſe obſervations there is a complete copy preſerved in the library of the Univerſity of Edinburgh. They contain many valuable commentaries on the *Principia*, many intereſting anecdotes, and various ſublime mathematical diſcuſſions. Some of the paragraphs are in the hand-writing of Huygens, and they relate to the theory of light of this philoſopher. The obſervations of Dr Gregory had come too late for the firſt edition of Newton's great work; but he availed himſelf of them in the ſecond. Beſides thoſe works publiſhed in his lifetime, he left in manuſcript, A Short Treatiſe of the Nature and Arithmetic of Logarithms, which is printed at the end of Dr Keill's tranſlation of Commandine's Euclid; and a Treatiſe of Practical Geometry, which was afterwards tranſlated, and publiſhed in 1745, by Mr Maclaurin.

Dr David Gregory married in 1695, Elizabeth the daughter of Mr Oliphant of Langtown in Scotland. By this lady he had four ſons, of whom, the eldeſt, David, was appointed regius profeſſor of modern hiſtory at Oxford by King George I. and died in 1767, in an advanced age, after enjoying for many years the dignity of dean of Chriſt-church in that univerſity.

GREGORY, *Dr John*, profeſſor of medicine in the univerſity of Edinburgh, was the ſon of Dr James Gregory profeſſor of medicine in King's college Aberdeen, and grandſon of James the inventor of the Gregorian teleſcope. His father was firſt married to Catharine Forbes, daughter of Sir John Forbes of Monymuſk; by whom he had ſix children, moſt of whom died in infancy. He married afterwards Ann Chalmers, only daughter of the Rev. Mr George Chalmers principal of King's college, by whom he had two ſons and a daughter. John, the youngeſt of the three, was born at Aberdeen, June 3. 1724. Loſing his father when only in the 7th year of his age, the care of his education devolved on his grandfather Principal Chalmers, and on his elder brother Dr James Gregory, who, upon the reſignation of their father a ſhort time before his death, had been appointed to ſucceed him in the profeſſorſhip of medicine in King's college. He likewiſe owed much in his infant years, and during the whole courſe of his ſtudies, to the care and attention of his couſin, the celebrated Dr Reid, afterwards of the univerſity of Glaſgow. The rudiments of our author's claſſical education he received at the grammar-ſchool of Aberdeen; and under the eye of his grandfather, he completed, in King's college, his ſtudies in the Latin and Greek languages, and in the ſciences of ethics, mathematics, and natural philoſophy. His maſter in philoſophy and in mathematics was Mr Thomas Gordon, philoſophy profeſſor of King's college, who ably filled an academical chair for above half a century.

Ibid. Gregory.

In 1742, Mr Gregory went to Edinburgh, where the ſchool of medicine was then riſing to that celebrity which has ſince ſo remarkably diſtinguiſhed it. Here he attended the anatomical lectures of the elder Dr Monro, of Dr Sinclair on the theory of medicine, and of Dr Rutherford on the practice. He heard likewiſe the prelections of Dr Alſton on the materia medica and botany, and of Dr Plummer on chemiſtry. The medical ſociety of Edinburgh, inſtituted for the free diſcuſſion of all queſtions relative to medicine and philoſophy, had begun to meet in 1737. Of this ſociety we find Mr Gregory a member in 1742, at the time when Dr Mark Akenſide, his fellow ſtudent and intimate companion, was a member of the ſame inſtitution.

In the year 1745 our author went to Leyden, and attended the lectures of thoſe celebrated profeſſors Gaubius, Albinus, and Van Royen. While at this place he had the honour of receiving from the King's college of Aberdeen, his *alma mater*, who regarded him as a favourite ſon, an unſolicited degree of doctor of medicine; and ſoon after, on his return thither from Holland, he was elected profeſſor of philoſophy in the ſame univerſity. In this capacity he read lectures during the years 1747, 1748, and 1749, on mathematics, on experimental philoſophy, and on moral philoſophy. In the end of 1749, however, he choſe to reſign his profeſſorſhip of philoſophy, his views being turned chiefly to the practice of phyſic, with which he apprehended the duties of this profeſſorſhip, occupying a great portion of his time, too much interfered. Previouſly, however, to his ſettling as a phyſician at Aberdeen, he went for a few months to the continent; a tour of which the chief motive was probably amuſement, though, to a mind like his, certainly not without its profit in the enlargement of ideas, and an increaſed knowledge of mankind.

Some time after his return to Scotland, Dr Gregory married in 1752, Eliſabeth daughter of William Lord Forbes; a young lady who, to the exterior endowments of great beauty and engaging manners, joined a very ſuperior underſtanding, and an uncommon ſhare of wit. With her he received a handſome addition of fortune; and during the whole period of their union, which was but for the ſpace of nine years, enjoyed the higheſt portion of domeſtic happineſs. Of her character it is enough to ſay, that her huſband, in that admired little work, A Father's Legacy to his Daughters, the laſt proof of his affection for them, declares, that "while he endeavours to point out what they ſhould be, he draws but a very faint and imperfect picture of what their mother was." The field of medical practice at Aberdeen being at that time in a great meaſure pre-

Gregory. occupied by his elder brother Dr James Gregory, and others of ſome note in their profeſſion, our author determined to try his fortune in London. Thither accordingly he went in 1754; and being already known by reputation as a man of genius, he found an eaſy introduction to many perſons of diſtinction both in the literary and polite world. The late George Lord Lyttelton was his friend and patron. An attachment, which was founded on a ſtriking ſimilarity of manners, of taſtes, and of diſpoſitions, grew up into a firm and permanent friendſhip; and to that nobleman, to whom Dr Gregory was wont to communicate all his literary productions, the world is indebted for the publication of the Comparative View of the State and Faculties of Man, which made him firſt known as an author. Dr Gregory likewiſe enjoyed the friendſhip of the late Edward Montagu, Eſq. and of his lady, the celebrated champion of the fame of Shakeſpeare, againſt the cavils and calumnies of Voltaire. At her aſſemblies, or *converſaziones*, the reſort of taſte and genius, our author had an opportunity of cultivating an acquaintance with many of the moſt diſtinguiſhed literary characters of the preſent times.

In 1754 Dr Gregory was choſen fellow of the royal ſociety of London; and daily advancing in the public eſteem, it is not to be doubted, that, had he continued his reſidence in that metropolis, his profeſſional talents would have found their reward in a very extenſive practice. But the death of his brother, Dr James Gregory, in November 1755, occaſioning a vacancy in the profeſſorſhip of phyſic in King's college, Aberdeen, which he was ſolicited to fill, he returned to his native country in the beginning of the following year, and took upon him the duties of that office to which he had been elected in his abſence.

Here our author remained till the end of the year 1764, when urged by a very laudable ambition, and preſuming on the reputation he had acquired as affording a reaſonable proſpect of ſucceſs in a more extended field of practice, he changed his place of reſidence for Edinburgh. His friends in that metropolis had repreſented to him the ſituation of the college of medicine as favourable to his views of filling a profeſſorial chair in that univerſity; which accordingly he obtained in 1766, on the reſignation of Dr Rutherford, profeſſor of the practice of phyſic. In the ſame year he had the honour of being appointed firſt phyſician to his majeſty for Scotland on the death of Dr Whytt.

On his firſt eſtabliſhment in the univerſity of Edinburgh, Dr Gregory gave lectures on the practice of phyſic during the years 1767, 1768, and 1769. Afterwards, by agreement with Dr Cullen, profeſſor of the theory of phyſic, theſe two eminent men gave alternate courſes of the theory and of the practice.—As a public ſpeaker, Dr Gregory's manner was ſimple, natural, and animated. Without the graces of oratory, which the ſubject he had to treat in a great degree precluded, he expreſſed his ideas with uncommon perſpicuity, and in a ſtyle happily attempered between the formality of ſtudied compoſition and the eaſe of converſation. It was his cuſtom to premeditate, for a ſhort time before entering the college, the ſubject of his lecture, conſulting thoſe authors to whom he had occaſion to refer, and marking in ſhort notes the arrangement of his intended diſcourſe: then fully maſter of his ſubject, and confident of his own powers, he Gregory. truſted to his natural facility of expreſſion to convey thoſe opinions which he had maturely deliberated. The only lectures which he committed fully to writing, were thoſe introductory diſcourſes which he read at the beginning of his annual courſe, and which are publiſhed in theſe volumes under the title of Lectures on the Duties and Qualifications of a Phyſician. Of theſe, which were written with no view to publication, many copies were taken by his pupils, and ſome from the original manuſcript, which he freely lent for their peruſal. On hearing that a copy had been offered for ſale to a bookſeller, it became neceſſary to anticipate a fraudulent, and perhaps a mutilated publication, by authoriſing an impreſſion from a corrected copy, of which he gave the profits to a favourite pupil. Theſe lectures were firſt publiſhed in 1770, and afterwards in an enlarged and more perfect form in 1772.

In the ſame year, 1772, Dr Gregory publiſhed Elements of the Practice of Phyſic, for the uſe of Students: a work intended ſolely for his own pupils, and to be uſed by himſelf as a text-book to be commented upon in his courſe of lectures. In an advertiſement prefixed to this work, he ſignified his intention of comprehending in it the whole ſeries of diſeaſes of which he treated in his lectures on the Practice of Phyſic; but this intention he did not live to accompliſh, having brought down the work no further than to the end of the claſs of Febrile Diſeaſes.—In his academical lectures, Dr Gregory never attempted to miſlead the ſtudent by flattering views of the perfection of the ſcience; but was, on the contrary, anxious to point out its defects; wiſely judging that a thorough ſenſe of the imperfection of an art or ſcience is the firſt ſtep towards its improvement. In this view he was careful to expoſe the fallaciouſneſs of the ſeveral theories and hypotheſes which have had the moſt extenſive currency, and perpetually inculcated the danger of ſyſtematizing with limited experience, or an imperfect knowledge of facts. Yet in the work laſt mentioned it will appear from the order in which he has treated of the ſeveral diſeaſes, that he did not entirely neglect the ſyſtematic arrangements of other authors. Theſe, however, he warned his pupils, that he had not adopted from any conviction of the rectitude of thoſe theories to which they referred, but only as affording that degree of method, and regularity of plan, which is found to be the beſt help to the ſtudy of any ſcience. Conſidering a rational theory of phyſic to be as yet a deſideratum, it was his object to communicate to his pupils the greateſt portion of practical knowledge, as the only baſis on which ſuch a theory could ever be reared. His method, in treating of the ſeveral diſeaſes, was firſt to mention thoſe ſymptoms which are underſtood among phyſicians to characterize or define a diſeaſe; proceeding from the general to the more particular ſeries of ſymptoms and their occaſional varieties; to point out accurately the *diagnoſtic* ſymptoms, or thoſe by which one diſeaſe is eſſentially diſtinguiſhed from others that reſemble it, and to mark likewiſe the *prognoſtics* by which a phyſician is enabled to conjecture of the probable event of a diſeaſe, whether favourable or otherwiſe. He then proceeded to ſpecify the various cauſes, prediſpoſing, occaſional, and proximate; accounting, as far as he thought could be done

on

Gregory. on juſt principles, for the appearance of the ſeveral ſymptoms; and, finally, he pointed out the general plan of cure, the particular remedies to be employed, and the cautions requiſite in the adminiſtration of them. Thus deſirous of eſtabliſhing the ſcience of medicine upon the ſolid foundation of practice and experience; and knowing that many things aſſerted as facts by medical writers have been aſſumed on a very careleſs obſervation, while confirming a favourite theory; and that, on the other hand, many real and important facts have, from the ſame ſpirit of ſyſtem, been explained away and diſcredited; he conſtantly endeavoured, both by his precept and example, to inculcate to his pupils the neceſſity of extreme caution either in admitting or in denying medical facts, or what are commonly given as ſuch. To the deſire of enforcing this neceſſary caution is owing that multitude of queries reſpecting matters of fact, as well as matters of opinion, which occurs in the Elements of the Practice of Phyſic.

Dr Gregory, ſoon after the death of his wife, and, as he himſelf ſays, "for the amuſement of his ſolitary hours," employed himſelf in the compoſition of that admirable tract, entitled, A Father's Legacy to his Daughters; a work which, though certainly never intended by its author for the public eye, it would have been an unwarrantable diminution of his fame, and a capricious refuſal of a general benefit to mankind, to have limited to the ſole purpoſe for which it was originally deſigned. It was, therefore, with great propriety, publiſhed after the author's death by his eldeſt ſon. This work is a moſt amiable diſplay of the piety and goodneſs of his heart, and his conſummate knowledge of human nature and of the world. It manifeſts ſuch ſolicitude for their welfare, as ſtrongly recommends the advice which he gives. He ſpeaks of the female ſex in the moſt honourable terms, and labours to increaſe its eſtimation, whilſt he plainly, yet genteelly and tenderly, points out the errors into which young ladies are prone to fall.—It is particularly obſervable, in what high and honourable terms he ſpeaks of the Holy Scriptures, of Chriſtian worſhip, and faithful miniſters; how warmly he recommends to his daughters the ſerious and devout worſhip of God in public and private. He dwells largely on that temper and behaviour, which were particularly ſuited to their education, rank, and circumſtances; and recommends that gentleneſs, benevolence, and modeſty, which adorn the character of the ladies, and do particular honour to their ſex. His advices, with regard to love, courtſhip, and marriage, are peculiarly wiſe, and intereſting to them. They ſhow what careful obſervation he had made on female domeſtic conduct, and on the different effects of poſſeſſing or wanting the virtues and qualities which he recommends. There is ſomething peculiarly curious, animated, and uſeful, in his directions to them, how to judge of, and manifeſt an honourable paſſion in, and towards the other ſex, and in the very accurate and uſeful diſtinction which he makes between true and falſe delicacy. Nothing can be more ſtriking and affecting, nothing more likely to give his paternal advices their deſired effect, than the reſpectful and affectionate manner in which he mentions his lady their mother, and the irreparable loſs which he and they ſuſtained by her early death. In ſhort, in this tract, the profeſſor ſhines with peculiar luſtre as a huſband and father, and it is admirably adapted to promote domeſtic happineſs. Gregory, Gre-hound.

Theſe letters to his daughters were evidently written under the impreſſion of an early death, which Dr Gregory had reaſon to apprehend from a conſtitution ſubject to the gout, which had begun to ſhow itſelf at irregular intervals even from the 18th year of his age. His mother, from whom he inherited that diſeaſe, died ſuddenly in 1770, while ſitting at table. Dr Gregory had prognoſticated for himſelf a ſimilar death; an event of which, among his friends, he often talked, but had no apprehenſion of the nearneſs of its approach. In the beginning of the year 1773, in converſation with his ſon Dr James Gregory, the latter remarking, that having for the three preceding years had no return of a fit, he might make his account with a pretty ſevere attack at that ſeaſon; he received the obſervation with ſome degree of anger, as he felt himſelf then in his uſual ſtate of health. The prediction, however, was too true; for having gone to bed on the 9th of February 1773, with no apparent diſorder, he was found dead in the morning. His death had been inſtantaneous, and probably in his ſleep; for there was not the ſmalleſt diſcompoſure of limb or of feature.—a perfect *Euthanaſia*.

Dr Gregory, in perſon, was conſiderably above the middle ſize. His frame of body was compacted with ſymmetry, but not with elegance. His limbs were not active; he ſtooped ſomewhat in his gait; and his countenance, from a fullneſs of feature and a heavineſs of eye, gave no external indication of ſuperior power of mind or abilities. It was otherwiſe when engaged in converſation. His features then became animated, and his eye moſt expreſſive. He had a warmth of tone and of geſture which gave a pleaſing intereſt to every thing which he uttered: But, united with this animation, there was in him a gentleneſs and ſimplicity of manner, which, with little attention to the exterior and regulated forms of politeneſs, was more engaging than the moſt finiſhed addreſs. His converſation flowed with eaſe; and, when in company with literary men, without affecting a diſplay of knowledge, he was liberal of the ſtores of his mind. He poſſeſſed a large ſhare of the ſocial and benevolent affections, which, in the exerciſe of his profeſſion, manifeſted themſelves in many nameleſs, but important, attentions to thoſe under his care; attentions which, proceeding in him from an extended principle of humanity, were not ſquared to the circumſtances or rank of the patient, but ever beſtowed moſt liberally where they were moſt requiſite. In the care of his pupils, he was not ſatisfied with a faithful diſcharge of his public duties. To many of theſe, ſtrangers in the country, and far removed from all who had a natural intereſt in their concerns, it was matter of no ſmall importance to enjoy the acquaintance and countenance of one ſo univerſally reſpected and eſteemed.

GRE-HOUND. See CANIS, MAMMALIA *Index*.—Among a litter of gre-hound puppies, the beſt are always thoſe which are lighteſt. Theſe will make the nimbleſt dogs as they grow up. The gre-hound is beſt for open countries where there is little covert. In theſe places there will ſometimes be a courſe after a hare of two or three miles or more, and both the dogs and the game

Gre-hound, Grenada.

game in ſight all the while. It is generally ſuppoſed that the gre-hound bitch will beat the dog in running: but this ſeems to be an error; for the dog is both longer made, and conſiderably ſtronger, than the bitch of the ſame kind. In the breeding theſe dogs the bitch is principally to be regarded; for it is found by experience, that the beſt dog and a bad bitch will not get ſo good puppies as an indifferent dog with a good bitch. The dog and bitch ſhould be as nearly as may be of the ſame age; and for the breeding of fine and perfect dogs, they ſhould not be more than four years old. An old bitch may be uſed with a young dog, but the puppies of a young bitch and an old dog will never be good for any thing.

The general food for a gre-hound ought to be chippings or raſpings of bread, with ſoft bones and griſtles; and thoſe chippings ought always to be ſoaked in beef or mutton broth.

The proper exerciſe for a gre-hound is courſing him three times a-week, and rewarding him with blood; which will animate him in the higheſt degree, and encourage him to proſecute his game. But the hare alſo ſhould ever have fair play. She ſhould have the law, as it is called; that is, have leave to run about twelve ſcore yards before the dog is ſlipped at her, that he may have ſome difficulty in the courſe, and not pick up the game too eaſily. If he kills the hare, he muſt never be ſuffered to tear her; but ſhe muſt be taken from him, his mouth cleaned of the wool, and the liver and lights given him by way of encouragement. Then he is to be led home, and his feet waſhed with butter and beer, and about an hour after he is to be fed.

When the dog is to be taken out to courſe, he ſhould have nothing in the morning but a toaſt and butter, and then he is to be kennelled till taken out to the field. The kennelling theſe dogs is of great uſe, always giving them ſpirit and nimbleneſs when they are ſet looſe: and the beſt way of managing a fine gre-hound is, never to let him ſtir out of the kennel, except at the times of feeding, walking, or courſing.

GRENADA, one of the Caribbee iſlands, lying in W. Long. 61. 40. N. Lat. 12. 0. It is the laſt of the Windward Caribbees; and lies 30 leagues north of New Andaluſia, on the continent. It is about 30 miles in length, and in ſome places 15 in breadth. The chief port, formerly called *Louis*, now *St George's*, ſtands on the weſt ſide of the iſland, in the middle of a large bay, with a ſandy bottom. It is pretended that 1000 barks, from 300 to 400 tons, may ride ſecure from ſtorms; and that 100 ſhips, of 1000 tons each, may be moored in the harbour. A large round baſon, which is parted from it by a bank of ſand, would contain a conſiderable number of ſhips, if the bank was cut through: but by reaſon of it the large ſhips are obliged to paſs within 80 paces of one of the mountains lying at the mouth of the harbour; the other mountain lying about half a mile diſtant. The iſland abounds with wild game and fiſh; it produces alſo very fine timber, but the cocoa-tree is obſerved not to thrive here ſo well as in the other iſlands. A lake on a high mountain, about the middle of the iſland, ſupplies it with freſh-water ſtreams. Several bays and harbours lie round the iſland, ſome of which might be fortified to great advantage; ſo that it is very convenient for ſhipping, not being ſubject to hurricanes. The ſoil is capable of producing tobacco, ſugar, indigo, peaſe, and millet. Grenada.

In 1638, M. Poincy, a Frenchman, attempted to make a ſettlement in Grenada; but was driven off by the Caribbeans, who reſorted to this iſland in greater numbers than to the neighbouring ones, probably on account of the game with which it abounded. In 1650, Monſ. Parquet, governor of Martinico, carried over from that iſland 200 men, furniſhed with preſents to reconcile the ſavages to them; but with arms to ſubdue them, in caſe they ſhould prove intractable. The ſavages are ſaid to have been frightened into ſubmiſſion by the number of the Frenchmen: but, according to ſome French writers, the chief not only welcomed the new-comers; but, in conſideration of ſome knives, hatchets, ſciſſars, and other toys, yielded to Parquet the ſovereignty of the iſland, reſerving to themſelves their own habitations. The Abbé Raynal informs us, that theſe firſt French coloniſts, *imagining* they had purchaſed the iſland by theſe trifles, aſſumed the ſovereignty, and ſoon acted as tyrants. The Caribs, unable to contend with them by force, took their uſual method of murdering all thoſe whom they found in a defenceleſs ſtate. This produced a war; and the French ſettlers having received a reinforcement of 300 men from Martinico, forced the ſavages to retire to a mountain; from whence, after exhauſting all their arrows, they rolled down great logs of wood on their enemies. Here they were joined by other ſavages from the neighbouring iſlands, and again attacked the French, but were defeated anew; and were at laſt driven to ſuch deſperation, that 40 of them, who had eſcaped from the ſlaughter, jumped from a precipice into the ſea, where they all periſhed, rather than fall into the hands of their implacable enemies. From thence the rock was called *le morne des ſauteurs*, or "the hill of the leapers;" which name it ſtill retains. The French then deſtroyed the habitations and all the proviſions of the ſavages; but freſh ſupplies of Caribbeans arriving, the war was renewed with great vigour, and great numbers of the French were killed. Upon this they reſolved totally to exterminate the natives: and having accordingly attacked the ſavages unawares, they inhumanly put to death the women and children, as well as the men; burning all their boats and canoes, to cut off all communication between the few ſurvivors and the neighbouring iſlands. Notwithſtanding all theſe barbarous precautions, however, the Caribbees proved the irreconcileable enemies of the French; and their frequent inſurrections at laſt obliged Parquet to ſell all his property in the iſland to the Count de Cerillac in 1657. The new proprietor, who purchaſed Parquet's property for 30,000 crowns, ſent thither a perſon of brutal manners to govern the iſland. He behaved with ſuch inſupportable tyranny, that moſt of the coloniſts retired to Martinico; and the few who remained condemned him to death after a formal trial. In the whole court of juſtice that tried this miſcreant, there was only one man (called *Archangeli*) who could write. A farrier was the perſon who impeached: and he, inſtead of the ſignatures, ſealed with a horſe-ſhoe; and Archangeli, who performed

Grenada. formed the office of clerk, wrote round it theſe words in French, "Mark of M. de la Brie, counſel for the court."

It was apprehended that the court of France would not ratify a ſentence paſſed with ſuch unuſual formalities; and therefore moſt of the judges of the governor's crimes, and witneſſes of his execution, diſappeared. Only thoſe remained whoſe obſcurity ſcreened them from the purſuit of the laws. By an eſtimate, taken in 1700, there were at Grenada no more than 251 white people, 53 free ſavages or mulattoes, and 525 ſlaves. The uſeful animals were reduced to 64 horſes and 569 head of horned cattle. The whole culture conſiſted of three plantations of ſugar and 52 of indigo.—The iſland had been ſold in 1664 to the French Weſt Indian company for 100,000 livres.

This unfavourable ſtate of the affairs of Grenada was changed in 1714. The change was owing to the flouriſhing condition of Martinico. The richeſt of the ſhips from that iſland were ſent to the Spaniſh coaſts, and in their way touched at Grenada to take in refreſhments. The trading privateers, who undertook this navigation, taught the people of that iſland the value of their ſoil, which only required cultivation. Some traders furniſhed the inhabitants with ſlaves and utenſils to erect ſugar plantations. An open account was eſtabliſhed between the two colonies. Grenada was clearing its debts gradually by its rich produce; and the balance was on the point of being cloſed, when the war in 1744 interrupted the communication between the two iſlands, and at the ſame time ſtopped the progreſs of the ſugar-plantations. This loſs was ſupplied by the culture of coffee, which was purſued during the hoſtilities with all the activity and eagerneſs that induſtry could inſpire.—The peace of 1748 revived all the labours, and opened all the former ſources of wealth. In 1753 the population of Grenada conſiſted of 1262 white people, 175 free negroes, and 11,991 ſlaves. The cattle amounted to 2298 horſes or mules, 2456 head of horned cattle, 3278 ſheep, 902 goats, and 331 hogs. The cultivation roſe to 83 ſugar plantations, 2,725,600 coffee trees, 150,300 cocoa-trees, and 800 cotton plants. The proviſions conſiſted of 5,740,450 trenches of caſſada, 933,596 banana trees, and 143 ſquares of potatoes and yams. The colony made a rapid progreſs, in proportion to the excellence of its ſoil; but in the courſe of the laſt war but one the iſland was taken by the Britiſh. At this time one of the mountains at the ſide of St George's harbour was ſtrongly fortified, and might have made a good defence, but ſurrendered without firing a gun; and by the treaty concluded in 1763 the iſland was ceded to Britain. On this ceſſion, and the management of the colony after that event, the abbé Raynal has the following remarks.—"This long train of evils [the ambition and miſmanagement of his countrymen] has thrown Grenada into the hands of the Engliſh, who are in poſſeſſion of this conqueſt by the treaty of 1763. But how long will they keep this colony? Or, will it never again be reſtored to France?—England has not made a fortunate beginning. In the firſt enthuſiaſm raiſed by an acquiſition, of which the higheſt opinion had been previouſly formed, every one was eager to purchaſe eſtates there. They ſold for much more than their real value. This caprice, by expelling old coloniſts who were inured to the climate, has ſent about 1,553,000l. out of the mother-country. This imprudence has been followed by another. The new proprietors, miſled, no doubt, by national pride, have ſubſtituted new methods to thoſe of their predeceſſors. They have attempted to alter the mode of living among their ſlaves. The negroes, who from their very ignorance are more attached to their cuſtoms than other men, have revolted. It hath been found neceſſary to ſend out troops, and to ſhed blood. The whole colony was filled with ſuſpicions. The maſters who had laid themſelves under a neceſſity of uſing violent methods, were afraid of being burnt or maſſacred in their own plantations. The labours have declined, or been totally interrupted. Tranquillity has at length been reſtored. The number of ſlaves has been increaſed as far as 40,000, and the produce has been raiſed to the treble of what it was under the French government. The plantations will ſtill be improved by the neighbourhood of a dozen of iſlands, called the *Grenadines* or *Grenadilloes*, that are dependent on the colony. They are from three to eight leagues in circumference. The air is wholeſome. The ground, covered only with thin buſhes, has not been ſcreened from the ſun. It exhales none of thoſe noxious vapours which are fatal to the huſbandman. Cariacou, the only one of the Grenadines which the French have occupied, was at firſt frequented by turtle fiſhermen; who, in the leiſure afforded them by ſo eaſy an occupation, employed themſelves in clearing the ground. In proceſs of time, their ſmall number was increaſed by the acceſſion of ſome of the inhabitants of Guadaloupe; who, finding that their plantations were deſtroyed by a particular ſort of ants, removed to Cariacou. The iſland flouriſhed from the liberty that was enjoyed there. The inhabitants collected about 1200 ſlaves, by whoſe labours they made themſelves a revenue of near 20,000l. a-year in cotton.—The other Grenadines do not afford a proſpect of the ſame advantages, though the plantation of ſugar is begun there. It has ſucceeded remarkably well at Becouya, the largeſt and moſt fertile of theſe iſlands, which is no more than two leagues diſtant from St Vincent." Grenada.

In the year 1779 the conqueſt of this iſland was accompliſhed by D'Eſtaign the French admiral, who had been prevented from attempting it before by his enterpriſe againſt St Vincent. Immediately after his conqueſt of St Lucia, however, being reinforced by a ſquadron under M. de la Motte, he ſet ſail for Grenada with a fleet of 26 ſail of the line and 12 frigates, having on board 10,000 land forces. Here he arrived on the ſecond of July; and landed 3000 troops, chiefly Iriſh, being part of the brigade compoſed of natives of Ireland in the ſervice of France. Theſe were conducted by Count Dillon, who diſpoſed them in ſuch a manner as to ſurround the hill that overlooks and commands George's town, together with the fort and harbour. To oppoſe theſe, Lord M'Cartney, the governor, had only about 150 regulars, and 300 or 400 armed inhabitants; but though all reſiſtance was evidently vain, he determined nevertheleſs to make an honourable and gallant defence. The preparations he made were ſuch as induced D'Eſtaign himſelf to be preſent at the attack; and, even with his vaſt ſuperiority of force, the firſt attack on the entrenchments proved unſucceſsful.

Grenada. unſucceſsful. The ſecond continued two hours; when the garriſon were obliged to yield to the immenſe diparity of numbers who aſſaulted them, after having killed or wounded 300 of their antagoniſts. Having thus made themſelves maſters of the intrenchments on the hill, the French turned the cannon of them towards the fort which lay under it; on which the governor demanded a capitulation. The terms, however, were ſo extraordinary and unprecedented, that both the governor and inhabitants agreed in rejecting them; and determined rather to ſurrender without any conditions at all than upon thoſe which appeared ſo extravagant. On this occaſion D'Eſtaign is ſaid to have behaved in a very haughty and ſevere manner; indulging his ſoldiers alſo in the moſt unwarrantable liberties, and in which they would have proceeded much farther had they not been reſtrained by the Iriſh troops in the French ſervice.

In the mean time Admiral Byron, who had been convoying the homeward-bound Weſt India fleet, haſtened to St Vincent, in hopes of recovering it; but being informed, by the way, that a deſcent had been made at Grenada, he changed his courſe, hoping that Lord M'Cartney would be able to hold out till his arrival. On the ſixth of July he came in ſight of the French fleet; and, without regarding D'Eſtaign's ſuperiority of ſix ſhips of the line and as many frigates, determined if poſſible to force him to a cloſe engagement. The French commander, however, was not ſo confident of his own proweſs as to run the riſk of an encounter of this kind; and having already atchieved his conqueſt, had no other view than to preſerve it. His deſigns were facilitated by the good condition of his fleet; which being more lately come out of port than that of the Britiſh, ſailed faſter, ſo that he was thus enabled to keep at what diſtance he pleaſed. The engagement began about eight in the morning, when Admiral Barrington with his own and two other ſhips got up to the van of the enemy, which they attacked with the greateſt ſpirit. As the other ſhips of his diviſion, however, were not able to get up to his aſſiſtance, theſe three ſhips were neceſſarily obliged to encounter a vaſt ſuperiority, and of conſequence ſuffered exceedingly. The battle was carried on from beginning to end in the ſame unequal manner; nor were the Britiſh commanders, though they uſed their utmoſt efforts for this purpoſe, able to bring the French to a cloſe engagement. Thus Captains Collingwood, Edwards, and Cornwallis, ſtood the fire of the whole French fleet for ſome time. Captain Fanſhaw of the Monmouth, a 64 gun ſhip, threw himſelf ſingly in the way of the enemy's van; and Admiral Rowley and Captain Butchart fought at the ſame diſadvantage: ſo that finding it impoſſible to continue the engagement with any probability of ſucceſs, a general ceſſation of firing took place about noon. It recommenced in the ſame manner about two in the afternoon; and laſted, with different interruptions, till the evening. During this action ſome of the Britiſh ſhips had forced their way into St George's harbour, not imagining that the enemy were already in poſſeſſion of the iſland. They were ſoon undeceived, however, by perceiving the French colours flying aſhore, and the guns and batteries firing at them. This diſcovery put an end to the deſign which had brought on the engagement; and as it was now high time to think of providing for the ſafety of the Britiſh tranſports, which were in danger from the number of the enemy's frigates, the engagement was finally diſcontinued. During this action ſome of Admiral Byron's ſhips had ſuffered extremely. The Lion of 64 guns, Captain Cornwallis, was found incapable of rejoining the fleet which were plying to windward; and was therefore obliged to bear away alone before the wind. Two other ſhips lay far aſtern in a very diſtreſſed ſituation; but no attempt was made to capture them, nor did the French admiral ſhow the leaſt inclination to renew the engagement. Grenada.

Grenada was reſtored to Great Britain by the treaty of peace of 1783.—George's town, or St George's, is the reſidence of the governor.

When the levelling ſpirit of the French revolution threatened to baniſh all rational liberty and ſubordination from the face of the earth, the ill-fated iſland of Grenada did not eſcape the contagion. The ſlaves in this iſland were early tinctured with the love and admiration of thoſe principles which ſubverted the monarchy of France. They were of conſequence ready to revolt at the inſtigations of republican emiſſaries, who in 1795 effected a landing from the iſland of Guadaloupe in conſiderable numbers. Yet many of the ſlaves heſitated at firſt to take an active part in this unnatural rebellion againſt the Britiſh government; but their perſeverance was at length ſhaken by the alluring temptations which were held out to them, of participating of the property of their plundered maſters, and the flattering promiſes of total emancipation.

It is aſtoniſhing, as it ſeems repugnant to every feeling of human nature with which we are acquainted, that ſuch of the ſlaves, both male and female, as had experienced the moſt humane treatment, and enjoyed the greateſt ſhare of their maſters confidence, were the moſt active and cruel in this horrible inſurrection. This ſeems to be a melancholy proof of an aſſertion often made by thoſe who are inimical to the abolition of the ſlave-trade, that the moſt humane and benevolent treatment can make no impreſſion on their native ferocity.

As the French troops had been too ſucceſsful in their attack upon Guadaloupe, the diſaffected negroes in Grenada who ſpoke the French language, as well as numbers of white people who were charmed with the extravagant doctrine of liberty and equality, were encouraged to project and execute a revolt from the Britiſh government, every ſtep of which they marked with plunder and with blood. Having effected a landing at Grenville or *La Baye*, and Charlotte town, on different ſides of the iſland, the inſurgents, to the number of 100, ſurrounded the former place, and about one o'clock in the morning (March 6. 1795) plundered the dwelling and ſtore houſes, and dragging the innocent, the aſtoniſhed inhabitants into the ſtreets, ſet them up as marks to be ſhot at. When they fell before the diſcharge of their muſketry, the inhuman banditti mangled their bodies with cutlaſſes in the moſt ſhocking manner. At this time there were 14 Engliſh inhabitants in the town, only three of whom eſcaped the inſatiable vengeance of thoſe pretended lovers of freedom! Some eſcaped by ſwimming to the veſſels which were then lying in the roads, while others captured by the inſurgents, were murdered on their way to the camp of the rebel

Grenadines || Greſham.

rebel chief Fedon, becauſe they could not march ſo quickly as deſired.

The murders committed at this place, and the plunder and devaſtation which marked their ſteps in other parts of the iſland, are ſhocking to humanity; and it is too notorious that the inſurgents were inſtigated to the whole by the reſtleſs emiſſaries of the French republic. The inſurrection was not finally ſuppreſſed till June 1796.

GRENADINES, or GRENADILLOS. See the preceding article.—In theſe iſlands, freſh water is found only in one place. A ſmall ſpring has been diſcovered in the principal iſland Cariacou, by digging; but being of great value, it is kept locked by the proprietor. The capital of that iſland is called Hilſborough, in which there is a ſmall church.

GRENAILLE, a name given by the French writers to a preparation of copper, which the Chineſe uſe as a red colour in ſome of their fineſt china, particularly for that colour which is called *oil-red* or *red in oil*. The china-ware coloured with this is very dear. The manner in which they procure the preparation is thus: they have in China no ſuch thing as ſilver-coined money, but they uſe in commerce bars or maſſes of ſilver; theſe they pay and receive in large bargains; and among a nation ſo full of fraud as the Chineſe, it is no wonder that theſe are too often adulterated with too great an alloy of copper. They paſs, however, in this ſtate, in the common payments. There are ſome occaſions, however, ſuch as the paying the taxes and contributions, on which they muſt have their ſilver pure and fine: on this occaſion they have recourſe to certain people, whoſe ſole buſineſs it is to refine the ſilver, and ſeparate it from the copper and the lead it contains. This they do in furnaces made for the purpoſe, and with very convenient veſſels. While the copper is in fuſion, they take a ſmall bruſh, and dip the end of it into water; then ſtriking the handle of the bruſh, they ſprinkle the water by degrees upon the melted copper; a ſort of pellicle forms itſelf by this means on the ſurface of the matter, which they take off while hot with pincers of iron, and immediately throwing it into a large veſſel of cold water, it forms that red powder which is called the *grenaille*; they repeat the operation every time they in this manner ſeparate the copper; and this furniſhes them with as much of the *grenaille* as they have occaſion for in their china works.

GRENOBLE, a large, populous, and ancient town of France, in the department of Iſere, with a biſhop's ſee. It contains a great number of handſome ſtructures, particularly the churches and convents. The leather and gloves that are made here are highly eſteemed. It is ſeated on the river Iſere, over which there are two bridges to paſs into that part called *Perriere*, a large ſtreet on the other ſide of the river. E. Long. 5. 49. N. Lat. 45. 12.

GRESHAM, SIR THOMAS, an opulent merchant of London, deſcended from an ancient and honourable family of Norfolk, was born in 1519. He was, as his father had been before him, appointed king's agent at Antwerp, for taking up money of the merchants; and in 1551 he removed to that city with his family. This employment was ſuſpended on the acceſſion of Queen Mary: but on proper repreſentations, was reſtored to him again. Queen Elizabeth conferred the honour of knighthood upon him, and made him her agent in foreign parts. It was at this time he thought proper to provide himſelf with a manſion-houſe in the city, ſuitable to his ſtation and dignity; with which intention he built a large houſe on the weſt ſide of Biſhopſgate-ſtreet, afterwards known by the name of *Greſham-college*. His father had propoſed building a houſe or exchange for the merchants to meet in, inſtead of walking in the open ſtreet; but this deſign remained for the ſon to accompliſh. Sir Thomas went beyond his father: he offered, if the citizens would provide a proper piece of ground, to build a houſe at his own expence; which, being accepted, he fulfilled his promiſe after the plan of the exchange at Antwerp. When the new edifice was opened, the queen (Jan. 29. 1570) came and dined with the founder; and cauſed a herald with a trumpet to proclaim it by the name of the *Royal Exchange*. In purſuance alſo of a promiſe to endow a college for the profeſſion of the ſeven liberal ſciences, he made a teſtamentary diſpoſition of his houſe in London for that purpoſe; leaving one moiety of the royal exchange to the corporation of London, and the other to the mercers company, for the ſalaries of ſeven lecturers in divinity, law, phyſic, aſtronomy, geometry, muſic, and rhetoric, at 50l. each per annum. He left ſeveral other conſiderable benefactions, and died in 1579. As to the college, it was afterwards pulled down in conſequence of an application to parliament from the city, and the exciſe-office erected in its place. The lectures are read, or rather hurried through, in a chamber over the Royal Exchange.—Thoſe who have drawn Sir Thomas's character obſerve, that he had the happineſs of a mind every way ſuited to his fortune; generous and benign; ready to perform any good actions, and encourage them in others. He was a great friend and patron of our celebrated martyrologiſt John Fox. He was well acquainted with the ancient and ſeveral modern languages; he had a very comprehenſive knowledge of all affairs relating to commerce, whether foreign or domeſtic; and his ſucceſs was not leſs, being in his time eſteemed the higheſt commoner in England. He tranſacted Queen Elizabeth's mercantile affairs ſo conſtantly, that he was called *the royal merchant*; and his houſe was ſometimes appointed for the reception of foreign princes upon their firſt arrival at London.

Greſham || Greville.

GREUSSEN, a town of Upper Saxony, in the county of Schwaitzburg, 16 miles north of Erfurt, and 18 eaſt of Mulhauſen. Long. 10° 45′ eaſt, Lat. 51° 6′ north.

GREVILLE, FULKE, Lord Brook, of Beauchamp's Court in Warwickſhire, a poet and miſcellaneous writer, was born in the year 1554, and deſcended from the noble families of Beauchamps of Powick and Willoughby de Brook. In company with his couſin Sir Philip Sidney, he began his education at a ſchool in Shrewſbury; thence he went to Oxford, where he remained for ſome time a gentleman commoner, and then removed to Trinity-College in Cambridge. Having left the univerſity, he viſited foreign courts, and thus added to his knowledge of the ancient languages a perfect knowledge of the modern. On his return to England he was introduced to Queen Elizabeth by

Greville || Grew.

his uncle Robert Greville, at that time in her majesty's service; and by means of Sir Henry Sidney, lord president of Wales, was nominated to some lucrative employments in that principality.

In the year 1581, when the French commissioners who came to treat about the queen's marriage with the duke of Anjou were sumptuously entertained with tilts and tournaments, Mr Greville, who was one of the challengers, so signalized himself, as to "win the reputation of a most valiant knight." He continued a constant attendant at court, and a favourite with the queen to the end of her reign; during which he obtained the office of treasurer of marine causes, also a grant of the manor of Wedgnock, and likewise the honour of knighthood. In this reign he was several times elected member for the county of Warwick; and from the journals of the house seems to have been a man of business, as his name frequently appears in committees.

On the accession of King James I. he was installed knight of the Bath; and soon after obtained a grant of the ruinous castles of Warwick, which he repaired at a considerable expence, and where he probably resided during the former part of this reign: but in the year 1614, the twelfth of James I. he was made under-treasurer, and chancellor of the exchequer, one of the privy council, and gentleman of the bed-chamber; and in 1620, was raised to the dignity of a baron by the title of Lord Brook of Beauchamp's Court. He was also privy-counsellor to King Charles I. in the beginning of whose reign he founded a history-lecture in Cambridge.

Having thus attained the age of 74, through a life of continued prosperity, universally admired as a gentleman and a scholar, he fell by the hand of an assassin, one of his own domestics, who immediately stabbed himself with the same weapon with which he had murdered his master. This fellow's name was Haywood; and the cause is said to have been a severe reprimand for his presumption in upbraiding his master for not providing for him after his death. It seems he had been witness to Lord Brook's will, and knew the contents. Some say he stabbed him with a knife in the back, others with a sword. This affair happened at Brook-house in Holborne.—Lord Brook was buried with great pomp in St Mary's church at Warwick, in his own vault, over which he had erected a monument of black and white marble, ordering at his death the following inscription to be engraved upon the tomb: "Fulke Greville, servant to Queen Elizabeth, counsellor to King James, and friend to Sir Philip Sidney. *Trophæum Peccati.*" He wrote several works both in verse and prose; among which are, 1. Two tragedies, Alaham and Mustapha. 2. A Treatise of Human Learning, &c. in verse, folio. 3. The Life of Sir Philip Sidney. 4. An inquisition upon Fame and Honour, in 86 stanzas. 6. *Cæcilia*, a collection of 109 songs. 7. His Remains, consisting of political and philosophical poems.

GREVIUS. See GRÆVIUS.

GREW, NEHEMIAH, a learned English writer, in the 17th century, had a considerable practice as a physician in London, and succeeded Mr Oldenburg in the office of secretary to the royal society. In this capacity, pursuant to an order of council, he drew up a catalogue of the natural and artificial rarities belonging to the society, under the title of *Musæum Regalis Societatis*, &c. 1681. He also wrote, besides several pieces in the Philosophical Transactions, 1. The Comparative Anatomy of the Stomach and Guts, folio. 2. The Anatomy of Plants, folio. 3. *Tractatus de salis Cathartici natura et usu.* 3. *Cosmologia Sacra*, or a Discourse of the Universe as it is the Creature and Kingdom of God, folio. He died suddenly in 1721.

Grewia, Grey.

GREWIA, a genus of plants belonging to the gynandria class, and in the natural method ranking under the 37th order, *Columniferæ*. See BOTANY *Index*.

GREY, or GRAY colour. See GRAY.

GREY, *Lady Jane*, a most illustrious and unfortunate lady, descended of the blood-royal of England by both parents, was the eldest daughter of Henry Grey marquis of Dorset, and Frances the daughter of Charles Brandon Lord Suffolk, by Mary the dowager of Louis XII. king of France, who was the youngest daughter of Henry VII. king of England. She was born in the year 1537, at Broadgate, her father's seat in Leicestershire. She discovered an early propensity to all kinds of good literature; and having a fine genius, improved under the tuition of Mr Elmer, she made a most surprising progress in the languages, arts, and sciences. She understood perfectly both kinds of philosophy, and could express herself very properly at least in the Latin and Greek tongues; and we are informed by Sir Thomas Chaloner (in Strype's Memorials, vol. iii. p. 93.), that she was well versed in Hebrew, Chaldee, Arabic, French, and Italian; "and (he adds) she played well on instrumental music, writ a curious hand, and was excellent at the needle." Chaloner also tells us, that she accompanied her musical instrument with a voice exquisitely sweet in itself, assisted by all the graces that art could bestow.

In the year 1553, the dukes of Suffolk and Northumberland, who were now, after the fall of Somerset, arrived at the height of power, began, on the decline of the king's health, to think how to prevent that reverse of fortune which, as things then stood, they foresaw must happen upon Edward's death. To obtain this end, no other remedy was judged sufficient but a change in the succession of the crown, and transferring it into their own families, by rendering Lady Jane queen. Those most excellent and amiable qualities which had rendered her dear to all who had the happiness to know her, joined to her near affinity to the king, subjected her to become the chief tool of an ambition so notoriously not her own. Upon this very account she was married to Lord Guilford Dudley, fourth son of the duke of Northumberland, without discovering to her the real design of the match; which was celebrated with great pomp in the latter end of May, so much to the king's satisfaction, that he contributed bounteously to the expence of it from the royal wardrobe. The young king Edward VI. died in July following; and our fair scholar, with infinite reluctance, overpowered by the solicitations of her ambitious friends, allowed herself to be proclaimed queen of England, on the strength of a deed of settlement extorted from that prince by her father-in-law the duke of Northumberland, which set aside the succession of Queen Mary, Queen Elizabeth, and Mary

queen

Grey || Grief.

queen of Scots. Her regal pageantry continued but a few days. Queen Mary's undoubted right prevailed; and the unfortunate Lady Jane Grey and her husband were committed to the Tower, and on the 13th of November arraigned and found guilty of high treason. On the 12th of February following they were both beheaded on Tower-hill. Her magnanimity in this dreadful catastrophe was astonishing. Immediately before her execution, she addressed herself to the weeping multitude with amazing composure and coherency: she acknowledged the justice of the law, and died in charity with that wretched world which she had so much reason to execrate. Thus did the pious Mary begin her reign with the murder of an innocent young creature of 18; who for simplicity of manners, purity of heart, and extensive learning, was hardly ever equalled in any age or country. But, alas! Jane was an obstinate heretic.—A few days before her execution, Fleckenham, the queen's chaplain, with a pious intention to rescue her poor soul from eternal misery, paid her frequent visits in the Tower, and used every argument in his power to convert her to the Popish religion; but he found her so much his superior in argument, that he gave up the contest: resigning her body to the block, and her soul to the devil.

Her writings are, 1. Four Latin Epistles; three to Bullenger, and one to her sister Lady Catherine. The last was written the night before her execution, in a blank leaf of a Greek Testament. Printed in a book entitled *Epistolæ Helveticæ Reformatoribus, vel ad eos scriptæ*, &c. Tiguri, 1742, 8vo. 2. Her Conference with Fleckenham. (Ballard). 4. A letter to Dr Harding, her father's chaplain. Printed in the Phœnix, vol. ii. p. 28. 4. A prayer for her own use during her confinement. In Fox's acts and monuments. 5. Four Latin verses; written in prison with a pin. They are as follows:

Non aliena putes, homini quæ obtingere possunt:
Sors hodierna mihi, tunc erit illa tibi.
Jane Dudley.

Deo juvante, nil nocet livor malus:
Et non juvante, nil juvat labor gravis.
Post tenebras spero lucem.

6. Her Speech on the Scaffold. (Ballard). It began thus: "My Lords, and you good Christian people who come to see me die; I am under a law, and by that law, as a never-erring judge, I am condemned to die: not for any thing I have offended the queen's majesty; for I will wash my hands guiltless thereof, and deliver to my God a soul as pure from such trespass as innocence from injustice; but only for that I consented to the thing I was enforced unto, constraint making the law believe I did that which I never understood," &c. —Hollinshed, Sir Richard Baker, Bale, and Fox, tell us that she wrote several other things, but do not mention where they are to be found.

Grey-Hound. See *Gre-Hound.*

GRIAS, a genus of plants belonging to the polyandria class, and in the natural method ranking with those of which the order is doubtful. See Botany *Index.*

GRIEF, or Sorrow. The influence of this passion on the body is very great. Its effects resemble in several instances those of fear, with, however, some variations, owing perhaps to its being in general of longer duration. Grief diminishes the bodily strength in general, and particularly the force of the heart and circulation; as appears by the frequent sighs and deep respirations which attend it, which seem to be necessary exertions, in order to promote the passage of the blood through the lungs. It diminishes perspiration, obstructs the menstrual discharge, produces paleness of the skin, and œdematous complaints, and schirrus of the glandular parts. It aggravates the scurvy, and the malignity of putrid and contagious distempers, and renders people more apt to receive the infection of them. When it comes on suddenly, and in a great degree, it causes a palpitation of the heart, and renders the pulse irregular. Blindness, gangrene, and sudden death, have followed the excess of this sensation. Its effects of changing the colour of the hair are well known. Opiates, if not given in large doses, are good cordials in this case.

Grieffen haken || Grifon.

GRIEFFENHAKEN, a town of Prussian Pomerania, in the duchy of Stetin, seated on the Oder, opposite to Gartz. E. Long. 14. 42. N. Lat. 53. 25.

GRIELUM, a genus of plants belonging to the decandria class. See Botany *Index.*

GRIERSON, Constantia, born of poor parents in the county of Kilkenny in Ireland, was one of the most learned women on record, though she died at the age of 27, in 1733. She was an excellent Greek and Latin scholar; and understood history, divinity, philosophy, and mathematics. She proved her skill in Latin by her dedication of the Dublin edition of Tacitus to Lord Carteret, and by that of Terence to his son; to whom she also addressed a Greek epigram. She wrote many elegant English poems, several of which were inserted by Mrs Barber among her own. When Lord Carteret was lord lieutenant of Ireland, he obtained a patent for Mr Grierson to be the king's printer; and to reward the uncommon merit of his wife, caused her life to be included in it.

GRIESSEWALDE, a town of Upper Saxony, 24 miles south south-east of Stralsund. E. Long. 11. 18. N. Lat. 54. 4.

GRIFFON (Gryphus, γρυψ), in the natural history of the ancients, the name of an imaginary bird of prey, of the eagle kind. They represented it with four legs, wings, and a beak; the upper part representing an eagle, and the lower a lion: they supposed it to watch over gold mines, hidden treasures, &c. The animal was consecrated to the sun; and the ancient painters represented the chariot of the sun as drawn by griffons. M. Spanheim observes the same of those of Jupiter and Nemesis.

The griffon in Scripture is that species of the eagle called in Latin *ossifraga*, the "osprey;" and פרס, of the verb פרס, *pâras*, "to break."

The griffon is frequently seen on ancient medals; and is still borne in coat-armour. Guillim blazons it rampant; alleging, that any very fierce animal may be so blazoned as well as the lion. Sylvester, Morgan, and others, use the term *segreiant* instead of rampant.

This is also an ornament of architecture in constant

Griſlea, Grimaldi.

uſe among the Greeks, and was copied from them, with the other elegancies of architectural enrichments, by the Romans. See SPHYNX.

GRISLEA, a genus of plants belonging to the octandria claſs; and in the natural method ranking under the 17th order, *Calycanthemæ*. See BOTANY *Index*.

GRIMALDI, FRANCISCO, an eminent painter, generally known by the appellation of *Bologneſe*, was born at Bologna in 1606, where he became a diſciple of Annibal Caracci, and proved an honour to that illuſtrious maſter. From the ſchool of Annibal he went to complete his ſtudies at Rome, and improved himſelf daily, by copying the works of thoſe artiſts in which he obſerved the greateſt excellence, until his ſuperior talents recommended him to the favour of Innocent X. who afforded him immediate opportunities of exerting his genius in the gallery of his palace at Monte Cavallo, and alſo in the Vatican. The merit of his performances very ſoon engaged the attention and applauſe of the public, and increaſed the number of his admirers and friends; among whom were the prince Pamphilio, and many of the principal nobility of Rome. His reputation reached Cardinal Mazarine at Paris, who ſent for him, ſettled a large penſion on him, and employed him for three years in embelliſhing his palace and the Louvre, by the order of Louis XIII. The troubles of the ſtate, and the clamours raiſed againſt the cardinal, whoſe party he warmly eſpouſed, put him ſo much in danger, that his friends adviſed him to retire among the Jeſuits. He did ſo, and was of uſe to them; for he painted them a decoration for the expoſition of the ſacrament during the holy days, according to the cuſtom of Rome. This piece was mightily reliſhed at Paris: the king honoured it with two viſits, and commanded him to paint ſuch another for his chapel at the Louvre. Grimaldi after that returned to Italy; and at his arrival at Rome found his great patron Innocent X. dead: but his two ſucceſſors Alexander VII. and Clement IX. honoured him equally with their friendſhip, and found him variety of employment. Grimaldi was amiable in his manners, as well as ſkilful in his profeſſion: he was generous without profuſion, reſpectful to the great without meanneſs, and charitable to the poor. The following inſtance of his benevolence may ſerve to characteriſe the man. A Sicilian gentleman, who had retired from Meſſina with his daughter during the troubles of that country, was reduced to the miſery of wanting bread. As he lived over-againſt him, Grimaldi was ſoon informed of it; and in the duſk of the evening, knocking at the Sicilian's door, without making himſelf known, toſſed in money and retired. The thing happening more than once, raiſed the Sicilian's curioſity to know his benefactor; who finding him out, by hiding himſelf behind the door, fell down on his knees to thank the hand that had relieved him. Grimaldi remained confuſed, offered him his houſe, and continued his friend till his death. He died of a dropſy at Rome in 1680, and left a conſiderable fortune among ſix children. The genius of Grimaldi directed him chiefly to landſcape, which he executed moſt happily. His colouring is ſtrong; his touch light and delicate; his ſituations are uncommonly pleaſing; and the leafing of his trees is admirable. Sometimes, indeed, his colouring appears rather too green: but thoſe landſcapes, which he painted in the manner of Caracci, may ſerve as models for all thoſe who admire the ſtyle of that ſchool; and he deſigned his figures in an elegant taſte. The pictures of this maſter are very rare, eſpecially thoſe of his beſt time; and whenever they are to be purchaſed, they afford large prices. Of his children above-mentioned, the youngeſt, named *Alexander*, proved a good painter, in the ſame ſtyle and taſte with his father, though very far inferior to him: ſome of the pictures of Alexander, however, are either artfully, or injudiciouſly, aſcribed to Franciſco.

Grimbergen || Grinding.

GRIMBERGEN, a town of Auſtrian Brabant, with an abbey and a caſtle, ſix miles north of Bruſſels. E. Long. 4. 27. N. Lat. 50. 57.

GRIMM, a town in the electorate of Saxony, with a citadel, ſeated on the Muldaw, 10 miles ſouth-eaſt of Leipſic. E. Long. 12. 35. N. Lat. 51. 15.

GRIMMEN, a town of Swediſh Pomerania, five miles ſouth of Stralſund. E. Long. 13. 29. N. Lat. 54. 12.

GRIMSBY, a large ſea-port town of Lincolnſhire in England, 169 miles from London; and ſaid to be the ſecond, if not the firſt, corporation in England. It had anciently three convents and a caſtle. Here are ſeveral ſtreets of good houſes, and a church that looks like a cathedral. It was a place of great trade before its harbour was choaked up; yet the road before it is a good ſtation for ſhips that wait for a wind to get out to ſea. Its chief trade is in coals and ſalt brought by the Humber.

GRINDELWALD, a town of Switzerland, in the canton of Bern, ſeated among mountains, at the foot of a celebrated glacier, 25 miles ſouth-eaſt of Thun. E. Long. 7. 43. N. Lat. 46. 27.

GRINDING, or TRITURATION, the act of breaking or comminuting a ſolid body, and reducing it into powder. See PULVERISATION and LEVIGATION.

The painters colours are grinded on a marble or porphyry, either with oil or gum-water.

GRINDING is alſo uſed for rubbing or wearing off the irregular parts of the ſurface of a body, and reducing it to the deſtined figure, whether that be flat, concave, or the like.

The grinding and poliſhing of glaſs is a conſiderable art; for which ſee *GLASS-Grinding*. For the grinding of optical glaſſes, ſee OPTICS, the *Mechanical Part*.

GRINDING, in cutlery, is an operation univerſally underſtood, by which edge-tools are ſharpened. According to the uſual practice, this operation is attended with conſiderable inconveniency, occaſioned by the extrication of heat from friction. The ſteel very ſoon becomes ignited when the friction is performed on a dry ſtone; and even when immerſed in water, the operation muſt be ſlow, to prevent the water from being thrown off by the centrifugal force; and if the water is poured on the ſtone from above by means of a cock, the quantity will be too ſmall to preſerve a ſufficiently low temperature. But let the quantity of water be ever ſo great, if the inſtrument to be ſharpened has not its point or edge ſo held as to meet the ſtream, it will almoſt inevitably be made ſofter.

To remedy theſe defects in the common mode of grinding, Mr Nicholſon made an experiment with a grindſtone

Grinding, Grinſted.

grindſtone from Newcaſtle of a fine grit, 10 inches in diameter, with a block of mahogany to be employed with emery on the face of it. The grindſtone and block were fixed on an axis, to be applied occaſionally between the centres of a ſtrong lathe. Both were cylindrical, and of the ſame diameter; the wood was grooved in oppoſite directions, in which the emery might be lodged. The face of the ſtone was left ſmooth, with a trough under it to hold the water. The cylinder of wood was faced with emery and oil, and the ſtone was uſed with water. A file was the inſtrument ground, and it was propoſed to efface all the teeth. The mechaniſm of the lathe produced the rotation, by which the grinding apparatus made five revolutions in a ſecond. The operation of the ſtone was ſlow, and the workman ſoon found inconvenience from the water in the trough being ſoon exhauſted; but the emery cylinder cut rather faſter. The friction operated by quick changes on the whole ſurface of the file, yet it ſoon became too hot to be held conveniently by the uncovered hand; and even when it was held with a cloth, ſuch was the rapid increaſe of heat as to decompoſe the oil, which emitted an empyreumatic odour. When the ſtone became dry, the file was tried on the face of it, which ſoon became blue, and then nearly red-hot. After this both cylinders were covered with tallow, and emery was ſprinkled upon the wooden cylinder, when the ſame inſtrument was held to the ſtone in rapid motion. The friction at firſt was ſcarcely apparent, but the preſſure of the tool ſoon fuſed the tallow, and the ſtone cut very faſt. When the tool after ſome time began to be a little heated, it was removed to a new zone of the cylinder, by which means the temperature was diminiſhed. Similar effects accompanied the uſe of the wooden cylinder.

When oil was uſed upon the cylinder of wood, the heat occaſioned by the friction raiſed the temperature of the inſtrument and of the oil in a ſtate of fluidity; but when tallow inſtead of oil was employed, moſt of the heat was uſed in fuſing that ſubſtance. The increaſed capacity of the melted tallow abſorbed this heat, which became latent, and did not raiſe the temperature: and when the tallow already melted began to grow hot, as well as the tool, the employing another zone of conſiſtent tallow reduced the temperature.

This diſcovery may yet be of conſiderable importance, for which we are indebted to the ingenuity of the learned editor of the Journal which bears his name, a performance which is much eſteemed upon the continent as well as at home, by every man of literature and ſcience.

GRINSTED, EAST and WEST; two towns near Saliſbury in Wiltſhire.

GRINSTED, Eaſt, a town 29 miles from London, ſeated on a hill, near the borders of Surry, near Aſhdown foreſt. It has a handſome church, which was rebuilt after being burnt down 1683. On November 12. 1785, the beautiful tower having lately fallen to decay, fell down, and part lighting on the church very conſiderably damaged it. An hoſpital in the reign of King James I. for 31 poor people of this town, was built and endowed with 330l. a-year. It is a borough by preſcription, governed by a bailiff and his brethren; has ſent burgeſſes to parliament ever ſince the firſt of Edward II. who are elected by about 35 burgage-holders; had a charter for a monthly market from Henry VII. and is generally the place for the aſſizes. The returning officer here is the bailiff, who is choſen by a jury of burgage-holders. Its market is on Thurſday; and its fairs, which are well frequented, are July 13 and December 11; which laſt is a great one for Welſh runts, that are bought up here by the Kentiſh and Suſſex farmers, and for fat hogs and other cattle.

Grinſted || Griſons.

GRINSTED, *Weſt*, in Suſſex, a town above 10 miles to the ſouth-weſt of Eaſt-Grinſted.

GRIPES, in *Medicine*, a ſort of cholic or painful diſorder of the lower belly, occaſioned by irritating matters, or by wind pent up in the inteſtines. See MEDICINE *Index*.

GRIPSWALD, a ſtrong and conſiderable town of Pomerania in Germany; formerly imperial, but now ſubject to the Swedes, with a good harbour and univerſity: E. Long. 13. 53. N. Lat. 54. 12.

GRISGRIS, a ſuperſtition greatly in vogue among the negroes in the interior parts of Africa. The griſgris, according to Le Maire, are certain Arabic characters mixed with magical figures drawn by the marabuts or prieſts upon paper. Labat affirms, that they are nothing elſe than ſcraps of the Koran in Arabic; but this is denied by Barbot, who brought over one of theſe griſgris to Europe, and ſhowed it to a number of perſons deeply ſkilled in oriental learning. None of theſe could find the leaſt trace of any character they underſtood. Yet, after all, this might be owing to the badneſs of the hand-writing; and the words are probably of the Mandingo language, though the characters are an attempt to imitate the Arabic. The pooreſt negro never goes to war without his griſgris, as a charm againſt wounds; and if it proves ineffectual, the prieſt transfers the blame on the immorality of his conduct. Theſe prieſts invent griſgris againſt all kinds of dangers, and in favour of all deſires and appetites; by virtue of which the poſſeſſors may obtain or avoid whatever they like or diſlike. They defend them from ſtorms, enemies, diſeaſes, pains, and misfortunes; and preſerve health, long life, wealth, honour, and merit, according to the marabuts. No clergy in the world are more honoured and revered by the people than theſe impoſtors are by the negroes; nor are any people in the world more impoveriſhed by their prieſts than theſe negroes are, a griſgris being frequently ſold at three ſlaves and four or five oxen. The griſgris intended for the head is made in the form of a croſs, reaching from the forehead to the neck behind, and from ear to ear; nor are the arms and ſhoulders neglected. Sometimes they are planted in their bonnets in the form of horns; at other times, they are made like ſerpents, lizards, or ſome other animals, cut out of a kind of paſteboard, &c. There are not wanting Europeans, and otherwiſe intelligent ſeamen and merchants, who are in ſome degree infected with this weakneſs of the country, and believe that the negro ſorcerers have an actual communication with the devil, and that they are filled with the malignant influence of that evil ſpirit, when they ſee them diſtort their features and muſcles, make horrid grimaces, and at laſt imitate all the appearance of epileptics.

GRISONS, a people ſituated among the Alps, and allies of the Swiſs. Their country is bounded on the

north

Grisons. north by the counties of Surgans and Bludenz, the canton of Glaris, and the principality of Lichtenstein; on the south by the canton's Italian bailiwics, the county of Chavenne, and the Valteline; on the east by the territories of Venice and Milan; and on the west by some of the Italian bailiwics, and the canton of Uri. It is divided into three leagues, viz. the *Grison* or *gray league*, the *league of the house of God*, and that of the *ten jurisdictions*; which unite and form one republic. The two first lie towards the south, and the third towards the north. The length of the whole is above 70 miles, and the breadth about 60. The inhabitants are said to have had the name of *Grisons* from the gray coats they wore in former times. This country, lying among the Alps, is very mountainous; but the mountains yield good pasture for cattle, sheep, and goats, with some rye and barley: in the valleys there is plenty of grain, pulse, fruits, and wine. This country also abounds with hogs and wild-fowl; but there is a scarcity of fish and salt, and their horses are mostly purchased of foreigners. The principal rivers are the Rhine, the Inn, and the Adda. Here are also several lakes, most of which lie on the tops of the hills. The language of the Grisons is either a corrupt Italian or the German. Each of the leagues is subdivided into several lesser communities, which are so many democracies; every male above 16 having a share in the government of the community, and a vote in the election of magistrates. Deputies from the several communities constitute the general diet of the Grison leagues, which meets annually, and alternately at the capital of each league; but they can conclude nothing without the consent of their constituents. This country was anciently a part of Rhetia. After the extinction of the Roman empire in the west, it was some time subject to its own dukes, or those of Swabia. Then the bishop of Coire, and other petty princes, dependent on the emperors of Germany, became masters of great part of it: at last, by the extinction of some, purchase, voluntary grants, and force, it got rid of all its lords, and erected itself into three distinct republics, each of which, as we observed already, is subdivided into a certain number of communities, which are a sort of republics, exercising every branch of sovereignty, except that of making peace or war, sending embassies, concluding alliances, and enacting laws relating to the whole country, which belong to the provincial diets of the several leagues. The communities may be compared to the cities of Holland, and the diets of the several leagues to the provincial states. The particular diets are composed of a deputy from each community; and both in them and the communities every thing is determined by a majority of votes. In the communities, every male above 16 has a vote. Besides the annual provincial diets for choosing the chiefs and other officers, and deliberating on the affairs of the respective leagues, there are general diets for what concerns all the three leagues or whole body. In both these, the representatives can do nothing of themselves, but are tied down to the instructions of their principals. There is a general seal for all the three leagues; and each particular league has a separate seal. Besides the stated times of meeting, extraordinary diets are sometimes summoned, when either the domestic affairs of the state or any foreign minister require it. In the general diets, the Grey League has 28 votes; that of the House of God, 23; and that of the Ten Jurisdictions, 15. These leagues, at different times, have entered into close alliances with the neighbouring cantons and their associates. The bailiwics belonging in common to the three leagues are those of the Valteline, Chievane, Bormio, Meyenfeld, Malans, and Jennins; the officers of which are nominated successively by the several communities every two years. The yearly revenues arising to the Grisons from their bailiwics is said to amount to about 13,500 florins. The public revenues altogether are but small, though there are many private persons in the country that are rich. However, in case of any extraordinary emergency, they tax themselves in proportion to the necessity of the service and the people's abilities. They have no regular troops, but a well-disciplined militia; and upon occasion, it is said, can bring a body of 30,000 fighting men into the field: but their chief security arises from the narrow passes and high mountains by which they are surrounded. Grisons.

Of the jurisprudence, religion, &c. of the Grisons, the following account is given by Mr Coxe in his travels in Switzerland. Throughout the three leagues the Roman law prevails, modified by the municipal customs. The courts of justice in each community are composed of the chief magistrate, who presides, and a certain number of jurymen, chosen by the people: they have no regular salaries, but receive for their attendance, a small sum, arising in some communities from the expences of the process, which are defrayed by the criminals; in others from a share of the fines. They enjoy the power of pardoning or diminishing the penalty, and of receiving a composition in money. This mode of proceeding supposes what is as absurd in theory as it is contrary to experience, that judges will incline to mercy when it is their interest to convict; or will impartially inflict punishment, even when injurious to their own private advantage.—The prisoners are examined in private; frequently tortured for the purpose of forcing confession, when the judges either divide the fines, or remit the punishment for a composition. In some districts a criminal trial is a kind of festival to the judges, for whom a good repast is provided at the expence of the prisoner if convicted; and thus the following allusion, in Garth's Dispensary, applied with more wit than truth to our courts of justice, is literally fulfilled:—

'And wretches hang, that jurymen may *dine*.'

Capital punishments, however, are extremely rare; a circumstance arising not from a want of severity in the penal statutes, or from a propensity to mercy in the judges: but because the latter draw more advantages from fining than executing an offender. In a word, to use the expression of Burnet, which is as true at present as it was in his time, "Many crimes go unpunished, if the persons who commit them have either great credit or much money." It is remarkable, that torture is more frequently applied, and for smaller delinquencies, in these independent republics, than in the subject provinces. The infliction of it depends entirely upon the arbitrary will of the judges; a majority of whom may order it for an offence which is not capital, nor even punishable by corporal penalties. Thus

it

Griſons. it is not uncommon, in thoſe communities where fines are divided among the judges, to torture women of looſe conduct, for the purpoſe of compelling them to confeſs with whom they have been connected; for as ſuch offences are puniſhable by fines, the more perſons are convicted, the larger ſhare of money is diſtributed among the judges for the trouble of their attendance. Even in the diſtricts where the fines are paid to the community, torture is often no leſs wantonly inflicted, becauſe when the priſoner is not found guilty, the expences of the proceſs fall upon the public, and the judges receive little emolument. Even in the civil courts moſt cauſes are decided by bribing the judges; and appeals in thoſe communities, wherein they are admitted, ſcarcely ſerve any other end than to enlarge the ſphere of corruption. Coire and a few other places are excepted from this general reflection.

The religion of the Griſons is divided into catholic and reformed. The doctrines of the reformation were firſt preached about the year 1524, and received at Flæſch, a ſmall village in the Ten Juriſdictions upon the confines of Sargans; from thence they were extended to Mayenfeld and Malantz, and ſoon afterwards through the whole valley of Pretigau. The new opinions ſpread with ſuch celerity, that before the end of the 16th century they were embraced by the whole league of the ten juriſdictions (excepting part of the community of Alvenew), the greateſt part of the Houſe of God, and a few communities in the Grey League. The difference of religion nearly excited a civil war between the two ſects, as well at the firſt introduction of the Reformation as at the beginning of the troubles in the Valteline. In the latter inſtance, the two parties roſe in arms; but the Catholics being overpowered by the Proteſtants, matters were amicably adjuſted. Since that period all religious concerns have been regulated with perfect cordiality. According to the general conſent of the three leagues, each community being abſolute within its little territory, has the power of appointing its own particular worſhip, and the inhabitants are free to follow either the Catholic or Reformed perſuaſion. In the adminiſtration of civil affairs religion has no interference: the deputies of the general diet may be members of either communion, as choſen by the communities which they repreſent. By this moderate and tolerating principle, all religious diſſenſions have been ſuppreſſed as much as poſſible; and the moſt perfect amity ſubſiſts between the two ſects.

In ſpiritual concerns, the Catholics for the moſt part are under the juriſdiction of the biſhop of Coire. For the affairs of the Reformed churches, each league is divided into a certain number of diſtricts, the miniſters whereof aſſemble twice every year: theſe aſſemblies are called *colloquia*. Each colloquium has its preſident, and each league a ſuperintendant called a *dean*. The ſupreme authority in ſpiritual concerns is veſted in the ſynod, which is compoſed of the three deans, and the clergy of each league; the ſynod aſſembles every year alternately in each of the three leagues. Candidates for holy orders are examined before the ſynod. The neceſſary qualifications for admiſſion into the church ought to be the knowledge of Hebrew, Greek, and Latin; but this rule is not ſtrictly adhered to; many being ordained without the leaſt acquaintance with either of thoſe languages. Formerly Latin was ſolely uſed, as well in the debates of the ſynod as for the purpoſe of examining the candidates; but at preſent that tongue grows more and more into diſuſe, and German is employed in its ſtead.

Griſt ‖ Groningen.

The number of reformed pariſhes in the whole three leagues amounts to 135, in the following proportion: —In the Grey League 46, in that of God's Houſe 53, and in the League of Ten Juriſdictions 36. The miniſters of theſe churches enjoy but very ſmall ſalaries. The richeſt benefices do not perhaps yield more than 20l. or at moſt 25l. per annum, and the pooreſt ſometimes ſcarcely 6l. This ſcanty income is attended with many inconveniences. It obliges the clergy who have families to follow ſome branch of traffic, to the neglect of their eccleſiaſtical ſtudies, and to the degradation of the profeſſional character. Another inconvenience is ſuperadded to the narrowneſs of their income. In moſt communities the miniſters, though confirmed by the ſynod, are choſen by the people of the pariſh, and are ſolely dependent on their bounty. For theſe reaſons, the candidates for holy orders are generally extremely ignorant. They cannot ſupport that expence which is requiſite to purſue their ſtudies; they are not animated with the expectation of a decent competence; and, from the dependent mode of their election, are not encouraged to deſerve their promotion by a conſiſtent dignity of character.

GRIST, in country affairs, denotes corn ground, or ready for grinding.

GRIT, or gritſtone, a kind of ſtone which is uſed for building and for millſtones and grindſtones; and ſometimes for filtering water.

GROAT, an Engliſh money of account, equal to four pence. Other nations, as the Dutch, Polanders, Saxons, Bohemians, French, &c. have likewiſe their groats, groots, groches, gros, &c. In the Saxon times, no ſilver coin bigger than a penny was ſtruck in England, nor after the conqueſt, till Edward III. who, about the year 1351, coined groſſes, i. e. *groats*, or great pieces, which went for 4d. a-piece: and ſo the matter ſtood till the reign of Henry VIII. who, in 1504, firſt coined ſhillings.

GROATS, in country affairs, oats after the hulls are off, or great oat-meal.

GROCERS, anciently were ſuch perſons as engroſſed all merchandiſe that was vendible; but now they are incorporated, and make one of the companies of the city of London, which deals in ſugar, foreign fruits, ſpices, &c.

GROENLAND, or SPITZBERGEN. See GREENLAND.

GROGRAM, a kind of ſtuff made of ſilk and mohair.

GROIN, that part of the belly next the thigh.

GROIN, among builders, is the angular curve made by the interſection of two ſemi-cylinders or arches; and is either regular or irregular.—A *regular* groin is when the interſecting arches, whether ſemicircular or ſemielliptical, are of the ſame diameters and heights. An *irregular* groin is where one of the arches is ſemicircular and the other ſemielliptical.

GROMWELL. See LITHOSPERMUM, BOTANY *Index*.

GRONINGEN, the moſt northerly of the Seven United

Groningen || Gronovius.

United Provinces, is bounded on the north by the German ocean; on the ſouth, by the county of Drenthe; on the eaſt, by the biſhopric of Munſter, and the principality of Eaſt-Frieſland; and on the weſt by the province of Frieſland, from which it is parted by the river Lawers. Its greateſt length from ſouth-eaſt to north-weſt is about 47 miles; but its breadth is very unequal, the greateſt being about 33 miles. Here are rich paſtures, large herds of great and ſmall cattle, plenty of ſea and river fiſh, and of turf, with ſome foreſts and corn-land. There are ſeveral rivers in the province, of which the principal is the Hunſe; and a great number of canals and dykes. The ſtates conſiſt of the deputies of the town of Groningen, and the Ommeland, or circumjacent country; and hold their aſſemblies always in the town of Groningen. The province had anciently governors, under the title of *burgraves;* but their power being limited, the people enjoyed great privileges. Afterwards it became ſubject to the biſhop of Utrecht; but ſhook off his yoke at laſt, and recovered its liberty. In 1536 it ſubmitted to Charles V. and in 1579 acceded to the union of Utrecht. The colleges before the revolution were much the ſame here as in the other provinces, viz. the provincial ſtates, council of ſtate, provincial tribunal, and chamber of accounts; and ſix deputies were ſent to the ſtates-general. Of the eſtabliſhed clergy there are 160 miniſters, which form ſeven claſſes, whoſe annual ſynod is held, by turns, at Groningen and Appingedam.

GRONINGEN, the capital of the province of that name, is ſituated about 12 miles from the neareſt ſhore of the German ocean, at the conflux of ſeveral rivulets, which form the Hunſe and Fivel. Ships of conſiderable burden can come up to the city, in conſequence of which it enjoys a pretty good trade. It was formerly very ſtrong, but its fortifications are now much neglected. The univerſity here was founded in 1615, and is well endowed out of the revenues of the ancient monaſteries. The town, which was formerly one of the Hanſe, and has ſtill great privileges, is large and populous, being the ſeat of the high colleges, and containing three ſpacious market-places, and 27 ſtreets, in which are many fine houſes, beſides churches and other public ſtructures. By the river Fivel and the Ems, it has a communication with Weſtphalia. In 1672 it made ſuch a gallant reſiſtance againſt the biſhop of Munſter, that he is ſaid to have loſt 10,000 men before it. Rodolphus Agricola and Veſelius, two of the moſt learned men of the age in which they lived, were born here. Under the juriſdiction of this city is a conſiderable diſtrict, called the *Gorecht*. E. Long. 6. 25. Lat. 53. 10.

GRONOVIA, a genus of plants belonging to the pentandria claſs; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. See BOTANY *Index*.

GRONOVIUS, JOHN FREDERIC, a very learned critic, was born at Hamburgh in 1613; and having travelled through Germany, Italy, and France, was made profeſſor of polite learning at Deventer, and afterwards at Leyden, where he died in 1671. He publiſhed, 1. *Diatribe in Statii*, &c. 2. *De feſtertiis*. 3. Correct editions of Seneca, Statius, T. Livy, Pliny's Natural Hiſtory, Tacitus, Aulus Gellius, Phædrus's Fables, &c. with notes; and other works. Gronovius || Groſe.

GRONOVIUS, *James*, ſon of the preceding, and a very learned man, was educated firſt at Leyden, then went over to England, where he viſited the univerſities, conſulted the curious MSS. and formed an acquaintance with ſeveral learned men. He was choſen by the grand duke to be profeſſor at Piſa, with a conſiderable ſtipend. He returned into Holland, after he had reſided two years in Tuſcany, and conſulted the MSS. in the Medicean library. In 1679, he was invited by the curators of the univerſity to a profeſſorſhip; and his inaugural diſſertation was ſo highly approved of, that the curators added 400 florins to his ſtipend, and this augmentation continued to his death in 1716. He refuſed ſeveral honourable and advantageous offers. His principal works are, *The Treaſure of Greek Antiquities*, in 13 vols. folio; and a great number of diſſertations and editions of ancient authors. He was compared to Schioppus for the virulence of his ſtyle; and the ſeverity with which he treated other great men who differed from him, expoſed him to juſt cenſure.

GROOM, a name particularly applied to ſeveral ſuperior officers belonging to the king's houſehold, as groom of the chamber, groom of the ſtole. See STOLE, and WARDROBE.

GROOM is more particularly uſed for a ſervant appointed to attend on horſes in the ſtable.—The word is formed from the Flemiſh *grom*, "a boy."

GROOVE, among miners, is the ſhaft or pit ſunk into the earth, ſometimes in the vein, and ſometimes not.

GROOVE, among joiners, the channel made by their plough in the edge of a moulding, ſtyle, or rail, to put their pannels in, in wainſcotting.

GROSE, FRANCIS, Eſq. F. A. S. was born about the year 1731, and was the ſon of Mr Francis Groſe, a jeweller of Richmond, by whom the coronation crown of George II. was filled up. Young Groſe obtained an independent fortune by the death of his father, which happened in the year 1769. He was paymaſter and adjutant in the Surry militia, but diſſipation ſo far prevented him for ſome time from paying proper attention to his duty, that in his own humorous mode of expreſſing himſelf, he kept but two books of accounts, his right and left hand pockets. The loſſes which this thoughtleſs conduct occaſioned him, awakened his dormant talents, and he reſolved to turn his attention to literary purſuits. His education was claſſical, to which he united an excellent taſte for drawing, which induced him to commence his "Views of Antiquities in England and Wales." He began this work in numbers in 1773, and completed it in 1776; and by it he obtained both reputation and profit, the latter of which his almoſt unpardonable liberality had rendered extremely needful. In 1777 he added other two volumes to his Engliſh views, which included the iſlands of Guernſey and Jerſey, finiſhed in 1778. All his expectations were fully gratified by the publication of this work, and during the remainder of his life he continued to publiſh others, which in general increaſed his reputation as an author, and always tended to augment his wealth. In the ſummer of 1789 he paid a viſit to Scotland, and in

Groſs. 1790 began to publiſh in numbers, his views taken in that country. He next proceeded to Ireland, with a view to give a ſimilar deſcription of that country; but on the 6th of May 1791, while at Dublin in the houſe of Mr Horne, he was inſtantly ſeized at table with an apoplectic fit, and immediately expired. He was buried in Drumcondra churchyard near Dublin.

Although his literature was very reſpectable, it was even exceeded by his good humour, by his convivial and friendly turn of mind. As both at home and abroad he was always in the beſt company, his knowledge of the world was ſo extenſive, that his converſation was always uſeful and entertaining. He was free from the malignity and pride of ſome authors, for as he felt the independence of his own talents, he ſcorned to degrade others. Of the moſt careleſs, open, and artleſs diſpoſition, he was often the prey of the deſigning, and has more than once embarraſſed himſelf by too implicit confidence in the probity of others. A tale of diſtreſs never failed to touch his heart, and make the tear of commiſeration glide down his cheek.

Beſides the works formerly mentioned, he publiſhed a treatiſe on ancient armour and weapons; a claſſical dictionary of the vulgar tongue, military antiquities, &c.

GROSS, a foreign money, in divers countries, anſwering to our groat.

Gross is uſed among us for the quantity of twelve dozen.

Gross weight, is the weight of merchandiſes and goods, with their duſt and droſs, as alſo of the bag, caſk, cheſt, &c. wherein they are contained; out of which groſs weight, allowance is to be made of tare and tret.

Gross, or *Groſſus*, in our ancient law-writers, denotes a thing abſolute, and not depending on another. Thus, *villain in groſs*, *villanus in groſſo*, was a ſervant, who did not belong to the land, but immediately to the perſon of the lord; or a ſervile perſon not appendant, or annexed to the lord or manor, and to go along with the tenures as appurtenant to it; but like other perſonal goods and chattels of his lord, at his lord's pleaſure and diſpoſal.

Gross, *advowſon in*. See Advowson.

Gross-beak, the trivial name of the *cocothrauſtes*, or *haw-finch*, which is the *loxia cocothrauſtes*. See Ornithology *Index*.

GROSSULARIA, the gooſeberry. See Ribes, Botany *Index*.

GROTESQUE, or Grotesk, in ſculpture and painting, ſomewhat whimſical, extravagant, and monſtrous; conſiſting either of things that are merely imaginary, and have no exiſtence in nature; or of things ſo diſtorted, as to raiſe ſurpriſe and ridicule. The names ariſe hence, that figures of this kind were anciently much uſed to adorn the *grottoes* wherein the tombs of eminent perſons or families were incloſed. Such was that of Ovid, whoſe grotto was diſcovered near Rome about one hundred years ago.

GROTIUS, Hugo, or more properly Hugo de Groot, one of the greateſt men in Europe, was born at Delft in 1583. He made ſo rapid a progreſs in his ſtudies, that at the age of 15 he had attained a great knowledge in philoſophy, divinity, and civil law; and a yet greater proficiency in polite literature, as appeared by the commentary he had made at that age on Martianus Capella. In 1598, he accompanied the Dutch ambaſſador into France, and was honoured with ſeveral marks of eſteem by Henry V. He took his degree of doctor of laws in that kingdom; and at his return to his native country, devoted himſelf to the bar, and pleaded before he was 17 years of age. He was not 24 when he was appointed attorney-general. In 1613 he ſettled in Rotterdam, and was nominated ſyndic of that city; but did not accept of the office till a promiſe was made him that he ſhould not be removed from it. This prudent precaution he took from his foreſeeing, that the quarrels of the divines on the doctrine of grace, which had already given riſe to many factions in the ſtate, would occaſion revolutions in the chief cities. The ſame year he was ſent into England, on account of the diviſions that reigned between the traders of the two nations, on the right of fiſhing in the northern ſeas; but he could obtain no ſatisfaction. He was afterwards ſent to England, as it is thought, to perſuade the king and the principal divines to favour the Arminians; and he had ſeveral conferences with King James on that ſubject. On his return to Holland, his attachment to Barnevelt involved him in great trouble; for he was ſeized, and ſentenced to perpetual impriſonment in 1619, and to forfeit all his goods and chattels. But after having been treated with great rigour for above a year and a half in his confinement, he was delivered by the advice and artifice of his wife, who having obſerved that his keepers had often fatigued themſelves with ſearching and examining a great trunk full of foul linen which uſed to be waſhed at Gorkum, but now let to paſs without opening it, ſhe adviſed him to bore holes in it to prevent his being ſtifled, and then to get into it. He complied with this advice, and was carried to a friend's houſe in Gorkum; where dreſſing himſelf like a maſon, and taking a rule and trowel, he paſſed through the market-place, and ſtepping into a boat went to Valvet in Brabant. Here he made himſelf known to ſome Arminians, and hired a carriage to Antwerp. At firſt there was a deſign of proſecuting his wife, who ſtaid in the priſon; and ſome judges were of opinion that ſhe ought to be kept there in her huſband's ſtead: however, ſhe was releaſed by a plurality of voices, and univerſally applauded for her behaviour. He now retired into France, where he met with a gracious reception from that court, and Louis XIII. ſettled a penſion upon him. Having reſided there eleven years, he returned to Holland, on his receiving a very kind letter from Frederic Henry prince of Orange: but his enemies renewing their perſecution, he went to Hamburgh; where, in 1634, Queen Chriſtina of Sweden made him her counſellor, and ſent him ambaſſador into France. After having diſcharged the duties of this office above eleven years, he returned, in order to give an account to Queen Chriſtina of his embaſſy; when he took Holland in his way, and received many honours at Amſterdam. He was introduced to her Swediſh majeſty at Stockholm; and there begged that ſhe would grant his diſmiſſion, in order that he might return to Holland. This he obtained with difficulty; and the queen gave him many marks of her eſteem, though he had many enemies at this court. As he was returning, the ſhip in Grotius.

Grotſcaw || Grotto

which he embarked was caſt away on the coaſt of Pomerania; and being now ſick, he continued his journey by land; but was forced to ſtop at Roſtock, where he died, on the 28th of Auguſt 1645. His body was carried to Delft, to be interred in the ſepulchre of his anceſtors. Notwithſtanding the embaſſies in which he was employed, he compoſed a great number of excellent works; the principal of which are, 1. A treatiſe *De jure belli et pacis*, which is eſteemed a maſter-piece. 2. A treatiſe on the truth of the Chriſtian religion. 3. Commentaries on the Holy Scriptures. 4. The hiſtory and annals of Holland. 5. A great number of letters. All which are written in Latin.

GROTSCAW, a town of Turkey in Europe, in the province of Servia, where a battle was fought between the Germans and Turks, in the year 1739, in which the Germans were forced to retreat with loſs. E. Long. 21. 0. N. Lat. 45, 0.

GROTSKAW, a ſtrong town of Germany, capital of a province of the ſame name in Sileſia. It is very agreeably ſeated in a fruitful plain. E. Long. 17. 35. N. Lat. 50. 42.

GROTTO, or GROTTA, a large deep cavern or den in a mountain or rock. The word is Italian, *grotta*, formed, according to Menage, &c. from the Latin *crypta*. Du Cange obſerves, that *grotta* was uſed in the ſame ſenſe in the corrupt Latin.

The ancient anchorites retired into dens and grottoes, to apply themſelves the more attentively to meditation.

Okey-hole, Elden-hole, Peak's-hole, and Pool's-hole, are famous among the natural caverns or grottoes of our country.

The entrance to Okey-hole, on the ſouth ſide of Mendip-hills, is in the fall of thoſe hills, which is beſet all about with rocks, and has near it a precipitate deſcent of near twelve fathoms deep, at the bottom of which there continually iſſues from the rocks a conſiderable current of water. The naked rocks above the entrance ſhow themſelves about 30 fathoms high, and the whole aſcent of the hill above is about a mile, and is very ſteep. As you paſs into this vault, you go at firſt upon a level, but advancing farther, the way is found to be rocky and uneven, ſometimes aſcending and ſometimes deſcending. The roof of this cavern, in the higheſt part, is about eight fathoms from the ground, but in many particular places it is ſo low, that a man muſt ſtoop to get along. The breadth is not leſs various than the height, for in ſome places it is five or ſix fathoms wide, and in others not more than one or two. It extends itſelf in length about two hundred yards. People talk much of certain ſtones in it, reſembling men and women, and other things; but there is little matter of curioſity in theſe, being only ſhapeleſs lumps of a common ſpar. At the fartheſt part of the cavern there is a good ſtream of water, large enough to drive a mill, which paſſes all along one ſide of the cavern, and at length ſlides down about ſix or eight fathoms among the rocks, and then preſſing through the clefts of them, diſcharges itſelf into the valley. The river within the cavern is well ſtored with eels, and has ſome trouts in it; and theſe cannot have come from without, there being ſo great a fall near the entrance. In dry ſummers, a great number of frogs are ſeen all along this cavern, even to the farther part of it; and on the roof of it, at certain places, hang vaſt numbers of bats, as they do in almoſt all caverns, the entrance of which is either level, or but ſlightly aſcending or deſcending; and even in the more perpendicular ones they are ſometimes found, provided they are not too narrow, and are ſufficiently high. The cattle that feed in the paſtures through which this river runs, have been known to die ſuddenly ſometimes after a flood; this is probably owing to the waters having been impregnated, either naturally or accidentally, with lead ore. Grotto.

Elden hole is a huge profound perpendicular chaſm, three miles from Buxton, ranked among the natural wonders of the Peak. Its depth is unknown, and is pretended to be unfathomable. Cotton tells us he ſounded 884 yards; yet the plummet ſtill drew. But he might eaſily be deceived, unleſs his plummet was very heavy; the weight of a rope of that length might well make the landing of the plummet ſcarce perceivable.

Peak's-hole, and Pool's-hole, called alſo *the Devil's A—ſe*, are two remarkable horizontal ſprings under mountains; the one near Caſtleton, the other juſt by Buxton. They ſeem to have owed their origin to the ſprings which have their current through them; when the water had forced its way through the horizontal fiſſures of the ſtrata, and had carried the looſe earth away with it, the looſe ſtones muſt fall down of courſe: and where the ſtrata had few or no fiſſures, they remained entire; and ſo formed theſe very irregular arches, which are now ſo much wondered at. The water which paſſes through Pool's hole is impregnated with particles of limeſtone, and has incruſted the whole cavern in ſuch a manner that it appears as one ſolid rock.

In grottoes are frequently found cryſtals of the rock, ſtalactites, and other natural conglaciations, and thoſe often of an amazing beauty. M. Homberg conjectures, from ſeveral circumſtances, that the marble pillars in the grotto of Antiparos vegetate or grow. That author looks on this grotto as a garden, whereof the pieces of marble are the plants; and endeavours to ſhow, that they could only be produced by ſome vegetative principle. See ANTIPAROS.

At Foligno in Italy is another grotto, conſiſting of pillars and orders of architecture of marble, with their ornaments, &c. ſcarcely inferior to thoſe of art; but they all grow downwards: ſo that if this too be a garden, the plants are turned upſide down.

GROTTO del Cani, a little cavern near Pozzuoli, four leagues from Naples, the air of which is of a mephitical or noxious quality; whence alſo it is called *bocca venenoſa*, the poiſonous mouth.

"Two miles from Naples (ſays Dr Mead), juſt by the Lago de Agnano, is a celebrated moſeta, commonly called *la Grotto del Cani*, and equally deſtructive to all within the reach of its vapours. It is a ſmall grotto about eight feet high, twelve long, and ſix broad; from the ground ariſes a thin, ſubtile, warm fume, viſible enough to a diſcerning eye, which does not ſpring up in little parcels here and there, but in one continued ſtream, covering the whole ſurface of the bottom of the cave; having this remarkable difference from common vapours, that it does not like ſmoke diſperſe itſelf into the air, but quickly after its riſe falls back again, and returns

Grotto. returns to the earth; the colour of the ſides of the grotto being the meaſure of its aſcent: for ſo far it is of a darkiſh-green, but higher only common earth. And as I myſelf found no inconveniency by ſtanding in it, ſo no animal, if its head be above this mark, is the leaſt injured. But when, as the manner is, a dog, or any other creature, it forcibly kept below it; or, by reaſon of its ſmallneſs, cannot hold its head above it, it preſently loſes all motion, falls down as dead, or in a ſwoon; the limbs convulſed and trembling, till at laſt no more ſigns of life appear than a very weak and almoſt inſenſible beating of the heart and arteries; which, if the animal be left a little longer, quickly ceaſes too, and then the caſe is irrecoverable; but if it be ſnatched out, and laid in the open air, it ſoon comes to life again, and ſooner if thrown into the adjacent lake." The fumes of the grotto, the ſame author argues, are no real poiſon, but act chiefly by their gravity; elſe the creatures could not recover ſo ſoon, or if they did, ſome ſymptoms, as faintneſs, &c. would be the conſequence of it. He adds, "that in creatures killed therewith, when diſſected, no marks of infection appear; and that the attack proceeds from a want of air, by which the circulation tends to an entire ſtoppage; and this ſo much the more, as the animal inſpires a fluid of a quite different nature from the air, and ſo in no reſpect fit to ſupply its place. Taking the animal out, while yet alive, and throwing it into the neighbouring lake, it recovers: this is owing to the coldneſs of the water, which promotes the contraction of the fibres, and ſo aſſiſts the retarded circulation; the ſmall portion of air which remains in the veſiculæ, after every expiration, may be ſufficient to drive out the noxious fluid. After the ſame manner, cold water acts in a *deliquium animi*: the lake of Agnano has no greater virtue in it than others."

The air in this grotto was for a long time reckoned to be of a poiſonous nature, and thought to *ſuffocate* the animals which breathed it. Dr Hales imagined that it deſtroyed the elaſticity of the air, cauſed the veſicles of the lungs to collapſe, and thus occaſioned ſudden death.—It is now, however, found that this air is nothing elſe than fixed air, or carbonic acid gas, which iſſues from the earth in that place in great quantity.

GROTTO *del Serpi*, is a ſubterraneous cavern near the village of Saſſa, eight miles from the city of Braccano in Italy, deſcribed by Kircher thus: "The *grotto del ſerpi* is big enough to hold two perſons. It is perforated with ſeveral fiſtular apertures, ſomewhat in manner of a ſieve; out of which, at the beginning of the ſpring ſeaſon, iſſues a numerous brood of young ſnakes of divers colours, but all free from any particular poiſonous quality. In this cave they expoſe their lepers, paralytics, arthritics, and elephantiac patients, quite naked; where, the warmth of the ſubterraneous ſteams reſolving them into a ſweat, and the ſerpents clinging variouſly all around, licking and ſucking them, they become ſo thoroughly freed of all their vicious humours, that, upon repeating the operation for ſome time, they become perfectly reſtored."

This cave Kircher viſited himſelf; and found it warm, and every way agreeable to the deſcription given of it. He ſaw the holes, and heard a murmuring hiſſing noiſe in them. Though he miſſed ſeeing the ſerpents, it not being the ſeaſon of their creeping out; yet he ſaw a great number of their exuviæ, or ſloughs, and an elm growing hard by laden with them. Grotto, Grove.

The diſcovery of this cave was by the cure of a leper going from Rome to ſome baths near this place. Loſing his way, and being benighted, he happened upon this cave. Finding it very warm, he pulled off his clothes; and being weary and ſleepy, had the good fortune not to feel the ſerpents about him till they had wrought his cure. *Muſeum Worm.*

Milky GROTTO, *Crypta Lactea*, a mile diſtant from the ancient village of Bethlehem, is ſaid to have been thus denominated on occaſion of the bleſſed Virgin, who let fall ſome drops of milk in giving ſuck to Jeſus in this grotto. And hence it has been commonly ſuppoſed, that the earth of this cavern has the virtue of reſtoring milk to women that are grown dry, and even of curing fevers. Accordingly, they are always digging in it, and the earth is ſold at a good rate to ſuch as have faith enough to give credit to the fable. An altar has been built on the place, and a church juſt by it.

GROTTO, is alſo uſed for a little artificial edifice made in a garden, in imitation of a natural grotto. The outſides of theſe grottoes are uſually adorned with ruſtic architecture, and their inſide with ſhell-work, foſſils, &c. finiſhed likewiſe with jets d'eau or fountains, &c.

A cement for artificial grottoes may be made thus: Take two parts of white roſin, melt it clear, and add to it four parts of bees wax: when melted together, add two or three parts of the powder of the ſtone you deſign to cement, or ſo much as will give the cement the colour of the ſtone: to this add one part of flower of ſulphur: incorporate all together over a gentle fire, and afterwards knead them with your hands in warm water. With this cement the ſtones, ſhells, &c. after being well dried before the fire, may be cemented.

Artificial red coral branches, for the embelliſhment of grottoes, may be made in the following manner: Take clear roſin, diſſolve it in a braſs-pan; to every ounce of which add two drams of the fineſt vermilion: when you have ſtirred them well together, and have choſen your twigs and branches, peeled and dried, take a pencil and paint the branches all over whilſt the compoſition is warm; afterwards ſhape them in imitation of natural coral. This done, hold the branches over a gentle coal fire, till all is ſmooth and even as if poliſhed. In the ſame manner white coral may be prepared with white lead, and black coral with lamp-black.

A grotto may be built with little expence, of glaſs, cinders, pebbles, pieces of large flint, ſhells, moſs, ſtones, counterfeit coral, pieces of chalk, &c. all bound or cemented together with the above deſcribed cement.

GROVE, in *Gardening*, a ſmall wood impervious to the rays of the ſun.

GROVES have been in all ages held in great veneration. The *proſeuchæ*, and high-places of the Jews, whither they reſorted for the purpoſes of devotion, were probably ſituated in groves: See Joſhua xxiv. 26. The proſeuchæ in Alexandria, mentioned by Philo,

Grove. had groves about them, becauſe he complains that the Alexandrians, in a tumult againſt the Jews, cut down the trees of their proſeuchæ.

The ancient Romans had a ſort of groves near ſeveral of their temples, which were conſecrated to ſome god, and called *luci*, by antiphraſis, *à non lucendo*, as being ſhady and dark. The veneration which the ancient druids had for groves is well known.

Modern groves are not only great ornaments to gardens: but are alſo the greateſt relief againſt the violent heats of the ſun, affording ſhade to walk under in the hotteſt parts of the day, when the other parts of the garden are uſeleſs; ſo that every garden is defective which has not ſhade.

Groves are of two ſorts, viz. either open or cloſe. Open groves are ſuch as have large ſhady trees, which ſtand at ſuch diſtances, as that their branches approach ſo near to each other as to prevent the rays of the ſun from penetrating through them.

Cloſe groves have frequently large trees ſtanding in them; but the ground under theſe is filled with ſhrubs or underwood; ſo that the walks which are in them are private, and ſcreened from winds: by which means they are rendered agreeable for walking, at thoſe times when the air is either too hot or too cold in the more expoſed parts of the garden. Theſe are often contrived ſo as to bound the open groves, and frequently to hide the walls or other incloſures of the garden: and when they are properly laid out, with dry walks winding through them, and on the ſides of theſe ſweet-ſmelling ſhrubs and flowers irregularly planted, they have a charming effect.

GROVE, *Henry*, a learned and ingenious Preſbyterian divine, was born at Taunton in Somerſetſhire, in 1683. Having obtained a ſufficient ſtock of claſſical literature, he went through a courſe of academical learning, under the reverend Mr Warren of Taunton, who had a flouriſhing academy. He then removed to London, and ſtudied ſome time under the reverend Mr Rowe, to whom he was nearly related. Here he contracted a friendſhip with ſeveral perſons of merit, and particularly with Dr Watts, which continued till his death, though they were of different opinions in ſeveral points warmly controverted among divines. After two years ſpent under Mr Rowe, he returned into the country, and began to preach with great reputation; when an exact judgment, a lively imagination, and a rational and amiable repreſentation of Chriſtianity, delivered in a ſweet and well-governed voice, rendered him generally admired; and the ſpirit of devotion which prevailed in his ſermons procured him the eſteem and friendſhip of Mrs Singer, afterwards Mrs Row, which ſhe expreſſed in a fine ode on death, addreſſed to Mr Grove. Soon after his beginning to preach, he married; and on the death of Mr Warren, was choſen to ſucceed him in the academy at Taunton. This obliging him to reſide there, he preached for 18 years to two ſmall congregations in the neighbourhood; and though his ſalary from both was leſs than twenty pounds a-year, and he had a growing family, he went through it cheerfully. In 1708, he publiſhed a piece, entitled, The Regulation of Diverſions, drawn up for the uſe of his pupils. About the ſame time, he entered into a private diſpute by letter with Dr Samuel Clarke: but they not being able to convince each other, the debate was dropped with expreſ- Ground. ſions of great mutual eſteem. He next wrote ſeveral papers printed in the Spectator, viz. Numbers 588. 601. 626. 635. The laſt was republiſhed, by the direction of Dr Gibſon biſhop of London, in the Evidences of the Chriſtian Religion, by Joſeph Addiſon, Eſq. In 1725, Mr James, his partner in the academy, dying, he ſucceeded him in his paſtoral charge at Fulwood, near Taunton, and engaged his nephew to undertake the other parts of Mr James's work as tutor; and in this ſituation Mr Grove continued till his death, which happened in 1738. His great concern with his pupils, was to inſpire and cheriſh in them a prevailing love of truth, virtue, liberty, and genuine religion, without violent attachments or prejudices in favour of any party of Chriſtians. He repreſented truth and virtue in a moſt engaging light; and though his income, both as a tutor and a miniſter, was inſufficient to ſupport his family, without breaking into his paternal eſtate, he knew not how to refuſe the call of charity. Beſides the above pieces, he wrote, 1. An Eſſay towards a demonſtration of the Soul's Immortality. 2. An Eſſay on the Terms of Chriſtian Communion. 3. The Evidence of our Saviour's Reſurrection conſidered. 4. Some Thoughts concerning the Proof of a Future State from Reaſon. 5. A Diſcourſe concerning the Nature and Deſign of the Lord's Supper. 6. Wiſdom the firſt ſpring of Action in the Deity. 7. A Diſcourſe on Saving Faith. 8. Miſcellanies in proſe and verſe. 9. Many Sermons, &c. After his deceaſe, his poſthumous works were publiſhed by ſubſcription, in four volumes octavo, with the names of near 700 ſubſcribers, among whom were ſome of the beſt judges of merit in the eſtabliſhed church.

GROUND, in painting, the ſurface upon which the figures and other objects are repreſented.

The ground is properly underſtood of ſuch parts of the piece as have nothing painted on them, but retain the original colour upon which the other colours are applied to make the repreſentations.

A building is ſaid to ſerve as a ground to a figure when the figure is painted on the building.

The ground behind a picture in miniature is commonly blue or crimſon, imitating a curtain of ſattin or velvet.

GROUND, in etching, denotes a gummy compoſition ſmeared over the ſurface of the metal to be etched, to prevent the aquafortis from eating, except in ſuch places where this ground is cut through with the point of a needle. See ETCHING.

GROUND-Angling, fiſhing under water without a float, only with a plumb of lead, or a bullet, placed about nine inches from the hook; which is better, becauſe it will roll on the ground. This method of fiſhing is moſt proper in cold weather, when the fiſh ſwim very low.

The morning and evening are the chief ſeaſons for the ground line in fiſhing for trout; but if the day prove cloudy, or the water muddy, you may fiſh at ground all day.

GROUND-Tackle, a ſhip's anchors, cables, &c. and in general whatever is neceſſary to make her ride ſafe at anchor.

GROUND-Ivy. See GLECHOMA, BOTANY *Index*.

GROUND-

Ground || Grouthead.

Ground-Pine. See TEUCRIUM, BOTANY *Index.*

GROUNDSEL. See SENECIO, BOTANY *Index.*

GROUP, in painting and ſculpture, is an aſſemblage of two or more figures of men, beaſts, fruits, or the like, which have ſome apparent relation to each other. See PAINTING. The word is formed of the Italian *groppo*, a *knot*.

The Groups, a cluſter of iſlands lately diſcovered in the South ſea. They lie in about S. Lat. 18. 12. and W. Long. 142. 42. They are long narrow ſlips of land, ranging in all directions, ſome of them ten miles or upwards in length, but not more than a quarter of a mile broad. They abound in trees, particularly thoſe of the cocoa nut. They are inhabited by well-made people, of a brown complexion. Moſt of them carried in their hands a ſlender pole about 14 feet in length, pointed like a ſpear; they had likewiſe ſomething ſhaped like a paddle, about four feet long. Their canoes were of different ſizes, carrying from three to ſix or ſeven people, and ſome of them hoiſted a ſail.

GROUSE, or GROWSE, *Moor-fowl*, or *Moor-game*. See TETRAO, ORNITHOLOGY *Index*.

GROUTHEAD, or GREATHED, ROBERT, a learned and famous biſhop of Lincoln, was born at Stow in Lincolnſhire, or (according to others) at Stradbrook in Suffolk, in the latter part of the twelfth century. His parents were ſo poor, that when a boy he was reduced to do the meaneſt offices, and even to beg his bread; till the mayor of Lincoln, ſtruck with his appearance and the quickneſs of his anſwers to certain queſtions, took him into his family, and put him to ſchool. Here his ardent love of learning, and admirable capacity for acquiring it, ſoon appeared, and procured him many patrons, by whoſe aſſiſtance he was enabled to proſecute his ſtudies, firſt at Cambridge, afterwards at Oxford, and at laſt at Paris. In theſe three famous ſeats of learning, he ſpent many years in the moſt indefatigable purſuit of knowledge, and became one of the beſt and moſt univerſal ſcholars of the age. He was a great maſter not only of the French and Latin, but alſo of the Greek and Hebrew languages, which was a very rare accompliſhment in thoſe times. We are aſſured by Roger Bacon, who was intimately acquainted with him, that he ſpent much of his time for almoſt forty years in the ſtudy of geometry, aſtronomy, optics, and other branches of mathematical learning, in all which he very much excelled. Theology was his favourite ſtudy, in which he read lectures at Oxford with great applauſe. In the mean time, he obtained ſeveral preferments in the church, and was at length elected and conſecrated biſhop of Lincoln, A. D. 1235. In this ſtation he ſoon became very famous, by the purity of his manners, the popularity of his preaching, the vigour of his diſcipline, and the boldneſs with which he reproved the vices and oppoſed the arbitrary mandates of the court of Rome; of this laſt it may be proper to give one example. Pope Innocent IV. had granted to one of his own nephews named *Frederick*, who was but a child, a proviſion to the firſt canon's place in the church of Lincoln that ſhould become vacant; and ſent a bull to the archbiſhop of Canterbury, and Innocent, then papal legate in England, commanding them to ſee the proviſion made effectual; which they tranſmitted to the biſhop of Lincoln. But that brave and virtuous prelate boldly refuſed to obey this unreaſonable mandate, and ſent an anſwer to the papal bull containing the following ſevere reproaches againſt his holineſs for abuſing his power: "If we except the ſins of Lucifer and Antichriſt, there neither is nor can be a greater crime, nor any thing more contrary to the doctrine of the goſpel, or more odious and abominable in the ſight of Jeſus Chriſt, than to ruin and deſtroy the ſouls of men, by depriving them of the ſpiritual aid and miniſtry of their paſtors. This crime is committed by thoſe who command the benefices intended for the ſupport of able paſtors, to be beſtowed on thoſe who are incapable of performing the duties of the paſtoral office. It is impoſſible therefore that the holy apoſtolic ſee, which received its authority from the Lord Jeſus Chriſt, for edification, and not for deſtruction, can be guilty of ſuch a crime, or any thing approaching to ſuch a crime, ſo hateful to God and ſo hurtful to men. For this would be a moſt manifeſt corruption and abuſe of its authority, which would forfeit all its glory, and plunge it into the pains of hell." Upon hearing this letter, his holineſs became frantic with rage, poured forth a torrent of abuſe againſt the good biſhop, and threatened to make him an object of terror and aſtoniſhment to the whole world. "How dare (ſaid he) this old, deaf, doating fool, diſobey my commands? Is not his maſter the king of England my ſubject, or rather my ſlave? Cannot he caſt him into priſon, and cruſh him in a moment?" But the cardinals by degrees brought the pope to think more calmly, and to take no notice of this letter. "Let us not (ſaid they) raiſe a tumult in the church without neceſſity, and precipitate that revolt and ſeparation from us, which we know muſt one day take place." Remarkable words, when we reflect when and by whom they were ſpoken! The biſhop did not long ſurvive this noble ſtand againſt the groſs corruptions and tyranny of the church of Rome: for he fell ſick at his caſtle of Bugden that ſame year; and when he became ſenſible that his death was drawing near, he called his clergy into his apartment, and made a long diſcourſe to them, to prove that the reigning pope Innocent IV. was Antichriſt. With this exertion his ſtrength and ſpirits were ſo much exhauſted, that he expired ſoon after, October 9. 1253. A contemporary hiſtorian, who was perfectly well acquainted with him, hath drawn his character in the following manner. "He was a free and bold reprimander of the pope and the king; an admoniſher of the prelates; a corrector of the monks; an inſtructor of the clergy; a ſupporter of the ſtudious; a cenſurer of the incontinent; a ſcourge and terror to the court of Rome; a diligent ſearcher of the ſcriptures; and a frequent preacher to the people. At his table he was hoſpitable, polite, and cheerful. In the church he was contrite, devote, and ſolemn; and in performing all the duties of his office he was venerable, active, and indefatigable. The illuſtrious Roger Bacon, who was moſt capable, and had the beſt opportunities of forming a true judgment of the extent of his learning, by peruſing his works, and by frequently converſing with him, hath given this honourable teſtimony in his favour. "Robert Grouthead biſhop of Lincoln, and his friend Friar Adam de Mariſco, are the two moſt learned men in the world, and excel

Grouthead.

Growth. excel all the reſt of mankind both in divine and human knowledge." This moſt excellent and learned prelate was a very voluminous writer, and compoſed a prodigious number of treatiſes on a great variety of ſubjects in philoſophy and divinity, a catalogue of which is given by Bale.

GROWTH, the gradual increaſe of bulk and ſtature that takes place in animals or vegetables, to a certain period.—The increaſe of bulk in ſuch bodies as have no life, owing to fermentations excited in their ſubſtance, or to other cauſes, is called EXPANSION, SWELLING, &c.

The growth of animals, nay even of the human ſpecies, is ſubject to great variations. A remarkable inſtance in the laſt was obſerved in France in the year 1729. At this time the Academy of Sciences examined a boy who was then only ſeven years old, and who meaſured four feet eight inches and four lines high without his ſhoes. His mother obſerved the ſigns of puberty on him at two years old, which continued to increaſe very quick, and ſoon arrived at the uſual ſtandard. At four years old he was able to lift and toſs the common bundles of hay in ſtables into the horſes racks; and at ſix years old could lift as much as a ſturdy fellow of twenty. But though he thus increaſed in bodily ſtrength, his underſtanding was no greater than is uſual with children of his age, and their playthings were alſo his favourite amuſements.

Another boy, a native of the hamlet of Bouzanquet, in the dioceſe of Alais, though of a ſtrong conſtitution, appeared to be knit and ſtiff in his joints till he was about four years and a half old. During this time nothing farther was remarkable of him than an extraordinary appetite, which was ſatisfied no otherwiſe than by giving him plenty of the common aliments of the inhabitants of the country, conſiſting of rye-bread, cheſnuts, bacon, and water; but his limbs ſoon becoming ſupple and pliable, and his body beginning to expand itſelf, he grew up in ſo extraordinary a manner, that at the age of five years he meaſured four feet three inches; ſome months after, he was four feet eleven inches; and at ſix, five feet, and bulky in proportion. His growth was ſo rapid, that one might fancy he ſaw him grow: every month, his clothes required to be made longer and wider; and what was ſtill very extraordinary in his growth, it was not preceded by any ſickneſs, nor accompanied with any pain in the groin or elſewhere. At the age of five years his voice changed, his beard began to appear, and at ſix he had as much as a man of thirty; in ſhort, all the unqueſtionable marks of puberty were viſible in him. It was not doubted in the country but this child was, at five years old, or five and a half, in a condition of begetting other children; which induced the rector of the pariſh to recommend to his mother that ſhe would keep him from too familiar a converſation with children of the other ſex. Though his wit was riper than is commonly obſervable at the age of five or ſix years, yet its progreſs was not in proportion to that of his body. His air and manner ſtill retained ſomething childiſh, though by his bulk and ſtature he reſembled a complete man, which at firſt ſight produced a very ſingular contraſt. His voice was ſtrong and manly, and his great ſtrength rendered him already fit for the labours of the country. At the age of five years, he could carry to a good diſtance three meaſures of rye, weighing 84 pounds; when turned of ſix, he could lift up eaſily on his ſhoulders and carry loads of 150 pounds weight a good way off: and theſe exerciſes were exhibited by him as often as the curious engaged him thereto by ſome liberality. Such beginnings made people think that he would ſoon ſhoot up into a giant. A mountebank was already ſoliciting his parents for him, and flattering them with hopes of putting him in a way of making a great fortune. But all theſe hopes ſuddenly vaniſhed. His legs became crooked, his body ſhrunk, his ſtrength diminiſhed, his voice grew ſenſibly weaker, and he at laſt ſunk into a total imbecility. Grub ‖ Grubenhagen.

In the Paris Memoirs alſo there is an account of a girl who had her menſes at three months of age. When four years old, ſhe was four feet ſix inches in height, and had her limbs well proportioned to that height, her breaſts large and plump, and the parts of generation like thoſe of a girl of eighteen; ſo that there is no doubt but that ſhe was marriageable at that time, and capable of being a mother of children. Theſe things are more ſingular and marvellous in the northern than in the ſouthern climates, where the females come ſooner to maturity. In ſome places of the Eaſt Indies, the girls have children at nine years of age.

Many other inſtances of extraordinary growth might be brought, but the particulars are not remarkably different from thoſe already related.—It is at firſt ſight aſtoniſhing that children of ſuch early and prodigious growth do not become giants: but when we conſider, that the ſigns of puberty appear ſo much ſooner than they ought, it ſeems evident that the whole is only a more than uſually rapid expanſion of the parts, as in hot climates; and accordingly it is obſerved, that ſuch children, inſtead of becoming giants, always decay and die apparently of old age, long before the natural term of human life.

GRUB, in *Zoology*, the Engliſh name of the hexapode worms, produced from the eggs of beetles, and which at length are transformed into winged inſects of the ſame ſpecies with their parents.

GRUBBING, in *Agriculture*, the digging or pulling up of the ſtubs and roots of trees.

When the roots are large, this is a very troubleſome and laborious taſk; but Mr Mortimer hath ſhown how it may be accompliſhed in ſuch a manner as to ſave great expence by a very ſimple and eaſy method. He propoſes a ſtrong iron hook to be made about two feet four inches long, with a large iron ring faſtened to the upper part of it. This hook muſt be put into a hole in the ſide of the root, to which it muſt be faſtened; and a lever being put into the ring, three men, by means of this lever, may wring out the root, and twiſt the ſap-roots aſunder. Stubs of trees may alſo be taken up with the ſame hook, in which work it will ſave a great deal of labour, though not ſo much as in the other; becauſe the ſtubs muſt be firſt cleft with wedges, before the hook can enter the ſides of them, to wrench them out by pieces.

GRUBENHAGEN, a town and caſtle of the duchy

Gruinales || Guadalajara.

duchy of Brunſwic, in Lower Saxony, remarkable for its mines of ſilver, copper, iron, and lead. E. Long. 9. 36. N. Lat. 51. 45.

GRUINALES (from *grus*, "a crane"), the name of the fourteenth order in Linnæus's Fragments of a Natural Method, conſiſting of geranium, and a few other genera which the author conſiders as allied to it in their habit and external ſtructure.

GRUME, in *Medicine*, denotes a concreted clot of blood, milk, or other ſubſtance. Hence grumous blood is that which approaches to the nature of grume, and by its viſcidity and ſtagnating in the capillary veſſels produces ſeveral diſorders.

GRUPPO, or *Turned* SHAKE, a muſical grace, defined by Playford to conſiſt in the alternate prolation of two tones in juxtapoſition to each other, with a cloſe on the note immediately beneath the lower of them. See SHAKE.

GRUS, in antiquity, a dance performed yearly by the young Athenians around the temple of Apollo, on the day of the Delia. The motions and figures of this dance were very intricate, and variouſly interwoven; ſome of them being intended to expreſs the windings of the labyrinth wherein the minotaur was killed by Theſeus.

GRUS, in *Aſtronomy*, a ſouthern conſtellation, not viſible in our latitude. The number of ſtars in this conſtellation, according to Mr Sharp's Catalogue, is 13.

GRUS. See ARDEA, ORNITHOLOGY *Index*.

GRUTER, JAMES, a learned philologer, and one of the moſt laborious writers of his time, was born at Antwerp in 1560. He was but a child when his father and mother, being perſecuted for the Proteſtant religion by the ducheſs of Parma, governeſs of the Netherlands, carried him into England. He imbibed the elements of learning from his mother, who was one of the moſt learned women of the age, and beſides French, Italian, and Engliſh, was a complete miſtreſs of Latin, and well ſkilled in Greek. He ſpent ſome years in the univerſity of Cambridge; after which he went to that of Leyden to ſtudy the civil law; but at laſt applied himſelf wholly to polite literature. After travelling much, he became profeſſor in the univerſity of Heidelburgh; near which city he died in 1627. He wrote many works; the moſt conſiderable of which are, 1. A large collection of ancient inſcriptions. 2. *Theſaurus criticus*. 3. *Deliciæ poetarum Gallorum, Italorum, et Belgarum, &c.*

GRUYERS, a town of Swiſſerland, in the canton of Friburgh, with a caſtle. It is famous for its cheeſe, which bears the ſame name. E. Long. 7. 33. N. Lat. 46. 35.

GRY, a meaſure containing one-tenth of a line.

A line is one-tenth of a digit, and a digit one-tenth of a foot, and a philoſophical foot one-third of a pendulum, whoſe diadromes, or vibrations, in the latitude of 45 degrees, are each equal to one-ſecond of time, or one-ſixtieth of a minute.

GRYLLUS, a genus of inſects, belonging to the order *Hemiptera*. See ENTOMOLOGY *Index*.

GRYPHITES, CROW'S STONE, an old name for a mineral found in clay and gravel pits.

GUADALAJARA, or GUADALAXARA, a town of Spain, in New Caſtile, and diſtrict of Alcala, ſeated on the river Herares. W. Long. 2. 47. N. Lat. 40. 36. Guadalajara || Guadalupe.

GUADALAJARA, a conſiderable town of North America, and capital of a rich and fertile province of the ſame name, with a biſhop's ſee. W. Long. 114. 59. N. Lat. 20. 20.

GUADALAVIAR, a river of Spain, which riſes on the confines of Arragon and New Caſtile, and, running by Turvel in Arragon, croſſes the kingdom of Valencia, paſſes by the town of the ſame name, and ſoon after falls into the Mediterranean ſea, a little below Valencia.

GUADALQUIVER, one of the moſt famous rivers of Spain, riſes in Andaluſia, near the confines of Granada, and running quite through Andaluſia, by the towns of Baiza, Andaxar, Cordova, Seville, and St Lucar, falls at laſt into the bay of Cadiz.

GUADALUPE, a handſome town in Spain, in Eſtramadura, with a celebrated convent, whoſe ſtructure is magnificent, and is immenſely rich. It is ſeated on a rivulet of the ſame name. W. Long. 4. 45. N. Lat. 39. 12.

GUADALUPE, one of the Caribbee iſlands, belonging to the French, the middle of which is ſeated in about N. Lat. 16 30. W. Long. 61. 20. It was taken by the French in 1794, but retaken the ſame year.

This iſland, which is of an irregular figure, may be about 80 leagues in circumference. It is divided into two parts by a ſmall arm of the ſea, which is not above two leagues long, and from 15 to 40 fathoms broad. This canal, known by the name of the *Salt River*, is navigable, but will only carry veſſels of 50 tons burden.

That part of the iſland which gives its name to the whole colony is, towards the centre, full of craggy rocks, where the cold is ſo intenſe, that nothing will grow upon them but fern, and ſome uſeleſs ſhrubs covered with moſs. On the top of theſe rocks, a mountain called *la Souphriere*, or the *Brimſtone Mountain*, riſes to an immenſe height. It exhales, through various openings, a thick black ſmoke, intermixed with ſparks that are viſible by night. From all theſe hills flow numberleſs ſprings, which fertilize the plains below, and moderate the burning heat of the climate by a refreſhing ſtream, ſo celebrated, that the galleons which formerly uſed to touch at the Windward iſlands, had orders to renew their proviſion with this pure and ſalubrious water. Such is that part of the iſland properly called *Guadalupe*. That which is commonly called *Grand Terre*, has not been ſo much favoured by nature. It is indeed leſs rugged; but it wants ſprings and rivers. The ſoil is not ſo fertile, or the climate ſo wholeſome or ſo pleaſant.

No European nation had yet taken poſſeſſion of this iſland, when 550 Frenchmen, led on by two gentlemen named *Loline* and *Dupleſſis*, arrived there from Dieppe on the 28th of June 1635. They had been very imprudent in their preparations. Their proviſions were ſo ill choſen, that they were ſpoiled in the paſſage, and they had ſhipped ſo few, that they were exhauſted in two months. They were ſupplied with more from the mother-country. St Chriſtopher's, whether from ſcarcity or deſign, refuſed to ſpare them any; and the firſt attempts in huſbandry they made in the country could not as yet afford any thing. No reſource was left for the

Guadalupe. the colony but from the ſavages; but the ſuperfluities of a people, who cultivate but little, and therefore had never laid up any ſtores, could not be very conſiderable. The new comers, not content with what the ſavages might freely and voluntarily bring, came to a reſolution to plunder them; and hoſtilities commenced on the 16th of January 1636.

The Caribs, not thinking themſelves in a condition openly to reſiſt an enemy who had ſo much the advantage from the ſuperiority of their arms, deſtroyed their own proviſions and plantations, and retired to Grande Terre, or to the neighbouring iſlands. From thence the moſt deſperate came over to the iſland from which they had been driven, and concealed themſelves in the thickeſt parts of the foreſts. In the day-time, they ſhot with their poiſoned arrows, or knocked down with their clubs, all the Frenchmen who were ſcattered about for hunting or fiſhing. In the night, they burned the houſes and deſtroyed the plantations of their unjuſt ſpoilers.

A dreadful famine was the conſequence of this kind of war. The coloniſts were reduced to graze in the fields, to eat their own excrements, and to dig up dead bodies for their ſubſiſtence. Many who had been ſlaves at Algiers, held in abhorrence the hands that had broken their fetters; and all of them curſed their exiſtence. It was in this manner that they atoned for the crime of their invaſion, till the government of Aubert brought a peace with the ſavages at the end of the year 1640. The remembrance, however, of hardſhips endured in an invaded iſland, proved a powerful incitement to the cultivation of all articles of immediate neceſſity; which afterwards induced an attention to thoſe of luxury conſumed in the mother-country. The few inhabitants who had eſcaped the calamities they had drawn upon themſelves, were ſoon joined by ſome diſcontented coloniſts from St Chriſtopher's, by Europeans fond of novelty, by ſailors tired of navigation, and by ſome ſea-captains, who prudently choſe to commit to the care of a grateful ſoil the treaſures they had ſaved from the dangers of the ſea. But ſtill the proſperity of Guadalupe was ſtopped or impeded by obſtacles ariſing from its ſituation.

The facility with which the pirates from the neighbouring iſlands could carry off their cattle, their ſlaves, their very crops, frequently brought them into a deſperate ſituation. Inteſtine broils, ariſing from jealouſies of authority, often diſturbed the quiet of the planters. The adventurers who went over to the Windward iſlands, diſdaining a land that was fitter for agriculture than for naval expeditions, were eaſily drawn to Martinico by the convenient roads it abounds with. The protection of thoſe intrepid pirates brought to that iſland all the traders who flattered themſelves that they might buy up the ſpoils of the enemy at a low price, and all the planters who thought they might ſafely give themſelves up to peaceful labours. This quick population could not fail of introducing the civil and military government of the Caribbee iſlands into Martinico. From that time the French miniſtry attended more ſeriouſly to this than to the other colonies, which were not ſo immediately under their direction; and hearing chiefly of this iſland, they turned all their encouragements that way.

It was in conſequence of this preference, that in 1700 the number of inhabitants in Guadalupe amount- Guadalupe.
ed only to 3825 white people, 325 ſavages, free negroes, mulattoes, and 6725 ſlaves, many of whom were Caribs.

At the end of the year 1755, the colony was peopled with 9643 whites, 41,140 ſlaves of all ages and of both ſexes. Her ſaleable commodities were the produce of 330 ſugar-plantations, and 15 plots of indigo; beſides cocoa, coffee, and cotton. Such was the ſtate of Guadalupe when it was conquered by the Britiſh in the month of April 1759.

France lamented this loſs; but the colony had reaſon to comfort themſelves for this diſgrace. During a ſiege of three months, they had ſeen their plantations deſtroyed, the buildings that ſerved to carry on their works burnt down, and ſome of their ſlaves carried off. Had the enemy been forced to retreat after all theſe devaſtations, the iſland was ruined. Deprived of all aſſiſtance from the mother-country, which was not able to ſend her any ſuccours; and expecting nothing from the Dutch (who, on account of their neutrality, came into her roads), becauſe ſhe had nothing to offer them in exchange; ſhe could never have ſubſiſted till the enſuing harveſt.

The conquerors delivered them from theſe apprehenſions. The Britiſh, indeed, are no merchants in their colonies. The proprietors of lands, who moſtly reſide in Europe, ſend to their repreſentatives whatever they want, and draw the whole produce of the eſtate by the return of their ſhip. An agent ſettled in ſome ſea-port of Great Britain is intruſted with the furniſhing the plantation and receiving the produce. This was impracticable at Guadalupe; and the conquerors in this reſpect were obliged to adopt the cuſtom of the conquered. The Britiſh, informed of the advantage the French made of their trade with the colonies, haſtened, in imitation of them, to ſend their ſhips to the conquered iſland; and ſo multiplied their expeditions, that they overſtocked the market, and ſunk the price of all European commodities. The coloniſts bought them at a very low price; and, in conſequence of this plenty, obtained long delays for the payment.

To this credit, which was neceſſary, was ſoon added another ariſing from ſpeculation, which enabled the colony to fulfil its engagements. A great number of negroes were carried thither, to haſten the growth and enhance the value of the plantations. It has been ſaid in various memorials, all copied from each other, that the Engliſh had ſtocked Guadalupe with 30,000 during the four years and three months that they remained maſters of the iſland. The regiſters of the cuſtom-houſes, which may be depended on, as there could be no inducement for an impoſition, atteſt that the number was no more than 18,721. This was ſufficient to give the nation well-grounded hopes of reaping great advantages from their new conqueſt. But their hopes were fruſtrated; and the colony, with its dependencies, was reſtored to its former poſſeſſors by the treaty of peace in July 1763.

By the ſurvey taken in 1767, this iſland, including the ſmaller iſlands, Deſeada, St Bartholomew, Marigalante, and the Saints, dependent upon it, contains 11,863 white people of all ages and of both ſexes, 752 free blacks and mulattoes, 72,761 ſlaves; which makes in all a population of 85,376 ſouls.

Guadiana || Gualeor.

The produce of Guadalupe, including what is poured in from the ſmall iſlands under her dominion, ought to be very conſiderable. But in 1768 it yielded to the mother-country no more than 140,418 quintals of fine ſugar, 23,603 quintals of raw ſugar, 34,205 quintals of coffee, 11,955 quintals of cotton, 456 quintals of cocoa, and 1884 quintals of ginger. Guadalupe was taken by the Britiſh in 1794; but it was retaken the ſame year.

GUADIANA, a large river of Spain, having its ſource in New Caſtile, and, paſſing croſs the high mountains, falls down to the lakes called *Ojos of Guadiana;* from whence it runs to Calatrava, Medelin, Merida, and Badajox in Eſtremadura of Spain; and after having run for ſome time in Alentejo in Portugal, it paſſes on to ſeparate the kingdom of Algarve from Andaluſia, and falls into the bay or gulf of Cadiz, between Caſtro Marino and Agramonte.

GUADIX, a town of Spain, in the kingdom of Granada, with a biſhop's ſee. It was taken from the Moors in 1253, who afterwards retook it, but the Spaniards again got poſſeſſion of it in 1489. It is ſeated in a fertile country, in W. Long. 2. 47. N. Lat. 37. 4.

GUAJACUM, Lignum Vitæ, or *Pockwood;* a genus of plants belonging to the decandria claſs; and in the natural method ranking under the 14th order, *Gruinales*. See Botany and Materia Medica *Index*.

GUALEOR, Gualior, or *Gowalier*, a large town of Indoſtan in Aſia, and capital of a province of the ſame name, with an ancient and celebrated fortreſs of great ſtrength. It is ſituated in the very heart of Hindoſtan Proper, being about 80 miles to the ſouth of Agra, the ancient capital of the empire, and 130 from the neareſt part of the Ganges. From Calcutta it is, by the neareſt route, upwards of 800 miles, and 910 by the ordinary one; and about 280 from the Britiſh frontiers. Its latitude is 26. 14. and longitude 78. 26. from Greenwich.

In the ancient diviſion of the empire it is claſſed in the ſoubah of Agra, and is often mentioned in hiſtory. In the year 1008, and during the two following centuries, it was thrice reduced by famine. It is probable that it muſt in all ages have been deemed a military poſt of the utmoſt conſequence, both from its ſituation in reſpect to the capital, and from the peculiarity of its ſite, which was generally deemed impregnable. With reſpect to its relative poſition, it muſt be conſidered that it ſtands on the principal road leading from Agra to Malwa, Guzerat, and the Decan: and that too, near the place where it enters the hilly tract which advances from Bundelcund, Malwa, and Agimere, to a parallel with the river Jumnah, throughout the greateſt part of its courſe. And from all theſe circumſtances of general and particular ſituation, together with its natural and acquired advantages as a fortreſs, the poſſeſſion of it was deemed as neceſſary to the ruling emperors of Hindoſtan as Dover caſtle might have been to the Saxon and Norman kings of England.—Its palace was uſed as a ſtate priſon as early as 1317, and continued to be ſuch until the downfal of the empire.—On the final diſmemberment of the empire, Gualeor appears to have fallen to the lot of a rajah of the Jat tribe; who aſſumed the government of the diſtrict in which it is immediately ſituated, under the title of Rana of Gohud or Gohd. Since that period it has changed maſters more than once; the Mahrattas, whoſe dominions extend to the neighbourhood of it, having ſometimes poſſeſſed it, and at other times the Rana: but the means of transfer were always either famine or treachery, nothing like a ſiege having ever been attempted. Gualeor.

Gualeor was in the poſſeſſion of Madajee Scindia, a Mahratta chief, in 1779, at the cloſe of which year the council-general of Bengal concluded an alliance with the Rana; in conſequence of which four battalions of ſepoys of 500 men each, and ſome pieces of artillery, were ſent to his aſſiſtance, his diſtrict being overrun by the Mahrattas, and himſelf almoſt ſhut up in his fort of Gohud. The grand object of this alliance was to penetrate into Scindia's country, and finally to draw Scindia himſelf from the weſtern ſide of India, where he was attending the motions of General Goddard, who was then employed in the reduction of Guzerat; it being Mr Haſtings's idea, that when Scindia found his own dominions in danger, he would detach himſelf from the confederacy, of which he was the principal member, and thus leave matters open for an accommodation with the court of Poonah. It fell out exactly as Mr Haſtings predicted. Major William Popham was appointed to the command of the little army ſent to the Rana's aſſiſtance; and was very ſucceſsful, as well in clearing his country of the enemy, as in driving them out of one of their own moſt valuable diſtricts, and keeping poſſeſſion of it: and Mr Haſtings, who juſtly concluded that the capture of Gualeor, if practicable, would not only open the way into Scindia's country, but would alſo add to the reputation of our arms in a degree much beyond the riſk and expence of the undertaking, repeatedly expreſſed his opinion to Major Popham, together with a wiſh that it might be attempted; and founding his hopes of ſucceſs on the confidence that the garriſon would probably have in the natural ſtrength of the place. It was accordingly undertaken; and the following account of the place, and the manner of our getting poſſeſſion of it, was written by Captain Jonathan Scott, at that time Perſian interpreter to Major Popham, to his brother Major John Scott.

"The fortreſs of Gualeor ſtands on a vaſt rock of about four miles in length, but narrow, and of unequal breadth, and nearly flat at the top. The ſides are ſo ſteep as to appear almoſt perpendicular in every part; for where it was not naturally ſo, it has been ſcraped away; and the height from the plain below is from 200 to 300 feet. The rampart conforms to the edge of the precipice all round; and the only entrance to it is by ſteps running up the ſide of the rock, defended on the ſide next the country by a wall and baſtions, and farther guarded by ſeven ſtone gateways, at certain diſtances from each other. The area within is full of noble buildings, reſervoirs of water, wells, and cultivated land; ſo that it is really a little diſtrict in itſelf. At the north-weſt foot of the mountain is the town, pretty large, and well built; the houſes all of ſtone. To have beſieged this place would be vain, for nothing but a ſurpriſe or blockade could have carried it.

"A tribe of banditti from the diſtrict of the Rana had

Gualeor. had been accuſtomed to rob about this town, and once in the dead of night had climbed up the rock and got into the fort. This intelligence they had communicated to the Rana, who often thought of availing himſelf of it, but was fearful of undertaking an enterpriſe of ſuch moment with his own troops. At length he informed Major Popham of it, who ſent a party of the robbers to conduct ſome of his own ſpies to the ſpot. They accordingly climbed up in the night, and found that the guards generally went to ſleep after their rounds. Popham now ordered ladders to be made; but with ſo much ſecrecy, that until the night of ſurpriſe only myſelf and a few others knew it. On the 3d of Auguſt, in the evening, a party was ordered to be in readineſs to march under the command of Captain William Bruce; and Popham put himſelf at the head of two battalions, which were immediately to follow the ſtorming party. To prevent as much as poſſible any noiſe in approaching or aſcending the rock, a kind of ſhoes of woollen cloth were made for the ſepoys, and ſtuffed with cotton. At 11 o'clock the whole detachment marched from the camp at Reypour, eight miles from Gualeor, through unfrequented paths, and reached it at a little before daybreak. Juſt as Captain Bruce arrived at the foot of the rock, he ſaw the lights which accompanied the rounds moving along the rampart, and heard the ſentinels cough (the mode of ſignifying that all is well in an Indian camp or garriſon), which might have damped the ſpirit of many men, but ſerved only to inſpire him with more confidence, as the moment for action, that is, the interval between the paſſing the rounds was now aſcertained. Accordingly when the lights were gone, the wooden ladders were placed againſt the rock, and one of the robbers firſt mounted, and returned with an account that the guard was retired to ſleep. Lieutenant Cameron, our engineer, next mounted, and tied a rope-ladder to the battlements of the wall; this kind of ladder being the only one adapted to the purpoſe of ſcaling the wall in a body (the wooden ones only ſerving to aſcend from crag to crag of the rock, and to aſſiſt in fixing the rope-ladders). When all was ready, Captain Bruce with 20 ſepoys, grenadiers, aſcended without being diſcovered, and ſquatted down under the parapet; but before a reinforcement arrived, three of the party had ſo little recollection as to fire on ſome of the garriſon who happened to be lying aſleep near them. This had nearly ruined the whole plan: the garriſon were of courſe alarmed, and ran in great numbers towards the place; but ignorant of the ſtrength of the aſſailants (as the men fired on had been killed outright), they ſuffered themſelves to be ſtopped by the warm fire kept up by the ſmall party of the grenadiers, until Major Popham himſelf, with a conſiderable reinforcement, came to their aid. The garriſon then retreated to the inner buildings, and diſcharged a few rockets, but ſoon afterwards retreated precipitately through the gate; whilſt the principal officers, thus deſerted, aſſembled together in one houſe, and hung out a flag. Major Popham ſent an officer to give them aſſurance of quarter and protection; and thus, in the ſpace of two hours, this important and aſtoniſhing fortreſs was completely in our poſſeſſion. We had only 20 men wounded and one killed. On the ſide of the enemy, Bapogee the governor was killed, and moſt of the principal officers wounded."

Guam.

Thus fell the ſtrongeſt fortreſs in Hindoſtan, garriſoned by a choſen body of 1200 men, on Auguſt 4. 1780; and which, before the capture of it by the Britiſh, was pronounced by the princes of Hindoſtan, as far as their knowledge in the military art extended, to be impregnable. In 1783 Madajee Scindia beſieged this fortreſs, then poſſeſſed by the Rana of Gohud, with an army of 70,000 men, and effected the reduction by the treachery of one of the Rana's officers, who formed the plan of admiſſion of a party of Scindia's troops; theſe were immediately ſupported by another party, who attacked an oppoſite quarter, and got admiſſion alſo.

GUAM, the largeſt of the Ladrone iſlands in the South ſea, being about 40 leagues in circumference. It is the only one among the innumerable iſlands that lie ſcattered in the immenſe South ſea which has a town built in the European ſtyle, with a regular fort, a church, and civilized inhabitants. The air is excellent, the water good, the garden ſtuffs and fruits are exquiſite, the flocks of buffaloes innumerable, as are thoſe of goats and hogs, and all kinds of poultry abound in an aſtoniſhing degree. There is no port in which worn-out ſailors can be more ſpeedily reſtored, or find better or more plentiful refreſhments, than in this.

But Guam did not formerly enjoy this ſtate of abundance. When it was firſt diſcovered by Magellan in 1521, with the other eight principal iſlands that lie north of it, which, with a multitude of ſmaller ones, form together that archipelago known by the name of the Ladrones, they were all crowded with inhabitants, but afforded no refreſhments to navigators except fiſh, bananas, cocoa nuts, and bread fruit; and even theſe could not be procured but by force, amidſt ſhowers of the arrows and lances of the natives. The Spaniards carried thither from America the firſt ſtock of cattle, of fowls, of plants, and ſeeds, and fruits, as well as garden ſtuffs, which are all now found in ſuch abundance.

The Ladrone iſlands, and Guam in particular, were covered with inhabitants when they were diſcovered. It is ſaid that Guam alone contained upon its coaſt more than 20,000 people. Theſe men were ferocious ſavages and bold thieves, as all the iſlanders in the South ſeas are, undoubtedly becauſe they were unacquainted with the rights of property; but they were ſo ſavage, ſo incapable of ſupporting the yoke of civilization, that the Spaniards, who undertook to bring them under the regulations of law and order, have ſeen their numbers almoſt annihilated within the ſpace of two centuries. Under the government of their miſſionaries, theſe fierce iſlanders, after having long defended, by cruel wars, the right of living like wild beaſts under the guidance of inſtinct, being at laſt obliged to yield to the ſuperiority of the Spaniſh arms, gave themſelves up to deſpair: they took the reſolution of adminiſtering potions to their women, in order to procure abortions, and to render them ſterile, that they might not bring into the world, and leave behind them, beings that were not free, according to the ideas that they had of liberty. A reſolution ſo violent,

Guam. lent, and ſo contrary to the views and intentions of nature, was perſiſted in with ſo much obſtinacy in the nine Ladrone iſlands, that their population, which at the time of the diſcovery conſiſted of more than 60,000 ſouls, does not now exceed 800 or 900 in the whole extent of the archipelago. About 20 or 30 years ago, the ſcattered fragments of the original natives were collected and eſtabliſhed in the iſland of Guam, where they now begin to recover by the wiſe precautions, and prudent, though tardy, exertions of a government more adapted to the climate of theſe iſlands and to the genius of their inhabitants.

The principal ſettlement, which the Spaniards call the town of Agana, is ſituated about four leagues north-eaſt of the landing-place, on the ſea-ſhore, and at the foot of ſome hills, not very high, in a beautiful well-watered country. Beſides this, there are 21 ſmaller ſettlements of Indians round the iſland, all on the ſea-ſhore, compoſed of five or ſix families, who cultivate fruits and grain, and employ themſelves in fiſhing.

The centre of the iſland is ſtill uncleared. The trees are not very tall, but they are fit for the building of houſes and of boats. The foreſts are in general very thick. The Spaniards at firſt cleared certain portions of land to turn them into ſavannahs for the feeding of cattle. The formation of ſavannahs conſiſts in multiplying within the foreſts ſmall cleared ſpots ſeparated only by thickets and rows of trees, and kept clean from ſhrubs of every kind. The Spaniards ſow theſe ſpots with graſs ſeeds, and other indigenous plants that are fit for paſturage. Theſe meadows, being effectually ſhaded on every quarter, preſerve their freſhneſs, and afford the flocks and herds a ſhelter from the ſun and the great heat of noon. The cattle that were formerly brought to the ſavannahs of Guam from America have multiplied aſtoniſhingly: they are become wild, and muſt be ſhot when wanted, or taken by ſtratagem.

The woods are likewiſe full of goats, of hogs, and fowls, which were all originally brought thither by the Spaniards, and are now wild. The fleſh of all theſe animals is excellent. In the ſavannahs, and even in the heart of the foreſts, there is a vaſt multitude of pigeons, of parroquets, of thruſhes, and of blackbirds.

Among the indigenous trees of the country, the moſt remarkable are, the cocoa-nut tree and the bread-fruit tree. The woods are alſo filled with guavas, bannanas, or plantains of many varieties, citrons, lemons, and oranges, both ſweet and bitter, and the ſmall dwarf thorny china-orange with red fruit. The caper-buſh abounds in all the Ladrone iſlands; and as it is conſtantly in flower, as well as the citron and orange ſhrubs, with many other of the indigenous plants, they perfume the air with the moſt agreeable ſmells, and delight the eye with the richeſt colours.

The rivers of Guam, which are either rivulets or torrents, abound in fiſh of an excellent quality: the Indians, however, eat none of them, but prefer the inhabitants of the ſea. The turtle, which grow here as large as thoſe in the iſland of Aſcenſion, are not eaten either by the Indians or Spaniards.

The cultivated crops lately introduced are, the rice, the maize, the indigo, the cotton, the cocoa, the ſugar-cane, which have all ſucceeded. That of the maize, eſpecially, is of aſtoniſhing fertility: it is common to find in the fields where this grain is cultivated plants of twelve feet high, bearing eight or ten ſpikes from nine to ten inches in length, ſet round with well-filled ſeeds. The gardens are ſtored with mangoes and pine-apples. The former is one of the fineſt fruits imaginable: it was brought from Manilla, and may be eaten in great quantity without any bad conſequences. —Horſes have been brought to Guam from Manilla, and aſſes and mules from Acapulco. The Indians have been taught to tame and domeſticate the ox, and to employ him in the draught. Guam || Guarantee.

This iſland, the land of which riſes gradually from the ſea-ſhore towards the centre by a gentle acclivity, is not very mountainous. The inhabitants ſay, that its ſoil is equally rich and fertile over the whole iſland, except in the northern part, which forms a peninſula almoſt deſtitute of water. But in the reſt, you cannot go a league without meeting a rivulet. Upon penetrating a little way into the interior part of the country, to the eaſt and the ſouth of Agana, many ſprings of fine water are found, forming, at little diſtances, baſons of pure water, which, being ſhaded by thick trees, preſerve a moſt agreeable coolneſs in ſpite of the heat of the climate.

The indigenous inhabitants are ſuch as they were deſcribed by Magellan; of ſmall ſtature, ſufficiently ugly, black, and in general dirty, though they are continually in the water. The women are for the moſt part handſome, well made, and of a reddiſh colour. Both ſexes have long hair. This ſcanty people have become by civilization, gentle, honeſt, and hoſpitable. They have, however, at the ſame time acquired a vice that was unknown to their ſavage anceſtors. The men are a little addicted to drunkenneſs, for they drink freely of the wine of the cocoa-nut. They love muſic and dancing much, but labour little. They are paſſionately fond of cock-fighting. On Sundays and holidays they gather together in crowds after the ſervice, at the door of the church; where each Indian brings his cock to match him with that of his neighbour, and each bets upon his own.—The miſſion of Guam is now in the hands of the Auguſtine friars, who have ſupplanted the Jeſuits. E. Long. 143° 15′. N. Lat. 13° 10′.

GUAMANGA, a conſiderable town of South America, and capital of a province of the ſame name in Peru, and in the audience of Lima, with a biſhop's ſee. It is remarkable for its ſweatmeats, manufactures, and mines of gold, ſilver, loadſtone, and quickſilver. W. Long. 74° 15′. S. Lat. 13° 10′.

GUANUGO, a rich and handſome town of South America, and capital of a diſtrict of the ſame name in the audience of Lima. W. Long. 75° 15′. S. Lat. 9. 55.

GUANZAVELCA, a town of South America, in Peru, and in the audience of Lima. It abounds in mines of quickſilver. W. Long. 74°. 39′. S. Lat. 12. 36.

GUARANTEE, or WARRANTEE, in *Law*, a term relative to warrant or warranter, properly ſignifying him whom the warranter undertakes to indemnify or ſecure from damage.

GUARANTEE is more frequently uſed for a warranter,

Guaranty || Guard.

or a perſon who undertakes and obliges himſelf to ſee a ſecond perſon perform what he has ſtipulated to the third. See WARRANTY.

GUARANTY, in matters of polity, the engagement of mediatorial or neutral ſtates, whereby they plight their faith that certain treaties ſhall be inviolably obſerved, or that they will make war againſt the aggreſſor.

GUARD, in a general ſenſe, ſignifies the defence or preſervation of any thing; the act of obſerving what paſſes, in order to prevent ſurpriſe; or the care, precaution, and attention, we make uſe of to prevent any thing from happening contrary to our intentions or inclinations.

GUARD, in the military art, is a duty performed by a body of men, to ſecure an army or place from being ſurpriſed by an enemy. In garriſon the guards are relieved every day: hence it comes that every ſoldier mounts guard once every three or four days in time of peace, and much oftener in time of war. See HONOURS.

Advanced GUARD, is a party of either horſe or foot, that marches before a more conſiderable body, to give notice of any approaching danger. Theſe guards are either made ſtronger or weaker, according to ſituation, the danger to be apprehended from the enemy, or the nature of the country.

Van GUARD. See *Advanced* GUARD.

Artillery GUARD, is a detachment from the army to ſecure the artillery when in the field. Their *corps de garde* is in the front of the artillery park, and their ſentries diſperſed round the ſame. This is generally a 48-hours guard; and, upon a march, this guard marches in the front and rear of the artillery, and muſt be ſure to leave nothing behind: if a gun or waggon breaks down, the officer that commands the guard is to leave a ſufficient number of men to aſſiſt the gunners and matroſſes in getting it up again.

*Artillery Quarter-*GUARD, is frequently a non-commiſſioned officer's guard from the royal regiment of artillery, whoſe *corps de garde* is always in the front of their encampment.

*Artillery Rear-*GUARD, conſiſts in a corporal and ſix men, poſted in the rear of the park.

Corps de GARDE, are ſoldiers entruſted with the guard of a poſt, under the command of one or more officers. This word alſo ſignifies the place where the guard mounts.

Grand GUARD; three or four ſquadrons of horſe, commanded by a field-officer, poſted at about a mile or a mile and a half from the camp, on the right and left wings, towards the enemy, for the better ſecurity of the camp.

Forage GUARD, a detachment ſent out to ſecure the foragers, and who are poſted at all places, where either the enemy's party may come to diſturb the foragers, or where they may be ſpread too near the enemy, ſo as to be in danger of being taken. This guard conſiſts both of horſe and foot, and muſt remain on their poſts till the foragers are all come off the ground.

Main GUARD, is that from which all other guards are detached. Thoſe who are for mounting guard aſſemble at their reſpective captain's quarters, and march from thence to the parade in good order; where, after the whole guard is drawn up, the ſmall guards are detached to their reſpective poſts: then the ſubalterns throw lots for their guards, who are all under the command of the captain of the main guard. This guard mounts in garriſon at different hours, according as the governor pleaſes. Guard.

Piquet GUARD, a good number of horſe and foot, always in readineſs in caſe of an alarm: the horſes are generally ſaddled all the time, and the riders booted.

The foot draw up at the head of the battalion, frequently at the beating of the tat-too; but afterwards return to their tents, where they hold themſelves in readineſs to march upon any ſudden alarm. This guard is to make reſiſtance in caſe of an attack, until the army can get ready.

Baggage GUARD, is always an officer's guard, who has the care of the baggage on a march. The waggons ſhould be numbered by companies, and follow one another regularly: vigilance and attention in the paſſage of hollow ways, woods, and thickets, muſt be ſtrictly obſerved by this guard.

Quarter GUARD, is a ſmall guard commanded by a ſubaltern officer, poſted in the front of each battalion, at 222 feet before the front of the regiment.

Rear GUARD, that party of the army which brings up the rear on a march, generally compoſed of all the old grand guards of the camp. The rear-guard of a part is frequently eight or ten horſe, about 500 paces behind the party. Hence the advance-guard going out upon a party, form the rear-guard in their retreat.

Rear GUARD, is alſo a corporal's guard placed in the rear of a regiment, to keep good order in that part of the camp.

Standard GUARD, a ſmall guard under a corporal, out of each regiment of horſe, who mount on foot in the front of each regiment, at the diſtance of 20 feet from the ſtreets, oppoſite the main ſtreet.

Trench GUARD, only mounts in the time of a ſiege, and ſometimes conſiſts of three, four, or ſix battalions, according to the importance of the ſiege. This guard muſt oppoſe the beſieged when they ſally out, protect the workmen, &c.

Provoſt GUARD, is always an officer's guard that attends the provoſt in his rounds, either to prevent deſertion, marauding, rioting, &c. See PROVOST.

GUARD, in fencing, implies a poſture proper to defend the body from the ſword of the antagoniſt.

Ordinary GUARDS, ſuch as are fixed during the campaign, and relieved daily.

Extraordinary GUARDS, or detachments, which are only commanded on particular occaſions, either for the further ſecurity of the camp, to cover the foragers, or for convoys, eſcorts, or expeditions.

GUARDS, alſo imply the troops kept to guard the king's perſon, and conſiſt both of horſe and foot.

Horſe GUARDS, in England, are gentlemen choſen for their bravery, to be entruſted with the guard of the king's perſon; and were divided into four troops, called the *1ſt*, *2d*, *3d*, *and 4th troop of horſe-guards*. The firſt troop was raiſed in the year 1660, and the command

Guard. command given to Lord Gerard; the second in 1661, and the command given to Sir Philip Howard; the third in 1693, and the command given to Earl Feversham; the fourth in 1702, and the command given to Earl Newburgh. Each troop had one colonel, two lieutenant-colonels, one cornet and major, one guidon and major, four exempts and captains, four brigadiers and lieutenants, one adjutant, four sub-brigadiers and cornets, and 60 private men. But the four troops are now turned into two regiments of life-guards.

Horse-Grenadier GUARDS, are divided into two troops called *the 1st and 2d troops of horse-grenadier guards*. The first troop was raised in 1693, and the command given to Lieutenant-general Cholmondeley; the second in 1702, and the command given to Lord Forbes. Each troop has one colonel, lieutenant-colonel, one guidon or major, three exempts and captains, three lieutenants, one adjutant, three cornets, and 60 private men.

Yeomen of the GUARD, first raised by Henry VII. in the year 1485. They are a kind of pompous foot-guards to the king's person; and are generally called by a nickname the *Beef-Eaters*. They were anciently 250 men of the first rank under gentry; and of larger stature than ordinary, each being required to be six feet high. At present there are but 100 in constant duty, and 70 more not on duty; and when any one of the 100 dies, his place is supplied out of the 70. They go dressed after the manner of King Henry VIII's time. Their first commander or captain was the earl of Oxford, and their pay is 2s. 6d. per day.

Foot GUARDS, are regiments of foot appointed for the guard of his majesty and his palace. There are three regiments of them, called *the 1st, 2d, and 3d, regiments of foot-guards*. They were raised in the year 1660; and the command of the first given to Colonel Russel, that of the second to General Monk, and the third to the earl of Linlithgow. The first regiment is at present commanded by one colonel, one lieutenant-colonel, three majors, 23 captains, one captain-lieutenant, 31 lieutenants, and 24 ensigns; and contains three battalions. The second regiment has one colonel, one lieutenant-colonel, two majors, 14 captains, one captain-lieutenant, 18 lieutenants, 16 ensigns, and contains only two battalions. The third regiment is the same as the second.

The French GUARDS are divided into those within, and those without the palace.—The first are the *gardes du corps*, or body-guards; which consist of four companies, the first of which companies was anciently Scots. See *Scots* GUARDS, *infra*.

The guards without are the *Gens d'Armes*, light horse, musqueteers, and two other regiments, the one of which is French and the other Swiss.

New arrangements, however, have taken place in this department as well as others since the late revolution.

Scots GUARDS, a celebrated band, which formed the first company of the ancient *gardes du corps* of France.

It happened from the ancient intercourse between France and Scotland, that the natives of the latter kingdom had often distinguished themselves in the service of the former. On this foundation the company of Scots guards, and the company of Scots gendarmes, were instituted.—Both of them owed their institution to Charles VII. of France, by whom the first standing army in Europe was formed, *anno* 1454; and their fates cannot but be interesting to Scotsmen. See GENDARMES. Guard.

Valour, honour, and fidelity, must have been very conspicuous features of the national character of the Scots, when so great and civilized a people as the French could be induced to choose a body of them, foreigners as they were, for guarding the persons of their sovereigns.—Of the particular occasion and reasons of this predilection we have a recital by Louis XII. a succeeding monarch. After setting forth the services which the Scots had performed for Charles VII. in expelling the English out of France, and reducing the kingdom to his obedience, he adds—"Since which reduction, and for the service of the Scots upon that occasion, and for the great loyalty and virtue which he found in them, he selected 200 of them for the guard of his person, of whom he made an hundred men at arms, and an hundred life-guards: And the hundred men at arms are the hundred lances of our ancient ordinances; and the life-guard men are those of our guard who still are near and about our person."—As to their fidelity in this honourable station, the historian, speaking of Scotland, says, "The French have so ancient a friendship and alliance with the Scots, that of 400 men appointed for the king's life-guard, there are an hundred of the said nation who are the neareſt to his person, and in the night keep the keys of the apartment where he sleeps. There are, moreover, an hundred complete lances and two hundred yeomen of the said nation, besides several that are dispersed through the companies: And for so long a time as they have served in France, never hath there been one of them found that hath committed or done any fault against the kings or their state; and they make use of them as of their own subjects." *Hist. of Louis XII.* by Claud Seyssil, master of requests to that prince.

The ancient rights and privileges of the Scottish life-guards were very honourable; especially of the twenty-four first. The author of the Ancient Alliance says, "On high holidays, at the ceremony of the royal touch, the election of knights of the king's order, the reception of extraordinary ambassadors, and the public entries of cities, there must be six of their number next to the king's person, three on each side; and the body of the king must be carried by these only, whereſoever ceremony requires. They have the keeping of the keys of the king's lodging at night, the keeping of the choir of the chapel, the keeping the boats where the king passes the rivers; and they have the honour of bearing the white silk fringe in their arms, which in France is the coronne coleur. The keys of all the cities where the king makes his entry are given to their captain in waiting or out of waiting.—He has the privilege, in waiting or out of waiting, at ceremonies, such as coronations, marriages, and funerals of the kings, and at the baptism and marriage of their children, to take duty upon him. The coronation robe belongs to him; and this company, by the death or change of a captain, never changes its rank, as do the three others."

This company's first commander, who is recorded as a person of great valour and military accomplishments, was Robert Patillock, a native of Dundee; and

Guard, Guardian.

and the band, ever ardent to diſtinguiſh itſelf, continued in great reputation till the year 1578. From that period, the Scots guards were leſs attended to, and their privileges came to be invaded. In the year 1612, they remonſtrated to Louis XIII. on the ſubject of the injuſtice they had ſuffered, and ſet before him the ſervices they had rendered to the crown of France. Attempts were made to re-eſtabliſh them on their ancient foundation; but no negociation for this purpoſe was effectual. The troops of France grew jealous of the honours paid them: the death of Francis II. and the return of Mary to Scotland, at a time when they had much to hope, were unfortunate circumſtances to them: the change of religion in Scotland was an additional blow; and the acceſſion of James VI. to the throne of England diſunited altogether the intereſts of France and Scotland. The Scots guards of France had therefore, latterly, no connection with Scotland but the name.

Guard-Boat, a boat appointed to row the rounds amongſt the ſhips of war which are laid up in any harbour, &c. to obſerve that their officers keep a good looking-out, calling to the guard-boat as ſhe paſſes, and not ſuffering her crew to come on board, without having previouſly communicated the watch-word of the night.

Guard-Ship, a veſſel of war appointed to ſuperintend the marine affairs in a harbour or river, and to ſee that the ſhips which are not commiſſioned have their proper watchword kept duly, by ſending her guard-boats around them every night. She is alſo to receive ſeamen who are impreſſed in the time of war.

GUARDIAN, in *Law*, a perſon who has the charge of any thing; but more commonly it ſignifies one who has the cuſtody and education of ſuch perſons as have not ſufficient diſcretion to take care of themſelves and their own affairs, as children and idiots.

Their buſineſs is to take the profits of the minor's lands to his uſe, and to account for the ſame: they ought to ſell all moveables within a reaſonable time, and to convert them into land or money, except the minor is near of age, and may want ſuch things himſelf; and they are to pay intereſt for the money in their hands that might have been ſo placed out; in which caſe it will be preſumed that the guardians made uſe of it themſelves. They are to ſuſtain the lands of the heir, without making deſtruction of any thing thereon, and to keep it ſafely for him: if they commit waſte on the lands, it is a forfeiture of the guardianſhip, 3 Edw. I. And where perſons, as guardians, hold over any land, without the conſent of the perſon who is next entitled, they ſhall be adjudged treſpaſſers, and ſhall be accountable; 6. Ann. cap. xviii.

GUARDIAN, or *Warden, of the Cinque ports*, is an officer who has the juriſdiction of the cinque-ports, with all the power that the admiral of England has in other places.

Camden relates, that the Romans, after they had ſettled themſelves and their empire in our iſland, appointed a magiſtrate, or governor, over the eaſt parts where the Cinque-ports lie, with the title of *comes littoris Saxonici per Britanniam;* having another, who bore the like title, on the oppoſite ſide of the ſea. Their buſineſs was to ſtrengthen the ſea coaſt with munition, againſt the outrages and robberies of the barbarians; and that antiquary takes our warden of the Cinque-ports to have been erected in imitation thereof. The wardenſhip is a place of value, ſuppoſed worth 7000l. per annum.

Guardian ‖ Guatimala.

Guardian of the Spiritualities, the perſon to whom the ſpiritual juriſdiction of any dioceſe is committed, during the time the ſee is vacant. A guardian of the ſpiritualities may likewiſe be either ſuch in law, as the archbiſhop is of any dioceſe within his province; or by delegation, as he whom the archbiſhop or vicar-general for the time appoints. Any ſuch guardian has power to hold courts, grant licences, diſpenſations, probates of wills, &c.

GUAREA, a genus of plants belonging to the octandria claſs. See BOTANY *Index*.

GUARINI, BATTISTA, a celebrated Italian poet, born at Ferrara in 1538. He was great-grandſon to Guarino of Verona, and was ſecretary to Alphonſo duke of Ferrara, who intruſted him with ſeveral important commiſſions. After the death of that prince, he was ſucceſſively ſecretary to Vincenzio de Gonzaga, to Ferdinand de Medicis grand duke of Tuſcany, and to Francis Maria de Feltri duke of Urbino. But the only advantages he reaped under theſe various maſters were great encomiums on his wit and compoſitions. He was well acquainted with polite literature; and acquired immortal reputation by his Italian poems, eſpecially by his *Paſtor Fido*, the moſt known and admired of all his works, and of which there have been innumerable editions and tranſlations. He died in 1612.

GUARDIA, or GUARDA, a town of Portugal, in the province of Beira, with a biſhop's ſee. It contains about 2300 inhabitants, is fortified both by art and nature, and has a ſtately cathedral. W. Long. 6. 37. N. Lat. 40. 20.

Guardia-Alferez, a town of Italy, in the kingdom of Naples, and in the Contado di Moliſe, with a biſhop's ſee. E. Long. 14. 56. N. Lat. 41. 39.

GUARGALA, or GUERGUELA, a town of Africa, and capital of a ſmall kingdom of the ſame name, in Biledulgerid, to the ſouth of Mount Atlas. E. Long. 9. 55. N. Lat. 28. 0.

GUARIBA, the name of a ſpecies of monkey. See SIMIA, MAMMALIA *Index*.

GUASTALLA, a ſtrong town of Italy, in the duchy of Mantua, with the title of a duchy, remarkable for a battle between the French and Imperialiſts in 1734. It was ceded to the duke of Parma in 1748, by the treaty of Aix-la-Chapelle. It is ſeated near the river Po, in E. Long. 10. 38. N. Lat. 44. 55.

GUATIMALA, the audience and province of, in New Spain, is above 750 miles in length, and 450 in breadth. It is bounded on the weſt by Soconjuſco, on the north by Verapax and Honduras, on the eaſt by Nicaragua, and on the ſouth by the South ſea. It abounds in chocolate, which they make uſe of inſtead of money. It has 12 provinces under it: and the native Americans, under the dominions of Spain, profeſs Chriſtianity, mixed indeed with many of their own ſuperſtitions. There is a great chain of high mountains, which runs acroſs it from eaſt to weſt, and it is ſubject to earthquakes and ſtorms. It is, however, very fertile; and produces beſides chocolate, great quanti-

Guatimala ‖ Gudgeon.

ties of cochineal and cotton, indigo, woad, balſam, and honey.

GUATIMALA, St Jago de, is the capital of the above audience, with a biſhop's ſee, and an univerſity. It carries on a great trade, eſpecially in chocolate. W. Long. 90. 30. N. Lat. 14. 0.

St Jago de Guatimala was almoſt ruined in 1541, by a ſtorm and an eruption from the volcanic mountain Guatimala. It was afterwards rebuilt at a good diſtance from this mountain. But in 1773, it was again deſtroyed by a terrible earthquake. The town then contained 60,000 inhabitants; but no traces of it now remain; 8000 perſons periſhed by this earthquake, and the loſs has been eſtimated at 15 millions ſterling.

GUAVA. See PSIDIUM, BOTANY *Index*.

GUAXACA, a province in the audience of Mexico, in New Spain, which is very fertile in wheat, Indian corn, cochineal, and caſſia. It is bounded by the gulf of Mexico on the north, and by the South ſea on the ſouth. It contains mines of gold and ſilver. Guaxaca is the capital town.

GUAXACA, the capital town of the above province, with a biſhop's ſee. It is without walls, and does not contain above 2000 inhabitants; but it is rich, and they make very fine ſweet-meats and chocolates. It has ſeveral rich convents, both for men and women. W. Long. 100. N. Lat. 17. 25.

GUAYRA, a diſtrict of the province of La Plata, in South America, having Braſil on the eaſt, and Paraguay on the weſt.

GUBEN, a handſome town of Germany, in Lower Luſatia, ſeated on the river Neiſſe, and belonging to the houſe of Saxe Marſenburg. E. Long. 14. 59. N. Lat. 51. 55.

GUBER, a kingdom of Africa, in Negroland. It is ſurrounded with high mountains; and the villages, which are many, are inhabited by people who are employed in taking care of their cattle and ſheep. There are alſo abundance of artificers, and linen-weavers, who ſend their commodities to Tombuto. The whole country is overflowed every year by the inundations of the Niger, and at that time the inhabitants ſow their rice. There is one town which contains almoſt 6000 families, among whom are many merchants.

GUBIO, a town of Italy, in the territory of the church, and in the duchy of Urbino, with a biſhop's ſee. E. Long. 12. 38. N. Lat. 43. 18.

GUDGEON, a ſpecies of cyprinus. See CYPRINUS, ICHTHYOLOGY *Index*.

This fiſh, though ſmall, is of ſo pleaſant a taſte, that it is very little inferior to ſmelt. They ſpawn twice in the ſummer ſeaſon; and their feeding is much like the barbels in ſtreams and on gravel, ſlighting all manner of flies: but they are eaſily taken with a ſmall red worm, fiſhing near the ground; and being a leather-mouthed fiſh, will not eaſily get off the hook when ſtruck.—The gudgeon may be fiſhed for with float, the hook being on the ground; or by hand, with a running line on the ground, without cork or float. But although the ſmall red worm above-mentioned is the beſt bait for this fiſh, yet waſps, gentles, and cadbaits will do very well. You may alſo fiſh for gudgeons with two or three hooks at once, and find very pleaſant ſport, where they riſe any thing large. When you angle for them, ſtir up the ſand or gravel with a long pole; this will make them gather to that place, bite faſter, and with more eagerneſs.

Gudgeon ‖ Guericke.

Sea GUDGEON, *Rock-fiſh*, or *Black Goby*. See GOBIUS, ICHTHYOLOGY *Index*.

GUEBRES, or GABRES. See GABRES.

GUELPHS, or GUELFS, a celebrated faction in Italy, antagoniſts of the Gibelins. See GIBELINS.

The Guelphs and Gibelins filled Italy with blood and carnage for many years. The Guelphs ſtood for the Pope, againſt the emperor. Their riſe is referred by ſome to the time of Conrad III. in the twelfth century; by others to that of Frederick I.; and by others to that of his ſucceſſor Frederick II. in the thirteenth century.

The name of *Guelph* is commonly ſaid to have been formed from *Welf*, or *Welfo*, on the following occaſion: the emperor Conrad III. having taken the duchy of Bavaria from Welfe VI. brother of Henry duke of Bavaria, Welfe, aſſiſted by the forces of Roger king of Sicily, made war on Conrad, and thus gave birth to the faction of the Guelfs.

Others derive the name *Guelfs* from the German *Wolff*, on account of the grievous evils committed by that cruel faction: others deduce the denomination from that of a German called *Guelfe*, who lived at Piſtoye; adding, that his brother, named *Gibel*, gave his name to the Gibelins. See the article GIBELINS.

GUELDERLAND, one of the united provinces, bounded on the weſt by Utrecht and Holland, on the eaſt by the biſhoprick of Munſter and the duchy of Cleves, on the north by the Zuyder ſea and Overyſſel, and on the ſouth it is ſeparated from Brabant by the Maeſe. Its greateſt extent from north to ſouth is about 47 miles, and from weſt to eaſt near as much; but its figure is very irregular. The air here is much healthier and clearer than in the maritime provinces, the land lying higher. Excepting ſome part of what is called the *Veluwe*, the ſoil is fruitful. It is watered by the Rhine, and its three branches, the Wahal, the Yſſel, and the Leck, beſides leſſer ſtreams. In 1079, it was raiſed to a county by the emperor Henry IV. and in 1339 to a duchy by the emperor Louis of Bavaria. It had dukes of its own till 1528, when it was yielded up to the emperor Charles V. In 1576, it acceded to the union of Utrecht. It is divided into three diſtricts, each of which has its ſtates and diets. Thoſe for the whole province are held twice a-year at the capital towns. The province ſends 19 deputies to the ſtates-general. Here are computed 285 Calviniſt miniſters, 14 Roman Catholic congregations, 4 of the Lutheran perſuaſion, beſides 3 others of Remonſtrants and Anabaptiſts. The places of moſt note are Nimeguen, Zutphen, Arnheim, Harderwyſt, Loo, &c.

GUELDRES, a ſtrong town of the Netherlands, in the duchy of the ſame name. It was ceded to the king of Pruſſia, by the peace of Utrecht, and is ſeated among marſhes. E. Long. 6. N. Lat. 51. 30. It ſurrendered to the French in 1794.

GUERCINO. See BARBIERI.

GUERICKE, OTTO or OTHO, a German philoſopher of conſiderable eminence, was born in 1602, and died at Hamburg in 1686. In conjunction with Torricelli, Paſchal, and Boyle, he contributed much to the farther explanation of the properties of air. He was counſellor to the elector of Brandenburg, and burgomaſter

Guernſey || Guiana.

gomaſter of Magdeburg, but his greateſt celebrity was derived from his philoſophical diſcoveries, in a particular manner the invention of the air-pump. Mr Boyle indeed made approaches towards the diſcovery of it much about the ſame time, but with that candour which is ever the characteriſtic of great and enlightened minds, he confeſſed that the merit of it belonged excluſively to Guericke, the account of whoſe experiments firſt enabled him to bring his deſign to any thing like maturity. Our author has alſo the merit of inventing the two braſs hemiſpheres, by which the preſſure of the air is illuſtrated, and an inſtrument for determining the changes in the ſtate of the atmoſphere, which fell into diſuſe on the invention of the barometer. By conſulting his tube he predicted approaching ſtorms, on which account he was deemed a ſorcerer by the ignorant multitude. It is worthy of obſervation, that when his braſs hemiſpheres were applied to each other, and the air exhauſted, it reſiſted the efforts of ſixteen horſes to draw them aſunder. He compoſed ſeveral treatiſes in natural philoſophy, the principal of which is entitled *Experimenta Magdeburgica*," 1672, folio, which contains his experiments on a vacuum.

GUERNSEY, an iſland in the Engliſh channel, on the coaſt of Normandy, ſubject to Britain; but (as well as the adjacent iſlands) governed by its own laws. See JERSEY. It extends from eaſt to weſt in the form of a harp, and is thirteen miles and a half from the ſouth-weſt to north-eaſt, and twelve and a half, where broadeſt, from eaſt to weſt. The air is very healthy, and the ſoil naturally more rich and fertile than that of Jerſey; but the inhabitants neglect the cultivation of the land for the ſake of commerce: they are, however, ſufficiently ſupplied with corn and cattle, both for their own uſe and that of their ſhips. The iſland is well fortified by nature with a ridge of rocks, one of which abounds with emery, uſed by lapidaries in the poliſhing of ſtones, and by various other artificers.—Here is a better harbour than any in Jerſey, which occaſions its being more reſorted to by merchants; and on the ſouth ſide the ſhore bends in the form of a creſcent, encloſing a bay capable of receiving very large ſhips. The iſland is full of gardens and orchards; whence cyder is ſo plentiful, that the common people uſe it inſtead of ſmall beer, but the more wealthy drink French wine.

GUETTARDA, a genus of plants belonging to the monœcia claſs, and in the natural method ranking under the 38th order, *Tricoccæ*. See BOTANY *Index*.

GUIANA, a large country of South America, is bounded on the eaſt and north by the Atlantic ocean, and the river Oroonoko; on the ſouth, by the river of the Amazons; and on the weſt, by the provinces of Grenada and New Andaluſia, in Terra Firma, from which it is ſeparated both on the weſt and north by the river Oroonoko. It extends above 1200 miles from the north-eaſt to the ſouth-weſt, that is, from the mouth of the river Oroonoko to the mouth of the river of the Amazons, and near 600 in the contrary direction.

Moſt geographers divide it into two parts, calling the country along the coaſt *Caribbeana Proper*, and the interior country *Guiana Proper:* The laſt is alſo ſtyled *El Dorado* by the Spaniards, on account of the immenſe quantity of gold it is ſuppoſed to contain.

The Portugueſe, French, and Dutch, have all ſettlements along the coaſt. What lies ſouth of Cape North belongs to the firſt of theſe nations; the coaſt between Cape North and Cape Orange is poſſeſſed by the natives; French Guiana, Old Cayenne, or Equinoctial France, extends from Cape Orange, about 240 miles along the coaſt, to the river Marani; where the Dutch territory begins, and extends to the mouth of the Oroonoko. Guiana.

Along the coaſt, the land is low, marſhy, and ſubject to inundations in the rainy ſeaſon, from a multitude of rivers which deſcend from the inland mountains. Hence it is, that the atmoſphere is ſuffocating, hot, moiſt, and unhealthful, eſpecially where the woods have not been cleared away. Indeed, the Europeans are forced to live in the moſt diſagreeable ſituations, and fix their colonies at the mouths of the rivers, amidſt ſtinking marſhes, and the putrid ooze of ſalt moraſſes, for the conveniency of exportation and importation.

"Dutch Guiana (according to the account of a phyſician who reſided ſeveral years at Surinam) was firſt diſcovered by Columbus in 1498. It lies between the 7° of north and the 5° of ſouth latitude, and between the 53° and 60° of longitude weſt from London. It is bounded on the north and eaſt, by the Atlantic; on the weſt, by the rivers Oroonoko and Negroe; and on the ſouth, by the river of the Amazons.

"It was formerly divided among the Spaniards, Dutch, French, and Portugueſe; but, except its ſea coaſt, and lands adjacent to its rivers, it has hitherto remained unknown to all but its original natives; and even of theſe, it is only what were the Dutch territories that foreigners have any knowledge of; for thoſe of the Spaniards, French, and Portugueſe, are inacceſſible to them.

"This country, on account of the diverſity and fertility of its ſoil, and of its vicinity to the equator, which paſſes through it, affords almoſt all the productions of the different American countries between the tropics, beſides a variety peculiar to itſelf."

Dutch Guiana was formerly the property of the Engliſh, who made ſettlements at Surinam, where a kind of corrupt Engliſh is ſtill ſpoken by the negroes. The Dutch took it in the reign of Charles the Second; and it was ceded to them by a treaty in 1674, in exchange for what they had poſſeſſed in the province now called *New York*.

The land for 50 miles up the country from the ſea-coaſt is flat; and, during the rainy ſeaſons, covered two feet high with water. This renders it inconceivably fertile, the earth, for 12 inches deep, being a ſtratum of perfect manure: an attempt was once made to carry ſome of it to Barbadoes; but the wood-ants ſo much injured the veſſel, that it was never repeated. The exceſſive richneſs of the ſoil is a diſadvantage, for the canes are too luxuriant to make good ſugar; and therefore, during the firſt and ſecond crops, are converted into rum.

There are ſome trees on this part; but they are ſmall and low, conſiſting chiefly of a ſmall ſpecies of palm, intermixed with a leaf near 30 feet long and three feet wide, which grows in cluſters, called a *Troœlie*, and at the edges of running-water, with mangroves.

Farther

Guiana. Farther inward the country riſes; and the ſoil, though ſtill fertile, is leſs durable. It is covered with foreſts of valuable timber, that are always green; and there are ſome ſandy hills, though no mountains; in the French territories, however, there are mountains, according to the report of the Indians, for they have never been viſited by any other people.

In this country the heat is ſeldom diſagreeable: the trade-winds by day, the land breezes in the evening, and the invariable length of the nights, with gentle dews, refreſh the air, and render it temperate and ſalubrious. There are two wet ſeaſons and two dry, of three months each, in every year; and, during more than a month in each wet ſeaſon, the rain is inceſſant. The dry ſeaſons commence ſix weeks before the equinoxes, and continue ſix weeks after. The wet ſeaſons are more wholeſome than the dry, becauſe the rains keep the waters that cover the low lands, next the ſea, freſh and in motion; but during the dry ſeaſon it ſtagnates, and, as it waſtes, becomes putrid, ſending up very unwholeſome exhalations. Bloſſoms, green and ripe fruit, are to be found upon the ſame tree in every part of the year. There are ſome fine white and red agates in Guiana, which remain untouched; and mines of gold and ſilver, which the Dutch will not ſuffer to be wrought.

The inhabitants of Guiana are either natives, who are of a reddiſh brown; or negroes and Europeans; or a mixed progeny of theſe in various combinations. The natives are divided into different tribes, more or leſs enlightened and poliſhed, as they are more or leſs remote from the ſettlements of the Europeans. They allow polygamy, and have no diviſion of lands. The men go to war, hunt, and fiſh; and the women look after domeſtic concerns, ſpin, weave in their faſhion, and manage the planting of caſſava and manive, the only things which in this country are cultivated by the natives. Their arms are bows and arrows; ſharp poiſoned arrows, blown through a reed, which they uſe in hunting: and clubs made of a heavy wood called *iron-wood*. They eat the dead bodies of thoſe that are ſlain in war; and ſell for ſlaves thoſe they take priſoners; their wars being chiefly undertaken to furniſh the European plantations. All the different tribes go naked. On particular occaſions they wear caps of feathers; but, as cold is wholly unknown, they cover no part but that which diſtinguiſhes the ſex. They are cheerful, humane, and friendly; but timid, except when heated by liquor, and drunkenneſs is a very common vice among them.

Their houſes conſiſt of four ſtakes ſet up in a quadrangular form, with croſs poles, bound together by ſlit nibbees, and covered with the large leaves called *troœlies*. Their life is ambulatory; and their houſe, which is put up and taken down in a few hours, is all they have to carry with them. When they remove from place to place, which, as they inhabit the banks of rivers, they do by water in ſmall canoes, a few veſſels of clay made by the women, a flat ſtone on which they bake their bread, and a rough ſtone on which they grate the roots of the caſſava, a hammock and a hatchet, are all their furniture and utenſils; moſt of them, however, have a bit of looking-glaſs framed in paper, and a comb.

Their poiſoned arrows are made of ſplinters of a hard heavy wood, called *cacario;* they are about 12 inches long, and ſomewhat thicker than a coarſe knitting needle: one end is formed into a ſharp point; round the other is wound ſome cotton, to make it fit the bore of the reed through which it is to be blown. They will blow theſe arrows 40 yards with abſolute certainty of hitting the mark, and with force enough to draw blood, which is certain and immediate death. Againſt this poiſon no antidote is known. The Indians never uſe theſe poiſoned arrows in war, but in hunting only, and chiefly againſt the monkeys; the fleſh of an animal thus killed may be ſafely eaten, and even the poiſon itſelf ſwallowed with impunity.

Guiaquil || Guides.

GUIAQUIL, alſo denominated by ſome GUAIAQUIL, a city, bay, harbour, and river, in Peru, South America. The city is the ſecond of Spaniſh origin, being as old as the year 1534. It lies on the weſt ſide of the river of the ſame name, in 1° 11′ S. Lat. and 79° 17′ W. Long. It is divided into the old and new towns, between which there is a communication by means of a wooden bridge. It is two miles in extent, and defended by two forts. The churches, convents, and houſes, are of wood, and it contains about 20,000 inhabitants. The women are celebrated for their perſonal charms, polite manners, and elegant dreſs. This place is moſt of all noted for a ſhell-fiſh no larger than a nut, which produces the moſt beautiful purple dye in the world. It is the blood of the fiſh, preſſed out by a particular proceſs. The commerce here is very conſiderable, the productions of the country alone forming the greateſt part of it, which conſiſt of timber, ſalt, horned cattle, mules, and colts, pepper, drugs, and a kind of wool much finer than cotton, made uſe of for mattreſſes and beds.

GUIARA, a ſea-port town of South America, and on the Caracca coaſt. The Engliſh attempted to take it in 1739 and 1743; but they were repulſed both times. W. Long. 66. 5. N. Lat. 10. 35.

GUICCIARDINI, FRANCISCO, a celebrated hiſtorian, born at Florence in 1482. He profeſſed the civil law with reputation, and was employed in ſeveral embaſſies. Leo X. gave him the government of Modena and Reggio, and Clement VII. that of Romagna and Bologna. Guicciardini was alſo lieutenant-general of the pope's army, and diſtinguiſhed himſelf by his bravery on ſeveral occaſions; but Paul III. having taken from him the government of Bologna, he retired to Florence, where he was made counſellor of ſtate, and was of great ſervice to the houſe of Medicis. He at length retired into the country to write his hiſtory of Italy, which he compoſed in Italian, and which comprehends what paſſed from the year 1494 to 1532. This hiſtory is greatly eſteemed; and was continued by John Baptiſt Adriani, his friend. He died in 1540.

GUICCIARDINI, *Lewis*, his nephew, compoſed a hiſtory of the Low Countries, and memoirs of the affairs of Europe, from 1530 to 1560. He wrote with great ſpirit againſt the perſecution of the duke d'Alva, for which he impriſoned him. Died in 1583.

GUIDES, in military language, are uſually the country people in the neighbourhood of an encampment; who give the army intelligence concerning the country, the roads by which they are to march, and the probable route of the enemy.

Guidi || Guild.

GUIDI, ALEXANDER, an eminent Italian poet, born at Pavia in 1650. Having a deſire to ſee Rome, he there attracted the notice of Queen Chriſtina of Sweden, who retained him at her court; he alſo obtained a conſiderable benefice from Pope Innocent XI. and a penſion from the duke of Parma. For a good office he did the ſtate of Milan with Prince Eugene, he was enrolled among the nobles and decurions of that town; and died in 1712. Nature had been kinder to his intellects than to his exterior form; his body was ſmall and crooked, his head was large, and he was blind of his right eye. A collection of his works was publiſhed at Verona in 1726.

GUIDO ARETIN. See ARETIN.

GUIDO *Reni*, an illuſtrious Italian painter, born at Bologna in 1595. In his early age he was the diſciple of Denis Calvert, a Flemiſh maſter of good reputation; but afterwards entered himſelf in the ſchool of the Caracci. He firſt imitated Ludovico Caracci; but fixed at laſt in a peculiar ſtyle of his own, that ſecured him the applauſe of his own time and the admiration of poſterity. He was much honoured, and lived in ſplendor: but an unhappy attachment to gaming ruined his circumſtances; the reflection of which brought on a languiſhing diſorder, that put an end to his life in 1642. There are ſeveral deſigns of this great maſter in print, etched by himſelf.

GUIDON, a ſort of flag or ſtandard borne by the king's life-guard; being broad at one extreme, and almoſt pointed at the other, and ſlit or divided into two. The guidon is the enſign or flag of a troop of horſe-guards. See GUARD.

GUIDON, alſo denotes the officer who bears the guidon. The guidon is that in the horſe-guards which the enſign is in the foot. The guidon of a troop of horſe takes place next below the cornet.

GUIDONS, *guidones*, or *ſchola guidonum*, was a company of prieſts eſtabliſhed by Charlemagne, at Rome, to conduct and guide pilgrims to Jeruſalem, to viſit the holy places: they were alſo to aſſiſt them in caſe they fell ſick, and to perform the laſt offices to them in caſe they died.

GUIENNE, a large province of France, now forming the department of Gironde and that of Lot and Garonne, bounded on the north by Saintogne, Angoumois, and Limoſin; on the eaſt by Limoſin, Auvergne, and Languedoc; on the ſouth by the Pyrenees, Lower Navarre, and Bearn; and on the weſt by the ocean. It is about 225 miles in length, and 200 in breadth. It is divided into the Upper and Lower. The Upper comprehends Querci, Rouergue, Armagnac, the territory of Comminges, and the county of Bigorre. The Lower contains Bourdelois, Perigord, Agenois, Condomois, Bazadois, the Lander, Proper Gaſcony, and the diſtrict of Labour. The principal rivers are, the Garonne, the Adour, the Tarn, the Aveiron, and the Lot. Bourdeaux is the capital town.

GUILANDINA, the NICKAR TREE, a genus of plants belonging to the decandria claſs, and in the natural method ranking under the 33d order, *Lomentaceæ*. See BOTANY *Index*.

GUILD, (from the Saxon *guildane*, to "pay"), ſignifies a fraternity or company, becauſe every one was *gildare*, i. e. to pay ſomething towards the charge and ſupport of the company. As to the original of theſe guilds or companies: It was a law among the Saxons, that every freeman of fourteen years of age ſhould find ſureties to keep the peace, or be committed: upon which certain neighbours, conſiſting of ten families, enter into an aſſociation, and become bound for each other, either to produce him who committed an offence, or to make ſatisfaction to the injured party: that they might the better do this, they raiſed a ſum of money among themſelves, which they put into a common ſtock; and when one of their pledges had committed an offence, and was fled, then the other nine made ſatisfaction out of this ſtock, by payment of money, according to the offence. Becauſe this aſſociation conſiſted of ten families, it was called a *decennary*: and from hence came out later kinds of fraternities. But as to the preciſe time when theſe guilds had their origin in England, there is nothing of certainty to be found; ſince they were in uſe long before any formal licence was granted to them for ſuch meetings. It ſeems to have been about the cloſe of the eleventh century, ſays Anderſon, in his Hiſtory of Commerce, vol. i. p. 70. that merchant-guilds, or fraternities, which were afterwards ſtyled corporations, came firſt into general uſe in many parts of Europe. Mr Madox, in his *Firma Burgi*, chap. i. § 9. thinks, they were hardly known to our Saxon progenitors, and that they might be probably brought into England by the Normans; although they do not ſeem to have been very numerous in thoſe days. The French and Normans might probably borrow them from the free cities of Italy, where trade and manufactures were much earlier propagated, and where poſſibly ſuch communities were firſt in uſe. Theſe guilds are now companies joined together, with laws and orders made by themſelves, by the licence of the prince.

Guild, Guilford.

GUILD, in the royal boroughs of Scotland, is ſtill uſed for a company of merchants, who are freemen of the borough. See BOROUGH.

Every royal borough has a dean of *guild*, who is the next magiſtrate below the bailiff. He judges of controverſies among men concerning trade; diſputes between inhabitants touching buildings, lights, watercourſes, and other nuiſances; calls courts, at which his brethren of the *guild* are bound to attend; manages the common ſtock of the *guild*; and amerces and collects fines.

GUILD, *Gild*, or *Geld*, is alſo uſed among our ancient writers, for a compenſation or mulct, for a fault committed.

GUILD-Hall, or *Gild-Hall*, the great court of judicature for the city of London. In it are kept the mayor's court, the ſheriff's court, the court of huſtings, court of conſcience, court of common council, chamberlain's court, &c. Here alſo the judges ſit upon *niſi prius*, &c.

GUILDFORD, or GULDEFORD, a borough-town of Surry, ſituated on the river Wey, 31 miles ſouth-weſt of London. Near it are the ruinous walls of an old caſtle, this having been in the Saxon times a royal villa, where many of our kings uſed to paſs the feſtivals. Here is a corporation conſiſting of a mayor, recorder, aldermen, &c. which ſent members to parliament ever ſince parliament had a being. The great road from London to Chicheſter and Portſmouth lies through this town, which has always been famous for good

Guillemot || Guillotine.

good inns, the cleaneſt of linen, and other excellent accommodations; and the aſſizes are often held here. Its manufactory formerly was cloth, of which there are ſtill ſome ſmall remains. Here is a ſchool founded by King Edward VI. alſo an almſhouſe endowed with lands worth 300l. a-year, of which 100l. to be employed in ſetting the poor at work, and the other 200l. for the maintenance of a maſter, 12 brethren, and 8 ſiſters, who are to have 2s. 6d. a-week. There are, beſides, two charity-ſchools for 30 boys and 20 girls. There were three churches in this town, but one of them fell down in April 1740. There is a fine circular courſe for horſe-matches, which begin when the Newmarket races are ended. King William III. founded a plate of 100 guineas to be run for here every May, and uſed to honour the race with his preſence, as did once King George I. The river Wey is made navigable to the town, and by it a great quantity of timber is carried to London, not only from this neighbourhood, but from Suſſex and Hampſhire woods, above 30 miles off, from whence it is brought hither in the ſummer by land carriage. This navigation is alſo of great ſupport to Farnham market, corn bought there being brought to the mills on this river within ſeven miles diſtance, and, after being ground and dreſſed, is ſent down in barges to London. The road from hence to Farnham is very remarkable, for it runs along upon the ridge of a high chalky hill, called *St Catharine's*, no wider than the road itſelf, from whence there is an extenſive proſpect, viz. to the north and north-weſt, over Bagſhot Heath, and the other way into Suſſex, and almoſt to the South Downs. The town ſends two members to parliament; and gives title of earl to the North family.

GUILLEMOT. See COLYMBUS, ORNITHOLOGY *Index*.

GUILLIM, JOHN, of Welſh extraction, was born in Herefordſhire about the year 1565. Having completed his education at Brazen-noſe college, Oxford, he became a member of the college of arms in London; and he was made rouge croix purſuivant, in which poſt he died in 1621. He publiſhed, in 1610, a celebrated work, entitled the Diſplay of Heraldry, folio, which has gone through many editions. To the fifth, which came out in 1679, was added A Treatiſe of Honour Civil and Military, by Captain John Loggan.

GUILLOTINE, the name of an inſtrument introduced by the authors of the French revolution, for beheading thoſe who were condemned to death. The decree for uſing it paſſed on the 20th of March 1792, by order of the national aſſembly. It was not a new invention, properly ſpeaking, but the revival of an inſtrument known before. It ſeems to have been firſt uſed under the name of *maiden*, in the barony of Halifax in Yorkſhire, and it was likewiſe ſet up in Scotland, but we have no good authority for aſſerting that it was ever uſed, although ſome are of opinion that Regent Morton, who brought a model of it from England, ſuffered by it himſelf. See MAIDEN.

Guillotine, the ſuppoſed inventor, a phyſician of Lyons, and a member of the national aſſembly, thought it an honour conferred upon his name, by having it united with this inſtrument of death. His invention was expenſive, and it received the moſt unqualified applauſe, both from the members and from the galleries. The propriety of uſing it was referred to a committee, with inſtructions to take the opinion of the moſt able ſurgeons reſpecting it. M. Louis, an eminent ſurgeon of Paris, declared it well fitted for the taſk, and commended the judgment of M. Guillotine in the contrivance. His diſcovery upon this occaſion was rewarded by the legiſlature with a donation of 2000 livres; and it was ordered to be printed in the Paris Journals. Guinea.

As far as this inſtrument diminiſhes the duration of the dreadful conflict with death, it may be deemed merciful, and is, in this reſpect, preferable to the hanging of malefactors by the neck; but the agitation of the mind is probably augmented by the long ſeries of preparatory operations. The hands of the criminal are tied behind his back; he is ſtretched on his face on a ſtrong plank. He is then faſtened to the plank, his neck is adjuſted to the block, and a baſket placed before him to receive his head, which in the ſpeedieſt manner muſt take up ſome time, although we recollect to have read of 21 (viz. Briſſot and his party) who were all decapitated in the courſe of 36 minutes.

The conſtruction of the guillotine has been variouſly modified, and was at length made ſo portable as to conſtitute part of the travelling equipage of a commiſſioner from the national aſſembly; and a repreſentation of it was put upon the coins, as an ornament. On a piece of ten ſous value, which was ſtruck at Mentz in the year 1793, there was for the device, the faſces and axe of ancient Rome, crowned with a red cap, and ſurrounded by a laurel wreath, having for an inſcription, *Republique Françoiſe*, 1793, (an 2).

GUINEA, a large tract of country lying on the weſt ſide of the continent of Africa, extends along the coaſt three or four thouſand miles, beginning at the river Senegal, ſituated about the 17th degree of north latitude (being the neareſt part of Guinea as well to Europe as to North America). From that river to the river Gambia, and in a ſoutherly courſe to Cape Sierra Leona, is comprehended a coaſt of about 700 miles; being the ſame tract for which Queen Elizabeth granted charters to the firſt traders to that coaſt. From Sierra Leona, the land of Guinea takes a turn to the eaſtward, extending that courſe about 1500 miles, including thoſe ſeveral diviſions known by the names of the *Grain Coaſt*, the *Ivory Coaſt*, the *Gold Coaſt*, and the *Slave Coaſt*, with the large kingdom of *Benin*. From thence the land runs ſouthward along the coaſt about 1200 miles, which contains the kingdoms of *Congo* and *Angola*; where the trade for ſlaves ends. From which to the ſouthermoſt cape of Africa, called the *Cape of Good Hope*, the country is ſettled by Caffres and Hottentots, who have never been concerned in the making or ſelling ſlaves.

1. Of the parts which are above mentioned, the firſt is that ſituated on the great river Senegal, which is ſaid to be navigable more than 1000 miles, and is by travellers deſcribed to be very agreeable and fruitful. Mr Brue, principal factor for the French African company, who lived 16 years in that country, after deſcribing its fruitfulneſs and plenty near the ſea, adds *, "The farther you go from the ſea, the country on the river ſeems the more fruitful and well improved, abounding with Indian corn, pulſe, fruit, &c. Here are vaſt meadows, which feed large herds of great and ſmall cattle, and poultry numerous: the villages that lie thick on the river, ſhow the country

* *Aſtley's Collect.* vol. ii. p. 46.

Guinea. is well peopled." The ſame author, in the account of a voyage he made up the river Gambia, the mouth of which lies about 300 miles ſouth of the Senegal, and is navigable about 600 miles up the country, ſays, "that he was ſurpriſed to ſee the land ſo well cultivated; ſcarce a ſpot lay unimproved; the low lands divided by ſmall canals were all ſowed with rice, &c. the higher ground planted with millet, Indian corn, and peaſe of different ſorts; their beef excellent; poultry plenty and very cheap, as well as all other neceſſaries of life." Mr Moore, who was ſent from England about the year 1735, in the ſervice of the African company, and reſided at James Fort on the river Gambia, or in other factories on that river, about five years, confirms the above account of the fruitfulneſs of the country. Captain Smith, who was ſent in the year 1726 by the African company to ſurvey their ſettlements throughout the whole coaſt of Guinea, ſays*, "the country about the Gambia is pleaſant and fruitful; proviſions of all kinds being plenty and exceeding cheap." The country on and between the two above-mentioned rivers is large and extenſive, inhabited principally by thoſe three Negro nations known by the name of *Jalofs*, *Fulis*, and *Mandingos*. The Jalofs poſſeſs the middle of the country. The Fulis principal ſettlement is on both ſides of the Senegal: great numbers of theſe people are alſo mixed with the Mandingos; which laſt are moſtly ſettled on both ſides the Gambia. The government of the Jalofs is repreſented as under a better regulation than can be expected from the common opinion we entertain of the negroes. We are told in Aſtley's Collection, "That the king has under him ſeveral miniſters of ſtate, who aſſiſt him in the exerciſe of juſtice. The grand jerafo is the chief juſtice through all the king's dominions, and goes in circuit from time to time to hear complaints and determine controverſies. The king's treaſurer exerciſes the ſame employment, and has under him alkairs, who are governors of towns or villages. That the kondi, or viceroy, goes the circuit with the chief juſtice, both to hear cauſes and inſpect into the behaviour of the alkadi, or chief magiſtrate of every village in their ſeveral diſtricts." Vaſconcelas, an author mentioned in the Collection, ſays, "the ancienteſt are preferred to be the prince's counſellors, who keep always about his perſon; and the men of moſt judgment and experience are the judges." The Fulis are ſettled on both ſides of the river Senegal: their country, which is very fruitful and populous, extends near 400 miles from eaſt to weſt. They are generally of a deep tawny complexion, appearing to bear ſome affinity to the Moors, whoſe country they join on the north: they are good farmers, and make great harveſt of corn, cotton, tobacco, &c. and breed great numbers of cattle of all kinds. But the moſt particular account we have of theſe people is from Moore, who ſays†, "Some of theſe Fuli blacks, who dwell on both ſides the river Gambia, are in ſubjection to the Mandingos, amongſt whom they dwell, having been probably driven out of their country by war or famine. They have chiefs of their own, who rule with much moderation. Few of them will drink brandy, or any thing ſtronger than water and ſugar, being ſtrict Mahometans. Their form of government goes on eaſy, becauſe the people are of a good quiet diſpoſition, and ſo well inſtructed in what is right, that a man who does ill is the abomination of all, and none will ſupport him againſt the chief. In theſe countries the natives are not covetous of land, deſiring no more than what they uſe; and as they do not plough with horſes and cattle, they can uſe but very little; therefore the kings are willing to give the Fulis leave to live in their country, and cultivate their lands. If any of their people are known to be made ſlaves, all the Fulis will join to redeem them; they alſo ſupport the old, the blind, and lame, amongſt themſelves; and as far as their abilities go, they ſupply the neceſſities of the Mandingos, great numbers of whom they have maintained in famine." The author, from his own obſervations, ſays, "They were rarely angry, and that he never heard them abuſe one another." Guinea.

The Mandingos are ſaid by Mr Brue before mentioned, "to be the moſt numerous nation on the Gambia, beſides which, numbers of them are diſperſed over all theſe countries; being the moſt rigid Mahometans amongſt the negroes, they drink neither wine nor brandy, and are politer than the other negroes. The chief of the trade goes through their hands. Many are induſtrious and laborious, keeping their grounds well cultivated, and breeding a good ſtock of cattle †. Every town has an alkadi, or governor, who has great power; for moſt of them having two common fields of clear ground, one for corn, and the other for rice, the alkadi appoints the labour of all the people. The men work the corn ground, and the women and girls the rice ground; and as they all equally labour, ſo he equally divides the corn amongſt them; and in caſe any are in want, the others ſupply them. This alkadi decides all quarrels, and has the firſt voice in all conferences in town affairs." Some of theſe Mandingos, who are ſettled at Galem, far up the river Senegal, can read and write Arabic tolerably; and are a good hoſpitable people, who carry on a trade with the inland nations. "They are extremely populous in thoſe parts, their women being fruitful, and they not ſuffering any perſon amongſt them, but ſuch as are guilty of crimes, to be made ſlaves." We are told from Jobſon, "That the Mahometan Negroes ſay their prayers thrice a-day. Each village has a prieſt who calls them to their duty. It is ſurpriſing (ſays the author), as well as commendable, to ſee the modeſty, attention, and reverence they obſerve during their worſhip. He aſked ſome of their prieſts the purport of their prayers and ceremonies; their anſwer always was, "that they adored God by proſtrating themſelves before him; that by humbling themſelves they acknowledged their own inſignificancy, and farther intreated him to forgive their faults, and to grant them all good and neceſſary things, as well as deliverance from evil." Jobſon takes notice of ſeveral good qualities in theſe negro prieſts, particularly their great ſobriety. They gain their livelihood by keeping ſchool for the education of the children. The boys are taught to read and write. They not only teach ſchool, but rove about the country, teaching and inſtructing, for which the whole country is open to them; and they have a free courſe through all places, though the kings may be at war with one another.

The three fore-mentioned nations practice ſeveral trades,

* *Voyage to Guinea*, p. 31, 34.

† *Travels into diſtant parts of Africa*, p. 198.

† *Aſtley's Collect.* p. 296.

Guinea. trades, as ſmiths, potters, ſaddlers, and weavers. Their ſmiths work particularly neat in gold and ſilver, and make knives, hatchets, reaping hooks, ſpades, and ſhears to cut iron, &c. Their potters make neat tobacco pipes, and pots to boil their food. Some authors ſay, that weaving is their principal trade: this is done by the women and girls, who ſpin and weave very fine cotton cloth, which they dye blue or black. Moore ſays, the Jalofs particularly make great quantities of the cotton cloth; their pieces are generally 27 yards long, and about nine inches broad, their looms being very narrow; theſe they ſew neatly together, ſo as to ſupply the uſe of broad cloth.

It was in theſe parts of Guinea that M. Adanſon, correſpondent of the Royal Academy of Sciences at Paris, was employed from the year 1749 to the year 1753, wholly in making natural and philoſophical obſervations on the country about the rivers Senegal and Gambia. Speaking of the great heats in Senegal, he ſays*, "it is to them that they are partly indebted for the fertility of their lands; which is ſo great, that, with little labour and care, there is no fruit nor grain but grows in great plenty."

*Voyage to Senegal, &c. p. 308.

Of the ſoil on the Gambia, he ſays, "it is rich and deep, and amazingly fertile; it produces ſpontaneouſly, and almoſt without cultivation, all the neceſſaries of life, grain, fruit, herbs, and roots. Every thing matures to perfection, and is excellent in its kind." One thing which always ſurpriſed him, was the prodigious rapidity with which the ſap of trees repairs any loſs they may happen to ſuſtain in that country; "And I was never (ſays he) more aſtoniſhed, than when landing four days after the locuſts had devoured all the fruits and leaves, and even the buds of the trees, to find the trees covered with new leaves, and they did not ſeem to me to have ſuffered much." "It was then (ſays the ſame author) the fiſh ſeaſon; you might ſee them in ſhoals approaching towards land. Some of theſe ſhoals were 50 fathoms ſquare, and the fiſh crowded together in ſuch a manner, as to roll upon one another, without being able to ſwim. As ſoon as the negroes perceive them coming towards land, they jump into the water with a baſket in one hand, and ſwim with the other. They need only to plunge and to lift up their baſket, and they are ſure to return loaded with fiſh." Speaking of the appearance of the country, and of the diſpoſition of the people, he ſays, "which way ſoever I turned mine eyes on this pleaſant ſpot, I beheld a perfect image of pure nature; an agreeable ſolitude, bounded on every ſide by charming landſcapes; the rural ſituation of cottages in the midſt of trees; the eaſe and indolence of the negroes, reclined under the ſhade of their ſpreading foliage; the ſimplicity of their dreſs and manners; the whole revived in my mind the idea of our firſt parents, and I ſeemed to contemplate the world in its primitive ſtate. They are, generally ſpeaking, very good-natured, ſociable, and obliging. I was not a little pleaſed with this my firſt reception; it convinced me, that there ought to be a conſiderable abatement made in the accounts I had read and heard everywhere of the ſavage character of the Africans. I obſerved, both in the negroes and Moors great humanity and ſociableneſs, which gave me ſtrong hopes that I ſhould be very ſafe amongſt them, and meet with the ſucceſs I deſired in my inquiries after the curioſities of the country." He was agreeably amuſed with the converſation of the negroes, their fables, dialogues, and witty ſtories with which they entertain each other alternately, according to their cuſtom. Speaking of the remarks which the natives made to him with relation to the ſtars and planets, he ſays, "it is amazing that ſuch a rude and illiterate people ſhould reaſon ſo pertinently in regard to thoſe heavenly bodies; there is no manner of doubt, but that with proper inſtruments, and a good will, they would become excellent aſtronomers."

Guinea.

2. That part of Guinea known by the name of the *Grain* and *Ivory Coaſt* extends about 500 miles. The ſoil is ſaid to be in general fertile, producing abundance of rice and roots; indigo and cotton thrive without cultivation, and tobacco would be excellent if carefully manufactured; they have fiſh in plenty; their flocks greatly increaſe; and their trees are loaded with fruit. They make a cotton cloth, which ſells well on the coaſt. In a word, the country is rich, and the commerce advantageous, and might be greatly augmented by ſuch as would cultivate the friendſhip of the natives. Theſe are repreſented by ſome writers as a rude, treacherous people; whilſt ſeveral other authors of credit give them a very different character, deſcribing them as ſenſible, courteous, and the faireſt traders on the coaſt of Guinea. In the Collection, they are ſaid || to be averſe to drinking to exceſs, and ſuch as do are ſeverely puniſhed by the king's order. On inquiry why there is ſuch a diſagreement in the character given of theſe people, it appears, that though they are naturally inclined to be kind to ſtrangers, with whom they are fond of trading, yet the frequent injuries done them by Europeans have occaſioned their being ſuſpicious and ſhy: the ſame cauſe has been the occaſion of the ill treatment they have ſometimes given to innocent ſtrangers, who have attempted to trade with them. As the Europeans have no ſettlement on this part of Guinea, the trade is carried on by ſignals from the ſhips, on the appearance of which the natives uſually come on board in their canoes, bringing their gold-duſt, ivory, &c. which has given opportunity to ſome villanous Europeans to carry them off with their effects, or retain them on board till a ranſom is paid. It is noted by ſome, that ſince the European voyagers have carried away ſeveral of theſe people, their miſtruſt is ſo great, that it is very difficult to prevail on them to come on board. Smith remarks, "As we paſſed along this coaſt, we very often lay before a town, and fired a gun for the natives to come off; but no ſoul came near us: at length we learnt by ſome ſhips that were trading down the coaſt, that the natives came ſeldom on board an Engliſh ſhip, for fear of being detained or carried off: yet at laſt ſome ventured on board; but if theſe chanced to ſpy any arms, they would all immediately take to their canoes, and make the beſt of their way home. They had then in their poſſeſſion one Benjamin Croſs, the mate of an Engliſh veſſel, who was detained by them to make repriſals for ſome of their men, who had formerly been carried away by ſome Engliſh veſſel." In the Collection we are told, "This villanous cuſtom is too often practiſed, chiefly by the Briſtol and Liverpool ſhips, and is a great detriment to the ſlave-trade on the windward coaſt." John Snock, mentioned in Boſman ‡, when

|| Vol. ii. p. 560.

‡ *Deſcription of Guinea*, p. 440.

Guinea. when on the coaſt, wrote, " We caſt anchor, but not one negro coming on board, I went on ſhore; and after having ſtaid a while on the ſtrand, ſome negroes came to me; and being deſirous to be informed why they did not come on board, I was anſwered, that about two months before, the Engliſh had been there with two large veſſels, and had ravaged the country, deſtroyed all their canoes, plundered their houſes, and carried off ſome of their people, upon which the remainder fled to the inland country, where moſt of them were at that time; ſo that there being not much to be done by us, we were obliged to return on board. When I inquired after their wars with other countries, they told me they were not often troubled with them; but if any difference happened, they choſe rather to end the diſpute amicably than to come to arms ||." He found the inhabitants civil and good-natured. Speaking of the king of Rio Seſtro, lower down the coaſt, he ſays, " He was a very agreeable, obliging man; and all his ſubjects are civil, as well as very laborious in agriculture and the purſuits of trade." Marchais ‡ ſays, " That though the country is very populous, yet none of the natives (except criminals) are ſold for ſlaves." Vaillant never heard of any ſettlement being made by the Europeans on this part of Guinea; and Smith remarks §, " That theſe coaſts, which are divided into ſeveral little kingdoms, and have ſeldom any wars, is the reaſon the ſlave-trade is not ſo good here as on the Gold and Slave Coaſt, where the Europeans have ſeveral forts and factories." A plain evidence this, that it is the intercourſe with the Europeans, and their ſettlements on the coaſt, which gives life to the ſlave-trade.

|| *Deſcription of Guinea*, p. 441.

‡ *Aſtley's Collect.* vol. ii. p. 565.

§ *Smith's Voyage to Guinea*, p. 512.

3. Next adjoining to the Ivory Coaſt are thoſe called the *Gold Coaſt* and the *Slave Coaſt*; authors are not agreed about their bounds, but their extent together along the coaſt may be about 500 miles. And as the policy, produce, and economy of theſe two kingdoms of Guinea are much the ſame, they ſhall be deſcribed together.

Here the Europeans have the greateſt number of forts and factories; from whence, by means of the negro factors, a trade is carried on above 700 miles back in the inland country; whereby great numbers of ſlaves are procured, as well by means of the wars which ariſe amongſt the negroes, or are fomented by the Europeans, as thoſe brought from the back country. Here we find the natives more reconciled to the European manners and trade; but, at the ſame time, much more inured to war, and ready to aſſiſt the European traders in procuring loadings for the great number of veſſels which come yearly on thoſe coaſts for ſlaves. This part of Guinea is agreed by hiſtorians to be, in general, extraordinary fruitful and agreeable; producing (according to the difference of the ſoil) vaſt quantities of rice and other grain, plenty of fruit and roots, palm wine and oil, and fiſh in great abundance, with much tame and wild cattle. Boſman, principal factor for the Dutch at D'Elmina, ſpeaking of the country of Axim, which is ſituated towards the beginning of the Gold coaſt, ſays, " The negro inhabitants are generally very rich, driving a great trade with the Europeans for gold: That they are induſtriouſly employed either in trade, fiſhing, or agriculture; but chiefly in the culture of rice, which grows here in an incredible abundance, and is tranſported hence all over the Gold coaſt: the inhabitants, in lieu, returning full fraught with millet, jamms, potatoes, and palm oil." The ſame author, ſpeaking of the country of Ante, ſays, " This country, as well as the Gold coaſt, abounds with hills, enriched with extraordinary high and beautiful trees; its valleys, betwixt the hills, are wide and extenſive, producing in great abundance very good rice, millet, jamms, potatoes, and other fruits, all good in their kind." He adds, " In ſhort, it is a land that yields its manurers as plentiful a crop as they can wiſh, with great quantities of palm wine and oil, beſides being well furniſhed with all ſorts of tame as well as wild beaſts; but that the laſt fatal wars had reduced it to a miſerable condition, and ſtripped it of moſt of its inhabitants." The adjoining country of Fetu, he ſays, " was formerly ſo powerful and populous, that it ſtruck terror into all the neighbouring nations; but it is at preſent ſo drained by continual wars, that it is entirely ruined; there does not remain inhabitants ſufficient to till the country, though it is ſo fruitful and pleaſant that it may be compared to the country of Ante juſt before deſcribed; frequently (ſays our author), when walking through it before the laſt war, I have ſeen it abound with fine well built and populous towns, agreeably enriched with vaſt quantities of corn, cattle, palm wine, and oil. The inhabitants all apply themſelves without any diſtinction to agriculture; ſome ſow corn; others preſs oil, and draw wine from palm trees, with both which it is plentifully ſtored." Guinea.

Smith gives much the ſame account of the beforementioned parts of the Gold coaſt; and adds, " the country about D'Elmina and Cape Coaſt is much the ſame for beauty and goodneſs, but more populous; and the nearer we come towards the Slave coaſt, the more delightful and rich all the countries are, producing all ſorts of trees, fruits, roots, and herbs, that grow within the torrid zone." Barbot alſo remarks *, with reſpect to the countries of Ante and Adom, " That the ſoil is very good and fruitful in corn and other produce; which it affords in ſuch plenty, that beſides what ſerves for their own uſe, they always export great quantities for ſale: they have a competent number of cattle, both tame and wild, and the rivers are abundantly ſtored with fiſh; ſo that nothing is wanting for the ſupport of life, and to make it eaſy." In the Collection it is ſaid " That the inland people on that part of the coaſt employ themſelves in tillage and trade, and ſupply the market with corn, fruit, and palm wine; the country producing ſuch vaſt plenty of Indian corn, that abundance is daily exported as well by Europeans as blacks reſorting thither from other parts." Theſe inland people are ſaid to live in great union and friendſhip, being generally well tempered, civil, and tractable; not apt to ſhed human blood, except when much provoked; and ready to aſſiſt one another. In the Collection it is ſaid, " That the fiſhing buſineſs is eſteemed on the Gold Coaſt next to trading; that thoſe who profeſs it are more numerous than thoſe of other employments. That the greateſt number of theſe are at Kommendo, Mina, and Kormantin; from each of which places there go out every morning (Tueſday excepted, which is the Fetiſh day or day of reſt), five, ſix, and ſometimes eight hundred

* *Barbot's Deſcription of Guinea*, p. 154.

canoes,

Guinea. canoes, from 13 to 14 feet long, which ſpread themſelves two leagues at ſea, each fiſherman carrying in his canoe a ſword, with bread, water, and a little fire on a large ſtone to roaſt fiſh. Thus they labour till noon, when the ſea breeze blowing freſh, they return on the ſhore, generally laden with fiſh; a quantity of which the inland inhabitants come down to buy, which they ſell again at the country markets."

Smith ſays. "The country about Acra, where the Engliſh and Dutch have each a ſtrong fort, is very delightful, and the natives courteous and civil to ſtrangers." He adds, "That this place ſeldom fails of an extraordinary good trade from the inland country, eſpecially for ſlaves, whereof ſeveral are ſuppoſed to come from very remote parts, becauſe it is not uncommon to find a Malayan or two amongſt a parcel of other ſlaves: The Malay people are generally natives of Malacca, in the Eaſt Indies, ſituated ſeveral thouſand miles from the Gold Coaſt." They differ very much from the Guinea negroes, being of a tawny complexion, with long black hair.

Moſt parts of the Slave coaſt are repreſented as equally fertile and pleaſant with the Gold coaſt. The kingdom of Whidah has been particularly noted by travellers. Smith and Boſman agree, "That it is one of the moſt delightful countries in the world. The great number and variety of tall, beautiful, and ſhady trees, which ſeem planted in groves; the verdant fields everywhere cultivated, and no otherwiſe divided than by thoſe groves, and in ſome places a ſmall foot-path, together with a great number of villages, contribute to afford the moſt delightful proſpect; the whole country being a fine, eaſy, and almoſt imperceptible aſcent for the ſpace of 40 or 50 miles from the ſea. That the farther you go from the ſea, the more beautiful and populous the country appears. That the natives were kind and obliging, and ſo induſtrious, that no place which was thought fertile could eſcape being planted, even within the hedges which incloſe their villages. And that the next day after they had reaped, they ſowed again."

Snelgrave alſo ſays, "The country appears full of towns and villages; and being a rich ſoil, and well cultivated, looks like an entire garden." In the Collection, the huſbandry of the negroes is deſcribed to be carried on with great regularity. "The rainy ſeaſon approaching, they go into the fields and woods, to fix on a proper place for ſowing; and as here is no property in ground, the king's licence being obtained, the people go out in troops, and firſt clear the ground from buſhes and weeds, which they burn. The field thus cleared, they dig it up a foot deep, and ſo let it remain for eight or ten days, till the reſt of their neighbours have diſpoſed their ground in the ſame manner. They then conſult about ſowing, and for that end aſſemble at the king's court the next Fetiſh day. The king's grain muſt be ſown firſt. They then go again to the field, and give the ground a ſecond digging, and ſow their ſeed. Whilſt "the king or governor's land is ſowing, he ſends out wine and fleſh, ready dreſſed, enough to ſerve the labourers. Afterwards, they in like manner ſow the ground allotted for their neighbours as diligently as that of the king's, by whom they are alſo feaſted; and ſo continue to work in a body for the public benefit till every man's ground is tilled and ſowed. None but the king, and a few great men, are exempted from this labour. Their grain ſoon ſprouts out of the ground. When it is about a man's height, and begins to ear, they raiſe a wooden houſe in the centre of the field, covered with ſtraw, in which they ſet their children to watch their corn, and fright away the birds." Guinea.

Boſman ſpeaks in commendation of the civility, kindneſs, and great induſtry of the natives of Whidah. This is confirmed by Smith, who ſays "The natives here ſeem to be the moſt gentleman-like negroes in Guinea, abounding with good manners and ceremony to each other. The inferior pay the utmoſt deference and reſpect to the ſuperior, as do wives to their huſbands, and children to their parents. All here are naturally induſtrious, and find conſtant employment; the men in agriculture, and the women in ſpinning and weaving cotton. The men, whoſe chief talent lies in huſbandry, are unacquainted with arms; otherwiſe, being a numerous people, they could have made a better defence againſt the king of Dahomy, who ſubdued them without much trouble." According to the Collection, there are, throughout the Gold coaſt, regular markets in all villages, furniſhed with proviſions and merchandiſe, held every day in the week except Tueſday, whence they ſupply, not only the inhabitants, but the European ſhips. The negro women are very expert in buying and ſelling, and extremely induſtrious; for they will repair daily to market from a conſiderable diſtance, loaded like packhorſes, with a child perhaps at their back, and a heavy burden on their heads. After ſelling their wares, they buy fiſh and other neceſſaries, and return home loaded as they came. There is a market held at Sabi every fourth day, alſo a weekly one in the province of Apologua, which is ſo reſorted to, that there are uſually 5000 or 6000 merchants. Their markets are ſo well regulated and governed, that ſeldom any diſorder happens; each ſpecies of merchandiſe and merchants have a ſeparate place allotted them by themſelves. The buyers may haggle as much as they will, but it muſt be without noiſe or fraud. To keep order, the king appoints a judge; who, with four officers well armed, inſpects the markets, hears all complaints, and in a ſummary way decides all differences; he has power to ſeize, and ſell as ſlaves, all who are catched in ſtealing or diſturbing the peace. In theſe markets are to be ſold men, women, children, oxen, ſheep, goats, and fowls of all kinds; European cloths, linen and woollen; printed calicoes, ſilk, grocery ware, china, gold-duſt, iron in bars, &c. in a word, moſt ſorts of European goods, as well as the produce of Africa and Aſia. They have other markets, reſembling our fairs, once or twice a-year, to which all the country repair; for they take care to order the day ſo in different governments as not to interfere with each other."

With reſpect to government, Smith ſays *, "that the Gold coaſt and Slave coaſt are divided into different diſtricts, ſome of which are governed by their chiefs or kings: the others, being more of the nature of a commonwealth, are governed by ſome of the principal men, called *Caboceros;* who, Boſman ſays, are properly denominated *civil fathers*, whoſe province, * *Smith*, p. 193.

Guinea. vince is to take care of the welfare of the city or village, and to appeaſe tumults." But this order of government has been much broken ſince the coming of the Europeans. Both Boſman and Barbot mention murder and adultery to be ſeverely puniſhed on the coaſt, frequently by death; and robbery by a fine proportionable to the goods ſtolen.

The income of ſome of the kings is large. Boſman ſays, "that the king of Whidah's revenues and duties on things bought and ſold are conſiderable; he having the tithe of all things ſold in the market, or imported into the country." Both the above-mentioned authors ſay, the tax on ſlaves ſhipped off in this king's dominions, in ſome years, amounts to near 20,000l.

Boſman tells us, "the Whidah negroes have a faint idea of a true God, aſcribing to him the attributes of almighty power and omnipreſence: but God, they ſay, is too high to condeſcend to think of mankind; wherefore he commits the government of the world to thoſe inferior deities which they worſhip." Some authors ſay, the wiſeſt of theſe negroes are ſenſible of their miſtake in this opinion; but dare not forſake their own religion, for fear of the populace riſing and killing them. This is confirmed by Smith, who ſays, "that all the natives of this coaſt believe there is one true God, the author of them and all things; that they have ſome apprehenſion of a future ſtate; and that almoſt every village has a grove, or public place of worſhip, to which the principal inhabitants, on a ſet day, reſort to make their offerings."

In the Collection it is remarked as an excellency in the Guinea government, "that however poor they may be in general, yet there are no beggars to be found amongſt them; which is owing to the care of their chief men, whoſe province it is to take care of the welfare of the city or village, it being part of their office to ſee that ſuch people may earn their bread by their labour; ſome are ſet to blow the ſmith's bellows, others to preſs palm oil, or grind colours for their mats, and ſell proviſion in the markets. The young men are liſted to ſerve as ſoldiers, ſo that they ſuffer no common beggar." Boſman aſcribes a further reaſon for this good order *, viz. "that when a negro finds he cannot ſubſiſt, he binds himſelf for a certain ſum of money, and the maſter to whom he is bound is obliged to find him neceſſaries; that the maſter ſets him a ſort of taſk, which is not in the leaſt flaviſh, being chiefly to defend his maſter on occaſions, or in ſowing time to work as much as himſelf pleaſes."

* *Boſman*, p. 119.

Adjoining to the kingdom of Whidah are ſeveral ſmall governments, as Coto, great and ſmall Popo, Ardrah, &c. all ſituated on the Slave coaſt, where the chief trade for ſlaves is carried on. Theſe are governed by their reſpective kings, and follow much the ſame cuſtoms with thoſe of Whidah, except that their principal living is on plunder and the ſlave-trade.

4. Next adjoining to the Slave Coaſt, is the kingdom of Benin, which, though it extends but about 170 miles on the ſea, yet ſpreads ſo far inland as to be eſteemed the moſt potent kingdom in Guinea. By accounts, the ſoil and produce appear to be in a great meaſure like thoſe before deſcribed, and the natives are repreſented as a reaſonable good-natured people. Artua ſays ‡, "they are a ſincere, inoffenſive people, and do no injuſtice either to one another or to ſtrangers." Smith confirms this account, and ſays, "that the inhabitants are generally very good-natured, and exceeding courteous and civil. When the Europeans make them preſents, which in their coming thither to trade they always do, they endeavour to return them doubly." Boſman tells us, "that his countrymen the Dutch, who were often obliged to truſt them till they returned the next year, were ſure to be honeſtly paid their whole debts." Guinea.

‡ *Collect.* vol. iii. p. 228.

There is in Benin a conſiderable order in government; theft, murder, and adultery, being ſeverely puniſhed. Smith ſays, "their towns are governed by officers appointed by the king, who have power to decide in civil caſes, and to raiſe the public taxes: but in criminal caſes, they muſt ſend to the king's court, which is held at the town of Oedo or Great Benin. This town, which covers a large extent of ground, is about 60 miles from the ſea." Barbot tells us, "that it contains 30 ſtreets, 20 fathoms wide, and almoſt two miles long, commonly extending in a ſtraight line from one gate to another; that the gates are guarded by ſoldiers; that in theſe ſtreets markets are held every day, for cattle, ivory, cotton, and many ſorts of European goods. This large town is divided into ſeveral wards or diſtricts, each governed by its reſpective king of a ſtreet, as they call them, to adminiſter juſtice, and to keep good order. The inhabitants are very civil and good-natured, condeſcending to what the Europeans require of them in a civil way." The ſame author confirms what has been ſaid by others of their juſtice in the payment of their debts; and adds, "that they, above all other Guineans, are very honeſt and juſt in their dealings; and they have ſuch an averſion for theft, that by the law of the country it is puniſhed with death." We are told by the ſame author, "that the king of Benin is able upon occaſion to maintain an army of 100,000 men; but that, for the moſt part, he does not keep 30,000. See the article BENIN.

5. The laſt diviſion of Guinea from which ſlaves are imported, are the kingdoms of *Congo* and *Angola:* theſe lie to the ſouth of Benin, extending with the intermediate land about 1200 miles on the coaſt. Great numbers of the natives of both theſe kingdoms profeſs the Chriſtian religion, which was long ſince introduced by the Portugueſe, who made early ſettlements in that country. See CONGO and ANGOLA.

In the Collection it is ſaid, that both in Congo and Angola, the ſoil is in general fruitful, producing great plenty of grain, Indian corn, and ſuch quantities of rice, that it hardly bears any price, with fruits, roots, and palm oil in plenty. The natives are generally a quiet people, who diſcover a good underſtanding, and behave in a friendly manner to ſtrangers, being of a mild converſation, affable, and eaſily overcome with reaſon. In the government of Congo, the king appoints a judge in every particular diviſion, to hear and determine diſputes and civil cauſes; the judges impriſon and releaſe, or impoſe fines, according to the rule of cuſtom; but in weighty matters, every one may appeal to the king, before whom all criminal cauſes are brought, in which he giveth ſentence; but ſeldom condemneth to death. The town of Leango ſtands in the midſt of four lordſhips, which abound in corn,

Guinea. corn, fruit, &c. Here they make great quantities of cloth of divers kinds, very fine and curious; the inhabitants are ſeldom idle; they even make needle-work caps as they walk in the ſtreets. The ſlave-trade is here principally managed by the Portugueſe, who carry it far up into the inland countries. They are ſaid to ſend off from theſe parts 15,000 ſlaves each year. At Angola, about the 10th degree of ſouth latitude, ends the trade for ſlaves.

As all theſe countries lie between the tropics, the air is exceſſively hot, eſpecially from the beginning of September to the end of March; which, with the coolneſs of the nights, the frequent thick, ſtinking, ſulphureous miſts, and the periodical rains, when the flat country is overflowed, makes it very unhealthy, eſpecially to Europeans. The natives, however, are little affected with the unwholeſome air. According to Barbot, they keep much within doors in tempeſtuous times; and when expoſed to the weather, their ſkins being ſuppled and pores cloſed by daily anointing with palm oil, the weather can make but little impreſſion on them. They generally, therefore, enjoy a good ſtate of health, and are able to procure to themſelves a comfortable ſubſiſtence, with much leſs care and toil than is neceſſary in our more northern climate; which laſt advantage ariſes not only from the warmth of the climate, but alſo from the overflowing of the rivers, whereby the land is regularly moiſtened and rendered extremely fertile; and being in many places improved by culture, abounds with grain and fruits, cattle, poultry, &c. The earth yields all the year a freſh ſupply of food: Few clothes are requiſite, and little art neceſſary in making them, or in the conſtruction of their houſes, which are very ſimple, principally calculated to defend them from the tempeſtuous ſeaſons and wild beaſts; a few dry reeds covered with mats ſerve for their beds. The other furniture, except what belongs to cookery, gives the women but little trouble; the moveables of the greateſt among them amounting only to a few earthen pots, ſome wooden utenſils, and gourds or calabaſhes; from theſe laſt, which grow almoſt naturally over their huts, to which they afford an agreeable ſhade, they are abundantly ſtocked with good clean veſſels for moſt houſehold uſes, being of different ſizes, from half a pint to ſeveral gallons.

The diſtempers the Europeans are ſubject to on this coaſt, are fevers, fluxes, and colics, which are occaſioned by indifferent water and bad air; their ſettlements lying near the coaſt, where the fogs and ſteams ariſing from the ooze and ſalt-marſhes, and the ſtinking fiſh the natives dry on the beach, corrupt the air, and render it fatal to foreigners. The moſt temperate men find it difficult to preſerve their health; but a great many haſten their death by their intemperance, or negligence, expoſing themſelves to the cold air in the evening, after a very hot day. This ſudden change, from one extreme to the other, has often very bad effects in hot climates.

Of mountains in Guinea, the moſt remarkable are thoſe of Sierra Leon. The principal capes are thoſe of Cape Blanco, Cape Verd, Cape Leon, Cape St Ann's, Cape Palmas, and Cape Three Points, Cape Formoſa, Cape Monte, Cape St John, Cape Lopas, Cape Lede, and Cape Negro. The chief bays are the Cyprian or Cintra bay, and the Bite of Guinea. Guinea.

Of the rivers, the moſt conſiderable are thoſe of Coanzo and Ambriſi, the Zaara, the Lunde, the Cameron, the Formoſa, the Volta, the Sierra Leon, and the Sherbro. All theſe run from eaſt to weſt (except the Volta, which runs from north to ſouth), and fall into the Atlantic.

Beſides gold, ivory, and ſlaves, Guinea affords indigo, wax, gum-ſenega, gum-tragacanth, and a variety of other gums and drugs.

The moſt ancient account we have of the country of the negroes, particularly that part ſituated on and between the two great rivers of Senegal and Gambia, is from the writings of two ancient authors, one an Arabian, and the other a Moor. The firſt wrote in Arabic about the 12th century. His works, printed in that language at Rome, were afterwards tranſlated into Latin, and printed at Paris under the patronage of the famous Thuanus chancellor of France, with the title of *Geographia Nubienſis*, containing an account of all the nations lying on the Senegal and Gambia. The other was written by John Leo, a Moor, born at Granada in Spain, before the Moors were totally expelled from that kingdom. He reſided in Africa; but being on a voyage from Tripoli to Tunis, was taken by ſome Italian corſairs, who finding him poſſeſſed of ſeveral Arabian books, beſides his own manuſcripts, apprehended him to be a man of learning, and as ſuch preſented him to Pope Leo X. This pope encouraging him, he embraced the Romiſh religion, and his deſcription of Africa was publiſhed in Italian. From theſe writings we gather, that after the Mahometan religion had extended to the kingdom of Morocco, ſome of the promoters of it croſſing the ſandy deſerts of Numidia, which ſeparate that country from Guinea, found it inhabited by men, who, though under no regular government, and deſtitute of that knowledge the Arabians were favoured with, lived in content and peace. The firſt author particularly remarks, "that they never made war, or travelled abroad, but employed themſelves in tending their herds, or labouring in the ground." J. Leo ſays, p. 65. "That they lived in common, having no property in land, no tyrant nor ſuperior lord, but ſupported themſelves in an equal ſtate, upon the natural produce of the country, which afforded plenty of roots, game, and honey. That ambition or avarice never drove them into foreign countries to ſubdue or cheat their neighbours. Thus they lived without toil or ſuperfluities." "The ancient inhabitants of Morocco, who wore coats of mail, and uſed ſwords and ſpears headed with iron, coming amongſt theſe harmleſs and naked people, ſoon brought them under ſubjection, and divided that part of Guinea which lies on the rivers Senegal and Gambia into 15 parts; thoſe were the 15 kingdoms of the negroes, over which the Moors preſided, and the common people were negroes. Theſe Moors taught the negroes the Mahometan religion, and arts of life; particularly the uſe of iron, before unknown to them. About the 14th century, a native negro, called *Heli Iſchia*, expelled the Mooriſh conquerors; but though the negroes threw off the yoke of a foreign nation, they only changed a Libyan for a negro maſter. Heli Iſchia himſelf becoming king, led the negroes on to foreign wars, and eſtabliſhed himſelf in power over a very large

Hiſtory of the Guinea trade.

Guinea. extent of country." Since Leo's time, the Europeans have had very little knowledge of thoſe parts of Africa, nor do they know what became of his great empire. It is highly probable that it broke into pieces, and that the natives again reſumed many of their ancient cuſtoms; for in the account publiſhed by Moore, in his travels on the river Gambia, we find a mixture of the Mooriſh and Mahometan cuſtoms, joined with the original ſimplicity of the negroes. It appears by accounts of ancient voyages, collected by Hackluit, Purchas, and others, that it was about 50 years before the diſcovery of America, that the Portugueſe attempted to ſail round Cape Bojador, which lies between their country and Guinea: this, after divers repulſes occaſioned by the violent currents, they effected; when landing on the weſtern coaſts of Africa, they ſoon began to make incurſions into the country, and to ſeize and carry off the native inhabitants. As early as the year 1434, Alonzo Gonzales, the firſt who is recorded to have met with the natives, being on that coaſt, purſued and attacked a number of them, when ſome were wounded, as was alſo one of the Portugueſe; which the author records as the firſt blood ſpilt by Chriſtians in thoſe parts. Six years after, the ſame Gonzales again attacked the natives, and took 12 priſoners, with whom he returned to his veſſels: he afterwards put a woman on ſhore, in order to induce the natives to redeem the priſoners; but the next day 150 of the inhabitants appeared on horſes and camels, provoking the Portugueſe to land; which they not daring to venture, the natives diſcharged a volley of ſtones at them, and went off. After this, the Portugueſe ſtill continued to ſend veſſels on the coaſt of Africa: particularly we read of their falling on a village, whence the inhabitants fled, and, being purſued, 25 were taken; "he that ran beſt (ſays the author), taking the moſt. In their way home they killed ſome of the natives, and took 55 more priſoners. Afterwards Diniſanes Dagrama, with two other veſſels, landed on the iſland Arguin, where they took 54 Moors; then running along the coaſt 80 leagues farther, they at ſeveral times took 50 ſlaves; but here ſeven of the Portugueſe were killed. Then being joined by ſeveral other veſſels, Diniſanes propoſed to deſtroy the iſland, to revenge the loſs of the ſeven Portugueſe; of which the Moors being appriſed, fled, ſo that no more than 12 were found, whereof only four could be taken, the reſt being killed, as alſo one of the Portugueſe." Many more captures of this kind on the coaſt of Barbary and Guinea are recorded to have been made in thoſe early times by the Portugueſe; who, in the year 1481, erected their firſt fort at D'Elmina on that coaſt, from whence they ſoon opened a trade for ſlaves with the inland parts of Guinea.

From the foregoing accounts, it is undoubted, that the practice of making ſlaves of the negroes owes its origin to the early incurſions of the Portugueſe on the coaſt of Africa, ſolely from an inordinate deſire of gain. This is clearly evidenced from their own hiſtorians, particularly Cada Moſto, about the year 1455, who writes *, "That before the trade was ſettled for purchaſing ſlaves from the Moors at Arguin, ſometimes four, and ſometimes more Portugueſe veſſels, were uſed to come to that gulf, well armed; and landing by night, would ſurpriſe ſome fiſhermen's villages: that they even entered into the country, and carried off Arabs of both ſexes, whom they ſold in Portugal." And alſo, "That the Portugueſe and Spaniards, ſettled on four of the Canary iſlands, would go to the other iſland by night, and ſeize ſome of the natives of both ſexes, whom they ſent to be ſold in Spain."

* *Collection*, vol. i. P. 576.

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After the ſettlement of America, thoſe devaſtations, and the captivating the miſerable Africans, greatly increaſed.

Anderſon, in his Hiſtory of Trade and Commerce, p. 336, ſpeaking of what paſſed in the year 1508, writes, "That the Spaniards had by this time found that the miſerable Indian natives, whom they had made to work in their mines and fields, were not ſo robuſt and proper for thoſe purpoſes as negroes brought from Africa: wherefore they, about that time, began to import negroes for that end into Hiſpaniola, from the Portugueſe ſettlements on the Guinea coaſts; and alſo afterwards for their ſugar-works."

It was about the year 1551, towards the latter end of the reign of Edward VI. when ſome London merchants ſent out the firſt Engliſh ſhip on a trading voyage to the coaſt of Guinea. This was ſoon followed by ſeveral others to the ſame parts; but the Engliſh not having then any plantations in the Weſt Indies, and conſequently no occaſion for negroes, ſuch ſhips traded only for gold, elephants teeth, and Guinea pepper. This trade was carried on at the hazard of loſing their ſhips and cargoes, if they had fallen into the hands of the Portugueſe, who claimed an excluſive right of trade, on account of the ſeveral ſettlements they had made there. In 1553, we find Captain Thomas Windham trading along the coaſt with 140 men, in three ſhips, and ſailing as far as Benin, which lies about 3000 miles down the coaſt, to take in a load of pepper. Next year John Loke traded along the coaſt of Guinea, as far as D'Elmina, when he brought away conſiderable quantities of gold and ivory. He ſpeaks well of the natives, and ſays, "That whoever will deal with them muſt behave civilly, for they will not traffic if ill uſed." In 1555, William Towerſon traded in a peaceable manner with the natives, who made complaint to him of the Portugueſe, who were then ſettled in their caſtle at D'Elmina; ſaying, "They were bad men; who made them ſlaves if they could take them, putting irons on their legs."

This bad example of the Portugueſe was ſoon followed by ſome evil diſpoſed Engliſhmen: for the ſame Captain Towerſon relates *, "That in the courſe of his voyage, he perceived the natives near D'Elmina unwilling to come to him, and that he was at laſt attacked by them; which he underſtood was done in revenge for the wrong done them the year before by one Captain Gainſh, who had taken away the negro captain's ſon and three others, with their gold, &c. This cauſed them to join the Portugueſe, notwithſtanding their hatred of them, againſt the Engliſh." The next year Captain Towerſon brought theſe men back again; whereupon the negroes ſhowed him much kindneſs. Quickly after this, another inſtance of the ſame kind occurred in the caſe of Captain George Fenner, who being on the coaſt with three veſſels, was alſo attacked by the negroes, who wounded ſeveral of his people, and violently carried three of his men to their town.

* *Collection*, vol. i. P. 148.

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Guinea. The captain ſent a meſſenger, offering any thing they deſired for the ranſom of his men: but they refuſed to deliver them; letting him know, "That three weeks before, an Engliſh ſhip, which came into the road, had carried off three of their people; and that till they were brought again, they would not reſtore his men, even though they ſhould give their three ſhips to releaſe them." It was probably the evil conduct of theſe and ſome other Engliſhmen which was the occaſion of what is mentioned in Hill's Naval Hiſtory, viz. "That when Captain Hawkins returned from his firſt voyage to Africa, Queen Elizabeth ſent for him, when ſhe expreſſed her concern, leſt any of the African negroes ſhould be carried off without their free conſent; which ſhe declared would be deteſtable, and would call down the vengeance of heaven upon the undertakers." Hawkins made great promiſes, which nevertheleſs he did not perform; for his next voyage to the coaſt appears to have been principally calculated to procure negro ſlaves, in order to ſell them to the Spaniards in the Weſt Indies; which occaſioned the ſame author to uſe theſe remarkable words: "Here began the horrid practice of forcing the Africans into ſlavery; an injuſtice and barbarity which, ſo ſure as there is vengeance in heaven for the worſt of crimes, will ſome time be the deſtruction of all who act or who encourage it." This Captain Hawkins, afterwards Sir John Hawkins, ſeems to have been the firſt Engliſhman who gave public countenance to this wicked traffic: for Anderſon, before mentioned, at p. 401. ſays, "That in the year 1562, Captain Hawkins, aſſiſted by ſubſcription of ſundry gentlemen, now fitted out three ſhips; and having learnt that negroes were a very good commodity in Hiſpaniola, he ſailed to the coaſt of Guinea, took in negroes, and ſailed with them for Hiſpaniola, where he ſold them, and his Engliſh commodities, and loaded his three veſſels with hides, ſugar, ginger, &c. with which he returned home anno 1563, making a proſperous voyage." As it proved a lucrative buſineſs, the trade was continued both by Hawkins and others, as appears from the Naval Chronicle, p. 55: where it is ſaid, "That on the 18th of October 1564, Captain John Hawkins, with two ſhips of 700 and 140 tons, ſailed for Africa; that on the 8th of December they anchored to the ſouth of Cape Verd, where the captain manned the boat, and ſent 80 men in armour into the country, to ſee if they could take ſome negroes; but the natives flying from them, they returned to their ſhips, and proceeded farther down the coaſt. Here they ſtaid certain days, ſending their men aſhore, in order (as the author ſays) to burn and ſpoil their towns and take the inhabitants. The land they obſerved to be well cultivated, there being plenty of grain and fruit of ſeveral ſorts, and the towns prettily laid out. On the 25th, being informed by the Portugueſe of a town of negroes called *Bymba*, where there was not only a quantity of gold, but 140 inhabitants, they reſolved to attack it, having the Portugueſe for their guide; but by miſmanagement they took but ten negroes, having ſeven of their own men killed and 27 wounded. They then went farther down the coaſt; when having procured a number of negroes, they proceeded to the Weſt Indies, where they ſold them to the Spaniards." And in the ſame Naval Chronicle, at p. 76, it is ſaid, "That in the year 1567, Francis Drake, before performing his voyage round the world, went with Sir John Hawkins in his expedition to the coaſt of Guinea, where taking in a cargo of ſlaves, they determined to ſteer for the Caribbee iſlands." How Queen Elizabeth ſuffered ſo grievous an infringement of the rights of mankind to be perpetrated by her ſubjects, and how ſhe was perſuaded, about the 30th year of her reign, to grant patents for carrying on a trade from the north part of the river Senegal to 100 leagues beyond Sierra Leona, which gave riſe to the African Company *, is hard to account for, any otherwiſe than that it aroſe from the miſrepreſentation made to her of the ſituation of the negroes, and of the advantages it was pretended they would reap from being made acquainted with the Chriſtian religion. This was the caſe of Louis XIII. of France: who, Labat, in his account of the iſles of America, tells us, "was extremely uneaſy at a law by which the negroes of his colonies were to be made ſlaves; but it being ſtrongly urged to him as the readieſt means of their converſion to Chriſtianity, he acquieſced therewith." Nevertheleſs, ſome of the Chriſtian powers did not ſo eaſily give way in this matter: for we find †, "That Cardinal Cibo, one of the pope's principal miniſters of ſtate, wrote a letter on behalf of the college of cardinals, or great council at Rome, to the miſſionaries in Congo, complaining that the pernicious and abominable abuſe of ſelling ſlaves was yet continued; requiring them to remedy the ſame if poſſible; but this the miſſionaries ſaw little hopes of accompliſhing, by reaſon that the trade of the country lay wholly in ſlaves and ivory.

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* See *Company*, vol. v. p. 225, 226.

† *Collection*, vol. iii. p. 164.

It has been urged in juſtification of this trade, that by purchaſing the captives taken in battle, they ſave the lives of ſo many human creatures, who otherwiſe would be ſacrificed to the implacable revenge of the victors. But this pretence has been refuted by an appeal to reaſon and fact. For if the negroes apprehended they ſhould be cruelly put to death if they were not ſent away; why, it is aſked, do they manifeſt ſuch reluctance and dread as they generally do, at being brought from their native country? Smith, in his Account, p. 28. ſays, "The Gambians abhor ſlavery, and will attempt any thing, though ever ſo deſperate, to avoid it." And Thomas Philips, in his account of a voyage he performed to the coaſt of Guinea, writes, "They (the negroes) are ſo loth to leave their own country, that they have often leaped out of the canoe, boat, or ſhip, into the ſea, and kept under water till they were drowned, to avoid being taken up." But had the fact even been otherwiſe, the above plea is urged with an extreme bad grace, when it is notorious that the very wars ſaid to be productive of ſuch cruelty were fomented by the infamous arts of the Europeans. From the foregoing accounts, as well as other authentic publications of this kind, it appears, that it was the unwarrantable luſt of gain which firſt ſtimulated the Portugueſe, and afterwards other Europeans, to engage in this horrid traffic. By the moſt unqueſtionable relations of thoſe early times, the natives were an inoffenſive people, who, when civilly uſed, traded amicably with the Europeans. It is recorded of thoſe of Benin, the largeſt kingdom in Guinea, that they were a gentle, loving people; and Reynold ſays, "They found more ſincere proofs of

Guinea. love and good will from the natives, than they could find from the Spaniards and Portugueſe, even though they had relieved them from the greateſt miſery." And from the ſame relations there is no reaſon to think otherwiſe, but that they generally lived in peace amongſt themſelves: there occurring no accounts of any wars at that early period, nor of any ſale of captives taken in battle.

In fact, it was long after the Portugueſe had made a practice of violently forcing the natives of Africa into ſlavery, that we read of the different negro nations making war upon each other, and ſelling their captives. And probably this was not the caſe, till thoſe bordering on the coaſt, who had been uſed to ſupply the veſſels with neceſſaries, had become corrupted by their intercourſe with the Europeans, and were excited by drunkenneſs and avarice to join them in carrying on thoſe wicked ſchemes, by which thoſe unnatural wars were perpetrated; the inhabitants kept in continual alarms; the country laid waſte; and, as Moore expreſſes it, "infinite numbers ſold into ſlavery." But that the Europeans are the principal cauſe of theſe devaſtations, is particularly evidenced by one whoſe connection with the trade would rather induce him to repreſent it in the faireſt colours, viz. Captain Smith, the perſon ſent in the year 1726, by the African company, to ſurvey their ſettlements; who, from the information he received of one of the factors who had reſided ten years in that country, ſays, "That the diſcerning natives account it their greateſt unhappineſs, that they were ever viſited by the Europeans*.—That we Chriſtians introduced the traffic of ſlaves; and that before our coming they lived in peace."

* *Smith*, p. 266.

In the accounts relating to the African trade, we find this melancholy truth farther aſſerted by ſome of the principal directors in the different factories; particularly A. Brue ſays †, "That the Europeans were far from deſiring to act as peace-makers amongſt the negroes; which would be acting contrary to their intereſt, ſince the greater the wars, the more ſlaves were procured." And William Boſman alſo remarks ‡, "That one of the former commanders gave large ſums of money to the negroes of one nation, to induce them to attack ſome of the neighbouring nations; which occaſioned a battle which was more bloody than the wars of the negroes uſually are." This is confirmed by J. Barbot, who ſays, "That the country of D'Elmina, which was formerly very powerful and populous, was in his time ſo much drained of its inhabitants by the inteſtine wars fomented among the negroes by the Dutch, that there did not remain inhabitants enough to till the country."

† *Collection*, vol. ii. p. 98.

‡ p. 31.

It has alſo been advanced as an argument in favour of keeping the negroes in bondage, that there are ſlaves in Guinea, and that thoſe amongſt us might be ſo in their own country. Not to dwell upon the inconſiſtency of our giving any countenance to ſlavery, becauſe the Africans, whom we eſteem a barbarous and ſavage people, allow of it, and perhaps the more from our example; the very circumſtance ſtated, when inquired into, muſt afford cauſe of bluſhing, rather than ſerve as a palliation of ſuch iniquitous conduct: for it will appear, that the ſlavery endured in Guinea is by no means ſo grievous as that in the colonies. Captain Moore, ſpeaking of the natives living on the river Gambia, ſays, "That ſome of the negroes have many houſe ſlaves, which are their greateſt glory; that thoſe ſlaves live ſo well and eaſy, that it is ſometimes a hard matter to know the ſlaves from their maſters or miſtreſſes. And that though in ſome parts of Africa they ſell their ſlaves born in the family, yet on the river Gambia they think it a very wicked thing." The author adds, "He never heard of but one that ever ſold a family ſlave, except for ſuch crimes as they would have been ſold for if they had been free." And in Aſtley's Collection, ſpeaking of the cuſtoms of the negroes in that large extent of country farther down the coaſt, particularly denominated the *Coaſt of Guinea*, it is ſaid, "They have not many ſlaves on the coaſt; none but the king or nobles are permitted to buy or ſell any; ſo that they are allowed only what are neceſſary for their families or tilling the ground." The ſame author adds, "That they generally uſe their ſlaves well, and ſeldom correct them." Guinea.

From the foregoing accounts of the natural diſpoſition of the negroes, and the fruitfulneſs of moſt parts of Guinea, which are confirmed by authors of candour, who have written from their own knowledge, it may well be concluded, that the negroes acquaintance with the Europeans might have been a happineſs to them: but theſe, forgetful of their duty as men and Chriſtians, have conducted themſelves in ſo iniquitous a manner, as muſt neceſſarily raiſe in the minds of the thoughtful and well-diſpoſed negroes the utmoſt ſcorn and deteſtation of the very name of Chriſtians. All other conſiderations have given way to an inſatiable deſire of gain, which has been the principal and moving cauſe of the moſt deteſtable and barbarous ſcene that was perhaps ever acted upon the face of the earth; inſtead of making uſe of that ſuperior knowledge with which the Almighty, the common Parent of mankind, had favoured them, to ſtrengthen the principle of peace and good will in the breaſts of the incautious negroes, the Europeans have, by their bad example, led them into exceſs of drunkenneſs, debauchery, and avarice: whereby every paſſion of corrupt nature being inflamed, they have been eaſily prevailed upon to make war and captivate one another, as well to furniſh means for the exceſſes they had been habituated to, as to ſatisfy the greedy deſire of gain in their profligate employers; who to this intent have furniſhed them with prodigious quantities of arms and ammunition. Thus they have been hurried into confuſion, diſtreſs, and all the extremities of temporal miſery; every thing, even the power of their kings, has been made ſubſervient to this wicked purpoſe; for inſtead of being protectors of their ſubjects, ſome of thoſe rulers, corrupted by the exceſſive love of ſpirituous liquors, and the tempting baits laid before them by the factors, have invaded the liberties of their unhappy ſubjects, and are become their oppreſſors.

Her it may be neceſſary to obſerve, that the accounts we have of the inhabitants of Guinea are chiefly given by perſons engaged in the trade, who, from ſelf-intereſted views, have deſcribed them in ſuch colours as were leaſt likely to excite compaſſion and reſpect, and endeavoured to reconcile ſo manifeſt a violation of the rights of mankind to the minds of the purchaſers; yet they cannot but allow the negroes to be poſſeſſed of ſome good qualities, though they contrive

Guinea. trive as much as poſſible to caſt a ſhade over them. A particular inſtance of this appears in Aſtley's Collection, vol. ii. p. 73.; where the author, ſpeaking of the Mandingos ſettled at Galem, which is ſituated 900 miles up the Senegal, after ſaying that they carry on a commerce to all the neighbouring kingdoms, and amaſs riches, adds, "That excepting the vices peculiar to the blacks, they are a good ſort of people, honeſt, hoſpitable, juſt to their word, laborious, induſtrious, and very ready to learn arts and ſciences." Here it is difficult to imagine what vices can be peculiarly attendant on a people ſo well diſpoſed as the author deſcribes theſe to be. With reſpect to the charge ſome authors have brought againſt them, as being void of all natural affection, it is frequently contradicted by others. In vol. ii. of the Collection, p. 275 and 629, the negroes of North Guinea and the Gold Coaſt are ſaid to be fond of their children, whom they love with tenderneſs. And Boſman ſays, p. 340, "Not a few in his country (viz. Holland) fondly imagine, that parents here ſell their children, men their wives, and one brother the other: but thoſe who think ſo, deceive themſelves; for this never happens on any other account but that of neceſſity, or ſome great crime." The ſame is repeated by J. Barbot, p. 326, and alſo confirmed by Sir Hans Sloane in the introduction to his natural hiſtory of Jamaica; where, ſpeaking of the negroes, he ſays, "they are uſually thought to be haters of their own children; and therefore it is believed that they ſell and diſpoſe of them to ſtrangers for money: but this is not true; for the negroes of Guinea being divided into ſeveral captainſhips, as well as the Indians of America, have wars; and beſides thoſe ſlain in battle, many priſoners are taken, who are ſold as ſlaves, and brought thither: but the parents here, although their children are ſlaves for ever, yet have ſo great love for them, that no maſters dare ſell or give away one of their little ones, unleſs they care not whether their parents hang themſelves or not." J. Barbot, ſpeaking of the occaſion of the natives of Guinea being repreſented as a treacherous people, aſcribes it to the Hollanders (and doubtleſs other Europeans) uſurping authority, and fomenting diviſions between the negroes. At p. 110, he ſays, "It is well known that many of the European nations trading amongſt theſe people, have very unjuſtly and inhumanly, without any provocation, ſtolen away, from time to time, abundance of the people, not only on this coaſt, but almoſt everywhere in Guinea, who have come on board their ſhips in a harmleſs and confiding manner: theſe they have in great numbers carried away, and ſold in the plantations, with other ſlaves which they had purchaſed." And although ſome of the negroes may be juſtly charged with indolence and ſupineneſs, yet many others are frequently mentioned by authors as a careful, induſtrious, and even laborious people.

By an inquiry into the laws and cuſtoms formerly in uſe, and ſtill in force among the negroes, particularly on the Gold Coaſt, it will be found, that proviſion was made for the general peace, and for the ſafety of individuals; even in W. Boſman's time, long after the Europeans had eſtabliſhed the ſlave-trade, the natives were not publicly enſlaved, any otherwiſe than in puniſhment for crimes, when priſoners of war, or by a violent exertion of the power of their corrupted kings. Guinea. Where any of the natives were ſtolen in order to be ſold to the Europeans, it was done ſecretly, or at leaſt only connived at by thoſe in power: this appears from Barbot and Boſman's account of the matter, both agreeing that man-ſtealing was not allowed on the Gold Coaſt. The firſt ſays, "Kidnapping or ſtealing of human creatures is puniſhed there, and even ſometimes with death." And Boſman, whoſe long reſidence on the coaſt enabled him to ſpeak with certainty, ſays, "That the laws were ſevere againſt murder, thievery, and adultery;" and adds, "That man-ſtealing was puniſhed on the Gold Coaſt with rigid ſeverity, and ſometimes with death itſelf." Hence it may be concluded, that the ſale of the greateſt part of the negroes to the Europeans is ſupported by violence, in defiance of the laws, through the knavery of their principal men, who (as is too often the caſe with thoſe in European countries), under pretence of encouraging trade, and increaſing the public revenue, diſregard the dictates of juſtice, and trample upon thoſe liberties which they are appointed to preſerve.

Moore alſo mentions man-ſtealing as being diſcountenanced by the negro governments on the river Gambia; and ſpeaks of the enſlaving the peaceable inhabitants, as a violence which only happens under a corrupt adminiſtration of juſtice. He ſays, "The kings of that country generally adviſe with their head men, ſcarcely doing any thing of conſequence without conſulting them firſt, except the king of Barſailay, who being ſubject to hard drinking, is very abſolute. It is to this king's inſatiable thirſt for brandy, that his ſubjects freedoms and families are in ſo precarious a ſituation. Whenever this king wants goods or brandy, he ſends a meſſenger to the Engliſh governor at James Fort, to deſire he would ſend a ſloop there with a cargo: *this news being not at all unwelcome*, the governor ſends accordingly; againſt the arrival of the ſloop, the king goes and ranſacks ſome of his enemies towns, ſeizing the people, and ſelling them for ſuch commodities as he is in want of, which commonly are brandy, guns, powder, balls, piſtols, and cutlaſſes, for his attendants and ſoldiers; and coral and ſilver for his wives and concubines. In caſe he is not at war with any neighbouring king, he then falls upon one of his own towns, which are numerous, and uſes them in the ſame manner. He often goes with ſome of his troops by a town in the day time, and returning in the night, ſets fire to three parts of it, and putting guards at the fourth, there ſeizes the people as they run out from the fire; he ties their arms behind them, and marches them either to Joar or Cohonc, where he ſells them to the Europeans."

M. Brue, the French director, gives much the ſame account, and ſays *, "That, having received goods, he wrote to the king, that if he had a ſufficient number of ſlaves, he was ready to trade with him. This prince, as well as the other negro monarchs, has always a ſure way of ſupplying his deficiencies, by ſelling his own ſubjects, for which they ſeldom want a pretence. The king had recourſe to this method, by ſeizing 300 of his own people, and ſent word to the director that he had the ſlaves ready to deliver for the goods." It ſeems the king wanted double the quantity of goods which

* *Aſtley*, vol. ii. p. 96.

Guinea. which the factor would give him for theſe 300 ſlaves; but the factor refuſing to truſt him as he was already in the company's debt, and perceiving that this refuſal had put the king much out of temper, he propoſed that he ſhould give him a licence for taking ſo many more of his people as the goods he ſtill wanted were worth: but this the king refuſed, ſaying, "*It* might occaſion a diſturbance among his ſubjects." Except in the above inſtance, and ſome others, where the power of the negro kings is unlawfully exerted over their ſubjects, the ſlave-trade is carried on in Guinea with ſome regard to the laws of the country, which allow of none to be ſold but priſoners taken in their national wars, or people adjudged to ſlavery in puniſhment for crimes; but the largeneſs of the country, the number of kingdoms or commonwealths, and the great encouragement given by the Europeans, afford frequent pretences and opportunities to the bold deſigning profligates of one kingdom, to ſurpriſe and ſeize upon not only thoſe of a neighbouring government, but alſo the weak and helpleſs of their own; and the unhappy people, taken on thoſe occaſions, are, with impunity, ſold to the Europeans. Theſe practices are doubtleſs diſapproved of by the moſt conſiderate amongſt the negroes; for Boſman acquaints us, that even their national wars are not agreeable to ſuch. He ſays, "If the perſon who occaſioned the beginning of the war be taken, they will not eaſily admit him to ranſom, though his weight of gold ſhould be offered, for fear he ſhould in future form ſome new deſign againſt their repoſe."

We ſhall conclude this article with the following account of the ſhocking methods uſed in the carrying on of the ſlave-trade, as deſcribed by factors of different nations.

* *Aſtley*, vol. ii. p. 28. Mr Moore *, factor for the Engliſh African Company on the river Gambia, writes, "That there are a number of negro traders, called *joncoes*, or merchants, who follow the ſlave-trade as a buſineſs; their place of reſidence is ſo high up the country as to be ſix weeks travel from James Fort, which is ſituated at the mouth of that river. Theſe merchants bring down elephants teeth, and in ſome years 2000 ſlaves, moſt of which, they ſay, are priſoners taken in war. They buy them from the different princes who take them; many of them are Bumbrongs and Petcharies; nations who each of them have different languages, and are brought from a vaſt way inland. Their way of bringing them is tying them by the neck with leather thongs, at about a yard diſtant from each other, 30 or 40 in a ſtring, having generally a bundle of corn or elephants teeth upon each of their heads. In their way from the mountains, they travel through very great woods, where they cannot for ſome days get water; ſo they carry in ſkin bags enough to ſupport them for a time. I cannot (adds Moore) be certain of the number of merchants who follow this trade, but there may, perhaps, be about 100, who go up into the inland country with the goods which they buy from the white men, and with them purchaſe, in various countries, gold, ſlaves, and elephants teeth. Beſides the ſlaves which the merchants bring down, there are many bought along the river: Theſe are either taken in war, as the former are, or men condemned for crimes; *or elſe people ſtolen, which is very frequent.*—Since the ſlave-trade has been uſed, all puniſhments are changed into ſlavery; there being an advantage on ſuch condemnation, *they ſtrain for crimes very hard, in order to get the benefit of ſelling the criminal.*" Guinea.

John Barbot, the French factor, in his account of the manner by which the ſlaves are procured, ſays, "The ſlaves ſold by the negroes are for the moſt part priſoners of war, or taken in the incurſions they make into their enemies territories; others are ſtolen away by their neighbours, when found abroad on the road, or in the woods; or elſe in the corn-fields, at the time of the year when their parents keep them there all the day to ſcare away the devouring ſmall birds." Speaking of the tranſactions on that part of Guinea called the *Slave Coaſt*, where the Europeans have the moſt factories, and from whence they bring away much the greateſt number of ſlaves, the ſame author ſays, "The inhabitants of Coto do much miſchief in ſtealing thoſe ſlaves they ſell to the Europeans from the upland country.——That the inhabitants of Popo excel the former; being endowed with a much larger ſhare of courage, they rob more ſucceſsfully, by which means they increaſe their riches and trade." The author particularly remarks, "*That they are encouraged in this practice by the Europeans:* ſometimes it happens, according to the ſucceſs of their inland excurſions, that they are able to furniſh 200 ſlaves or more in a few days." And he ſays, "The blacks of Fida, or Whidah, are ſo expeditious in trading for ſlaves, that they can deliver 1000 every month."—"If there happens to be no ſtock of ſlaves there, the factor muſt truſt the blacks with his goods, to the value of 150l. or 200l. which goods they carry up into the inland country to buy ſlaves, at all markets for above 600 miles up the country, where they are kept like cattle in Europe; the ſlaves ſold there being generally priſoners of war, taken from their enemies like other booty, and perhaps ſome few ſold by their own countrymen, in extreme want, or upon a famine, as alſo ſome as a puniſhment of heinous crimes." So far Barbot's account. That given by Boſman is as follows: "When the ſlaves which are brought from the inland countries come to Whidah, they are put in priſon together; when we treat concerning buying them, they are all brought out together in a large plain, where, by our ſurgeons, they are thoroughly examined, and that naked, both men and women, without the leaſt diſtinction or modeſty. Thoſe which are approved as good, are ſet on one ſide; in the meanwhile a burning iron, with the arms or name of the company, lies in the fire, with which ours are marked on the breaſt. When we have agreed with the owners of the ſlaves, they are returned to their priſons; where, from that time forward, they are kept at our charge, and coſt us twopence a-day each ſlave, which ſerves to ſubſiſt them like criminals on bread and water; ſo that to ſave charges, we ſend them on board our ſhips the very firſt opportunity; before which, their maſters ſtrip them of all they have on their backs, ſo that they come on board ſtark naked, as well women as men. In which condition they are obliged to continue, if the maſter of the ſhip is not ſo charitable (which he commonly is) as to beſtow ſomething on them to cover their nakedneſs. Six or ſeven hundred are ſometimes put on board a veſſel, where they lie as cloſe

Guinea. close together as it is possible for them to be crowded (A)."

When the great income which arises to the negro kings on the Slave Coast, from the slaves brought through their several governments to be shipped on board the European vessels, is considered, we have no cause to wonder that they give so great a countenance to that trade. Bosman says, "That each ship which comes to Whidah to trade, reckoning one with another, either by toll, trade, or custom, pays about 400l. and sometimes 50 ships come hither in a year." Barbot confirms the same, and adds, "That in the neighbouring kingdom of Ardah, the duty to the king is the value of 70 or 80 slaves for each trading ship;" which is near half as much more as at Whidah. Nor can the Europeans concerned in the trade, with any degree of propriety, blame the African kings for countenancing it, while they continue to send vessels on purpose to take in the slaves which are thus stolen, and that they are permitted, under the sanction of national laws, to sell them to the colonies.

According to Mr Ramsay, the annual British exports to these coasts are estimated at 500,000l. including a considerable quantity that is annually exchanged with American and other foreign traders there; about 50,000l. of this is returned in ivory, gold dust, gum, &c. The greatest part of the profits of the slave-trade is raised on the sugar plantations. If by establishing factories, and encouraging civilization on the coast of Africa, and returning some of our West Indian slaves to their original country, we tried to make up for our past treachery to the natives, and instructed the inhabitants in the culture of tobacco, indigo, cotton, rice, &c. to barter with us for our manufactures, and supply us with those articles, our demand for which has been so advantageous to America, great would be our profits. Were Africa civilized, and could we preoccupy the affections of the natives, and introduce gradually our religion, manners, and language among them, we should open a market that would fully employ our manufacturers and seamen, morally speaking, till the end of time. And while we enriched ourselves, we should contribute to their happiness. For Africa, in its highest probable state of culture, could not possibly interfere with the staple of Britain, so as to hinder an extensive and mutually advantageous trade from being carried on between the countries. The great difference of climate and soil must always distinguish the supplies and wants of each.

The slave-trade, indeed, has been long considered as disgraceful to an enlightened age; and in this country a spirit is arisen which seems bent on annihilating it altogether, or so changing the nature of it as to blend humanity with policy. During the session 1788, the philanthropy of parliament, supported by that of the nation, paid a very particular attention to this odious branch of traffic. It was, however, a subject of too comprehensive a nature, and too materially connected with our African commerce at large and our West Indian colonies, to come to an immediate decision upon it. Parliament, therefore, was obliged to content itself for that time with a temporary bill to regulate the shipping and carrying slaves in British vessels from those coasts. But the public attention has been since kept awake by a great variety of publications on both sides of the question; and the final arrangement of this important business, in which the honour of the British commerce and the British character, as well as the happiness of millions of our sable African brethren, is involved, is expected to take place during the present session 1791.—This traffic in human beings is not, however, without its advocates. But the most specious arguments of its ablest defenders reach no farther than political expediency, which can never alter the real nature of things. That in question would not remain less an unjust, cruel, and wicked trade, in its very nature essentially and unalterably wrong. Its abolition, therefore, not in a rash, but in as gentle and equitable a way as circumstances will allow, is devoutly to be wished, and it is hoped may be accomplished. Guinea.

New-Guinea, or *Papua*, a long and narrow island of the East Indies, which is yet but imperfectly known. It was supposed to be connected with New Holland, until Captain Cook discovered the strait which separates them. New Guinea, including Papua, its north-western part (which according to Bougainville's conjecture is separated from it by a strait), reaches from the equator to the 12th degree of south latitude, and from 131 to 150 degrees east longitude; in one part it does not appear to be above 50 miles broad. It was first visited by an European ship in 1529. Saavedra, a Portuguese, who made the discovery of the north-west part of this country, called it *Terra de Papuas*, or *Papos*. Van Schouten, a Dutch discoverer, afterwards gave the name of *New Guinea* to its south-western part. Admiral Roggewain also touched here; and before him Dampier, 1st January 1700. Captain Cook made the coast of New Guinea, in latitude 6 degrees 15 minutes, longitude 138 east, on the 3d of September, and landed in the pinnace, accompanied by Mr Banks, Dr Solander, nine of the ship's crew, and servants well armed, and leaving two seamen to take care of the boat, advanced some little way up the country; but coming to the skirts of a thick wood, they judged it prudent to proceed no farther, lest they should fall into an ambuscade of the natives, and their retreat to the boat be cut off. Having advanced about a quarter of a mile from the boat, three Indians rushed out of the wood with a hideous shout; they threw their darts, and showed such a hostile disposition, that the party, to prevent the destruction of these people, returned to the boat, as they had no intention forcibly to invade their country, either to gratify their appetites or curiosity, and it was evident nothing could be done upon friendly terms. When they got on board the boat, they rowed along the shore, and the number of Indians assembled seemed to be between 60 and 100. They made much the same appearance as the New Hollanders, being stark naked, and their hair cropped short. All the while they were shouting defiance, and throwing something out of their hand Guinea.

(A) Here it is necessary to observe, that the number of slaves to be taken on board British ships is now regulated by law.

Guinea. hand which burnt exactly like gunpowder, but made no report; what these fires were, or for what purpose intended, could not be guessed at; those who discharged them had in their hands a short piece of stick, possibly a hollow cane, which they swung sidewise from them, and immediately fire and smoke issued, exactly resembling the discharge of a musket, and of no longer duration. This wonderful phenomenon was observed from the ship; and the deception was so great, that the people on board thought they had fire-arms; and even in the boat, if they had not been so near as that they must have heard the report, if there had been any, they should have thought they had been firing volleys. After looking at them attentively for some time, without taking any notice of their flashing and vociferation, the sailors fired some muskets over their heads. Upon hearing the balls rattle among the trees, they walked leisurely away, and the boat returned to the ship. Upon examining some weapons which the natives had thrown, they were found to be light darts, about four feet long, very ill made, of a reed or bamboo cane, and pointed with hard wood in which there were many barbs. They were discharged with great force, for at 60 yards distance they went beyond the party; but in what manner they were thrown could not be exactly seen. But the general opinion was, that they were thrown with a stick in the manner practised by the New Hollanders.

The land here is very low, as is every other part of the coast; but it is covered with a luxuriance of wood and herbage that can scarcely be conceived. Here the cocoa-nut, plantain, and bread-fruit, flourish in the highest perfection.

We are very little acquainted with the natural history of this country; but its zoology is worthy of attention, from its striking and romantic nature. It seems to be the peculiar residence of the beautiful and singular birds of Paradise, of which Mr Pennant has enumerated about 12 species. They are conjectured to breed here, but are generally taken in the neighbouring islands of Arroo, to which they retire during the wet monsoon, in flocks of 30 or 40. Their cry, during their flight, has a strong resemblance to that of a starling; but when surprised with a strong gale, they croak like ravens, and mount into the superior regions of the air. Their food seems to be berries, or, as some think, nutmegs and butterflies. They are shot with blunt arrows, or taken with viscus or bird-lime. Here likewise are most elegant parrots and lories; and the crowned pigeon is said to be equal in size to a turkey.

Added to these are the islands of Waijoo and Salwatti, Arroo and Timorland, the first of which is of considerable magnitude, containing about 100,000 inhabitants; the second is also populous, but they are more ferocious than the people of Waijoo; the production of the third is chiefly sago, and the inhabitants sell captives at Banda, which they seize on the main land. Timorland is of considerable extent, but so very little known to geographers, that no particular account can be given of it.

GUINEA, a gold coin, struck and current in Britain. The value or rate of guineas has varied: it was first struck on the footing of 20s. by the scarcity of gold was afterwards advanced to 21s. 6d. but it is now sunk to 21s.

The pound weight troy of gold is cut into 44 parts and a half; each part makes a guinea. This coin, took its denomination *guinea*, because the gold, of which the first was struck, was brought from that part of Africa called *Guinea*; for this reason it likewise bore the impression of an elephant. Guinea-Company || Guldenstaedt.

Guinea-Company. See COMPANY, *African*.

Guinea-Hen. See NUMIDA, ORNITHOLOGY *Index*.

Guinea-Pig. See MUS, MAMMALIA *Index*.

Guinea-Wheat. See ZEA, BOTANY *Index*.

GUIPUSCOA, the north-east division of the province of Biscay in Spain, situated on the confines of Navarre.

GUISE, a small town of France in the department of Aisne, and in Tierache, with a very strong castle, and the title of a duchy. It is seated on the river Oise, in E. Long. 3. 42. N. Lat. 49. 54.

GUISE, *Henry*, of Lorrain, duke of Guise, eldest son of François of Lorrain duke of Guise, memorable in the history of France as a gallant officer; but an imperious, turbulent, seditious subject, who placed himself at the head of an armed force, and called his rebel band *The League*. The plan was formed by the cardinal, his younger brother; and under the pretext of defending the Roman Catholic religion, the king Henry III. and the freedom of the state, against the design of the Huguenots, or French Protestants, they carried on a civil war, massacred the Huguenots, and governed the king, who forbid his appearance at Paris; but Guise now became an open rebel, entered the city against the king's express order, and put to the sword all who opposed him; the streets being barricaded to prevent his progress, this fatal day is called in the French history, *The day of the barricades*. Masters of Paris, the policy of the Guises failed them: for they suffered the king to escape to Blois, though he was deserted in his palace at Paris by his very guards. At Blois, Henry convened an assembly of the states of France; the duke of Guise had the boldness to appear to a summons sent him for that purpose: a forced reconciliation took place between him and the king, by the advice of this assembly; but it being accidentally discovered, that Guise had formed a design to dethrone the king, that weak monarch, instead of resolutely bringing him to justice, had him privately assassinated, December 23. 1588, in the 38th year of his age. His brother the cardinal shared the same fate the next day.

GUITTAR, GUITARRA, a musical instrument of the stringed kind, with five double rows of strings; of which those that are brass are in the middle, except it be for the burden, an octave lower than the fourth. ——This instrument was first used in Spain and by the Italians. In the former country it is still greatly in vogue. There are few of that nation who cannot play on the guittar; and with this instrument they serenade their mistresses at night. At Madrid, and other cities in that country, it is common to meet in the streets young men equipped with a guittar and a dark lanthorn, who, taking their station under the windows, sing, and accompany their voices with this instrument; and there is scarce an artificer or day-labourer in any of the cities or principal towns who does not entertain himself with his guittar.

GULDENSTAEDT, JOHN ANTHONY, physician and

Guldenſtaedt.

and naturaliſt, was born at Riga, April 26. 1745; received the rudiments of his education in that town; and in 1763 was admitted into the medical college of Berlin. He completed his ſtudies at Frankfort upon the Oder, and in 1767 received the degree of M. D. in that univerſity. On account of his knowledge of foreign languages, and the conſiderable progreſs he had made in natural hiſtory, he was conſidered as a fit perſon to engage in the expeditions which were planned by the Imperial academy. Being invited to St Peterſburg, he arrived in that city in 1768, was created adjunct of the academy, and afterwards, in 1770, member of that ſociety, and profeſſor of natural hiſtory. In June 1768 he ſet out upon his travels, and was abſent ſeven years. From Moſcow, where he continued till March 1769, he paſſed to Voronetz, Tzaritzin, Aſtracan, and Kiſlar, a fortreſs upon the weſtern ſhore of the Caſpian, and cloſe to the confines of Perſia. In 1770 he examined the diſtricts watered by the rivers Terek, Sunſha, and Alkſai, in the eaſtern extremity of Caucaſus; and in the courſe of the enſuing year penetrated into Oſſetia, in the higheſt part of the ſame mountain; where he collected vocabularies of the languages ſpoken in thoſe regions, made inquiries into the hiſtory of the people, and diſcovered ſome traces of Chriſtianity among them. Having viſited Cabarda and the northern chain of the Caucaſus, he proceeded to Georgia, and was admitted to an audience of Prince Heraclius, who was encamped about ten miles from Teflis. Having paſſed the winter here, and in examining the adjacent country, he followed in ſpring the prince to the province of Kaketia, and explored the ſouthern diſtricts inhabited by the Turcoman Tartars in the company of a Georgian magnate, whom he had cured of a dangerous diſorder. In July he paſſed into Imeretia, a country which lies between the Caſpian and Black ſeas, and is bounded on the eaſt by Georgia, on the north by Oſſetia, on the weſt by Mingrelia, and on the ſouth by the Turkiſh dominions. He penetrated into the middle chain of Mount Caucaſus, viſited the confines of Mingrelia, Middle Georgia, and Eaſtern and Lower Imeretia; and, after eſcaping many imminent dangers from the banditti of thoſe parts, fortunately returned to Kiſlar on the 18th of November, where he paſſed the winter, collecting various information concerning the neighbouring Tartar tribes of the Caucaſus, and particularly the Leſgees. In the following ſummer he journeyed to Cabarda Major, continued his courſe to Mount Beſhton, the higheſt point of the firſt ridge of the Caucaſus; inſpected the mines of Madſhar, and went to Tcherkaſk upon the Don. From thence he made expeditions to Azof and Taganrog, and then, along the new limits to the Dnieper. He finiſhed this year's route at Krementſhuk, in the government of New Ruſſia. In the enſuing ſpring he was proceeding to Crim Tartary; but receiving an order of recal, he returned through the Ukraine to Moſcow and St Peterſburg, where he arrived in the month of March 1775. Upon his return, he was employed in arranging his papers; but before he could finiſh them for the preſs, was ſeized with a violent fever, which carried him to the grave in March 1781. His writings which have been hitherto publiſhed conſiſt of a number of curious treatiſes, of which a liſt is given in Coxe's Travels, vol. i. p. 162.

GULA, in *Anatomy*, the œſophagus or gullet; that conduit by which animals take down food into the ſtomach. See Anatomy, N° 92.

Gula Gum.

GULE *of* August, the day of St Peter *ad vincula*, which is celebrated on the firſt of Auguſt. It is called the *gule of Auguſt*, from the Latin *gula*, "a throat," for this reaſon, that one Quirinus, a tribune, having a daughter that had a diſeaſe in her throat, went to Pope Alexander, the ſixth from St Peter, and deſired of him to ſee the chains that St Peter was chained with under Nero; which requeſt being granted, and ſhe, kiſſing the chains, was cured of her diſeaſe; whereupon the Pope inſtituted this feaſt in honour of St Peter; and, as before, this day was termed only the kalends of Auguſt, it was on this occaſion called indifferently either the day of St Peter *ad vincula*, from what wrought the miracle; or the *gule of Auguſt*, from that part of the virgin whereon it was wrought.

GULES, in *Heraldry*, a corruption of the French word *geules*, which in this ſcience ſignifies "red," and is repreſented in engraving by perpendicular lines. It may ſerve of itſelf to denote martial proweſs, boldneſs, and hardineſs: for the ancients uſed this colour to make themſelves terrible to their enemies, to ſtir up magnanimity, and to prevent the ſeeing of blood, by the likeneſs of the colours; for which reaſon perhaps it is uſed by the Engliſh. But, according to G. Leigh, if this tincture is compounded with

Or.	it ſignifies	Deſire.
Arg.		Envy.
Azu.		Ardour.
Ver.		Strength.
Pur.		Juſtice.
Sab.		Wearineſs.

This colour is by the generality of the Engliſh heralds ranked before azure; but French heralds, N. Upton and his followers, prefer azure to it.

GULF, a broad and capacious bay comprehended between two promontories, and ſometimes taking the name of a *ſea* when it is very extenſive; but particularly when it only communicates with the ſea by means of a ſtrait. Such are the Euxine or Black ſea, otherwiſe called the *Gulf of Conſtantinople;* the Adriatic ſea, called alſo the *Gulf of Venice;* the gulf of Sidra near Barbary; and the gulf of Lyons near France. All theſe gulfs are in the Mediterranean. There are, beſides, the gulf of Mexico, the gulf of St Lawrence, and the gulf of California, which are in North America. There are alſo the gulf of Perſia, otherwiſe called the *Red ſea*, between Perſia and Arabia; the gulf of Bengal in India; and the gulfs of Cochinchina and Kamtſchatka, near the countries of the ſame name.

The word comes from the French *golfe*, and that from the Italian *golfo*, which ſignify the ſame. Some deduce theſe further from the Greek γολπος; which Guiſhart again derives from the Hebrew גאב *gob*. Du Cange derives them from the barbarous Latin *gulfum*, or *gulfus*, which ſignify the ſame thing.

GULL. See Larus, Ornithology *Index*.

GULLET. See Gula, Anatomy, N° 92.

GUM (*Gummi*), is a concrete vegetable juice, of no particular ſmell or taſte, becoming viſcous and tenacious

Gum, Gums.

cious when moiſtened with water; totally diſſolving in water into a liquid, more or leſs glutinous in proportion to the quantity of the gum; not diſſolving in vinous ſpirits or in oils; burning in the fire to a black coal, without melting or catching flame; ſuffering no diſſipation in the heat of boiling water.

The true gums are gum arabic, gum tragacanth, gum ſenegal, the gum of cherry and plum trees, and ſuch like. All elſe have more or leſs of reſin in them.

Gum Arabic is the produce of a ſpecies of MIMOSA; which ſee in CHEMISTRY and MATERIA MEDICA *Index*.

Gum Senegal, is a gum reſembling gum arabic, which is brought from the country through which the river Senegal runs, in looſe or ſingle drops: but theſe are much larger than thoſe of the gum arabic uſually are; ſometimes it is of the bigneſs of an egg, and ſometimes much larger: the ſurface is very rough or wrinkled, and appears much leſs bright than the inner ſubſtance where the maſſes are broken. It has no ſmell, and ſcarce any taſte. It is probably produced from a tree of the ſame kind with the former. The virtues of it are the ſame with the gum arabic; but it is rarely uſed in medicine, unleſs as mixed with the gum arabic; the dyers and calico printers conſume the great quantities of it that are annually imported. The negroes diſſolve it in milk, and in that ſtate make it a principal ingredient in many of their diſhes, and often feed on it thus alone.

Gum Tragacanth, the gum of the tragacanth, a thorny buſh growing in Crete, Aſia, and Greece. See ASTRAGALUS, BOTANY *Index*.

Other ſubſtances known by the name of *gums* are as follows:

Gum Ammoniac. See AMMONIAC.
Gum Elemi. See AMYRIS.
Gum Kino. See KINO.
Gum Guaiacum. See GUAIACUM.
Gum Lacca. See COCCUS and LACCA.

} See CHEMISTRY and MATERIA MEDICA *Index*.

GUM, among gardeners, a kind of gangrene incident to fruit trees of the ſtone kind, ariſing from a corruption of the ſap; which, by its viſcidity, not being able to make its way through the fibres of the tree, is, by the protruſion of other juice, made to extravaſate and ooze out upon the bark.

When the diſtemper ſurrounds the branch, it admits of no remedy; but when only on one part of a bough, it ſhould be taken off to the quick, and ſome cowdung clapped on the wound, covered over with a linen cloth, and tied down. M. Quintinie directs to cut off the morbid branch two or three inches below the part affected.

GUMMA, a ſort of venereal excreſcence on the perioſteum of the bones.

GUMS, in *Anatomy*, the hard fleſhy ſubſtance in either jaw, through which the teeth ſpring from the jaw-bone. See ANATOMY, N° 105.

The gums are apt to become ſpongy, and to ſeparate from the teeth; but the cauſe is frequently a ſtony kind of cruſt, which forms itſelf therein, which, when ſeparated, the gums ſoon return to their former ſtate, eſpecially if rubbed with a mixture of the infuſion of roſes four parts, and the tincture of myrrh one part.—The ſcurvy is another diſorder which affects the gums. This diſorder, when not manifeſt in any other part, ſometimes appears in this: indeed, when a ſcorbutic diſorder invades the whole habit, its firſt ſymptom is a putrid ſtate of the gums.

Gun.

GUN, in the military art, a fire arm, or weapon of offence, which forcibly diſcharges a ball or other hard and ſolid matter through a cylindrical tube, by means of inflamed gun-powder. See *GUN-POWDER*.

The word gun now includes moſt of the ſpecies of fire-arms; piſtols and mortars being almoſt the only ones excepted from this denomination. They are divided into great and ſmall guns: the former including all that we alſo call cannon, ordnance or artillery: the latter includes muſquets, carabines, muſquetoons, blunderbuſſes, fowling-pieces, &c.

It is not known at what time theſe weapons were firſt invented. Though, comparatively ſpeaking, the introduction of guns into the weſtern part of the world is but of a modern date; yet it is certain that in ſome parts of Aſia they have been uſed, though in a very rude and imperfect manner for many ages.—Philoſtratus ſpeaks of a city near the river Hyphaſis in the Indies, which was ſaid to be impregnable, and that its inhabitants were relations of the gods, becauſe they threw thunder and lightning upon their enemies. Hence ſome imagine that guns were uſed by the eaſtern nations even in the time of Alexander the Great: but however this may be, many of our modern travellers aſſert that they were uſed in China as far back as the year of Chriſt 85, and have continued in uſe ever ſince.

The firſt hint of the invention of guns in Europe is in the works of Roger Bacon, who flouriſhed in the 13th century. In a treatiſe written by him about the year 1280, he propoſes to apply the violent explоſive force of gun-powder for the deſtruction of armies. In 1320, Bartholomew Schwartz, a German monk, is commonly ſaid to have invented gun-powder, though it is certainly known that this compoſition is deſcribed by Bacon in ſome of his treatiſes long before the time of Schwartz. The following is ſaid to have been the manner in which Schwartz invented gun-powder. Having pounded the materials for it in a mortar, which he afterwards covered with a ſtone, a ſpark of fire accidentally fell into the mortar and ſet the mixture on fire; upon which the exploſion blew the ſtone to a conſiderable diſtance. Hence it is probable that Schwartz might be taught the ſimpleſt method of applying it in war; for Bacon ſeems rather to have conceived the manner of uſing it to be by the violent effort of the flame unconfined, and which is indeed capable of producing aſtoniſhing effects *. The figure and name of *mortars* given to a ſpecies of old artillery, and their employment (which was throwing great ſtone bullets at an elevation), very much corroborates this conjecture.

* See *Gun-powder.*

Soon after the time of Schwartz, we find guns commonly made uſe of as inſtruments of war. Great guns were firſt uſed. They were originally made of iron bars ſoldered together, and fortified with ſtrong iron hoops; ſome of which are ſtill to be ſeen, viz. one in the Tower of London, two at Woolwich, and one in the royal arſenal at Liſbon. Others were made of thin ſheets of iron rolled up together and hooped; and on emergencies they were made of leather, with plates of iron or copper. Theſe pieces were made in a rude and imperfect manner, like the firſt eſſays of many new inventions.

Gun. inventions. Stone balls were thrown out of them, and a ſmall quantity of powder uſed on account of their weakneſs. Theſe pieces had no ornaments, were placed on their carriages by rings, and were of a cylindrical form. When or by whom they were made is uncertain: the Venetians, however, uſed cannon at the ſiege of Claudia Jeſſa, now called *Chioggia*, in 1366, which were brought thither by two Germans, with ſome powder and leaden balls; as likewiſe in their wars with the Genoeſe in 1379. King Edward III. made uſe of cannon at the battle of Creſſy in 1346, and at the ſiege of Calais in 1347. Cannon were made uſe of by the Turks at the ſiege of Conſtantinople, then in poſſeſſion of the Chriſtians, in 1394, and in that of 1452, that threw a weight of 100lb. but they generally burſt either the firſt, ſecond, or third ſhot. Louis XII. had one caſt at Tours, of the ſame ſize, which threw a ball from the Baſtile to Charenton. One of thoſe famous cannon was taken at the ſiege of Dieu in 1546, by Don John de Caſtro; and is in the caſtle of St Juliao da Barra, 10 miles from Liſbon: its length is 20 feet 7 inches, diameter at the centre 6 feet 3 inches, and it diſcharges a ball of 100lb. It has neither dolphins, rings, nor button; is of a curious kind of metal; and has a large Indoſtan inſcription upon it, which ſays it was caſt in 1400.

Formerly the cannon were dignified with uncommon names; for in 1503, Louis XII. had 12 braſs cannon caſt, of an extraordinary ſize, called after the names of the 12 peers of France. The Spaniſh and Portugueſe called them after their ſaints. The emperor Charles V. when he marched before Tunis, founded the 12 apoſtles. At Milan there is a 70 pounder, called the *Pimontelle;* and one at Bois-le-duc, called the *Devil.* A 60 pounder at Dover-caſtle, called *Queen Elizabeth's pocket-piſtol.* An 80 pounder in the Tower of London (formerly in Edinburgh-caſtle), called *Mounts-meg.* An 80 pounder in the royal arſenal at Berlin, called the *Thunderer.* An 80 pounder at Malaga, called the *Terrible.* Two curious 60 pounders in the arſenal at Bremen, called the *Meſſengers of bad news.* And, laſtly, an uncommon 70 pounder in the caſtle of St Angelo at Rome, made of the nails that faſtened the copper plates which covered the ancient Pantheon, with this inſcription upon it: *Ex clavis trabalibus porticus Agrippæ.*

In the beginning of the 15th century theſe uncommon names were generally aboliſhed, and the following more univerſal ones took place, viz.

	Pounders.	Cwt.
Cannon royal, or carthoun	=48	about 90
Baſtard cannon, or ¾ carthoun	=36	79
½ Carthoun	=24	60
Whole culverins	=18	50
Demi culverins	= 9	30
Falcon	= 6	25
Sacker, loweſt ſort	= 5	13
Sacker, ordinary	= 6	15
Sacker, largeſt ſize	= 8	18
Baſiliſk	=48	85
Serpentine	= 4	8
Aſpic	= 2	7
Dragon	= 6	12
Syren	=60	81
Falconet	= 3, 2, & 1	15, 10, 5

Moyens, which carried a ball of 10 or 12 ounces.
Rabinet, which carried a ball of 16 ounces.

Theſe curious names of beaſts and birds of prey were adopted on account of their ſwiftneſs in motion or of their cruelty; as the falconet, falcon, ſacker, and culverin, &c. for their ſwiftneſs in flying; the baſiliſk, ſerpentine, aſpike, dragon, ſyren, &c. for their cruelty.

At preſent cannon take their names from the weight of the ball they diſcharge. Thus a piece that diſcharges a ball of 24 pounds is called a 24 *pounder;* one that carries a ball of 12 pounds is called a 12 *pounder*; and ſo of the reſt, divided into the following ſorts, viz.

Ship guns, conſiſting in 42, 36, 32, 24, 18, 12, 9, 6, and 3 pounders.

Garriſon guns, in 42, 32, 24, 18, 12, 9, and 6 pounders.

Battering guns, in 24, 18, and 12 pounders.

Field-pieces, in 12, 9, 6, 3, 2, 1½, 1, and ½ pounders.

Mortars are thought to have been fully as ancient as cannon. They were employed in the wars of Italy, to throw balls of red-hot iron, ſtones, &c. long before the invention of ſhells. Theſe laſt are thought to be of German invention, and the uſe of them in war to have been taught by the following accident. A citizen of Venlo, at a certain feſtival celebrated in honour of the duke of Cleves, threw a number of ſhells, one of which fell on a houſe and ſet fire to it, by which misfortune the greateſt part of the town was reduced to aſhes. The firſt account of ſhells uſed for military purpoſes is in 1435, when Naples was beſieged by Charles VIII. Hiſtory informs us with more certainty, that ſhells were thrown out of mortars at the ſiege of Wachtendonk in Guelderland, in 1588, by the earl of Mansfeld. Mr Malter, an Engliſh engineer, firſt taught the French the art of throwing ſhells, which they practiſed at the ſiege of Motte in 1634. The method of throwing red-hot balls out of mortars was firſt certainly put in practice at the ſiege of Stralſund in 1675 by the elector of Brandenburgh; though ſome ſay in 1653 at the ſiege of Bremen. For the proper dimenſions of guns, their weight, the metal of which they are formed, &c. ſee the article GUNNERY.

Muſkets were firſt uſed at the ſiege of Rhege in the year 1521. The Spaniards were the firſt who armed part of their foot with theſe weapons. At firſt they were very heavy, and could not be uſed without a reſt. They had match-locks, and did execution at a great diſtance. On their march the ſoldiers carried only the reſts and ammunition, and had boys to bear their muſkets after them. They were very ſlow in loading, not only by reaſon of the unwieldineſs of their pieces, and becauſe they carried the powder and ball ſeparate, but from the time it took to prepare and adjuſt the match; ſo that their fire was not near ſo briſk as ours is now. Afterwards a lighter matchlock-muſket, came in uſe: and they carried their ammunition in bandeliers, to which were hung ſeveral little caſes of

Gundelia, Gunner.

wood covered with leather, each containing a charge of powder. The balls were carried looſe in a pouch, and a priming-horn hanging by their ſide. The muſkets with reſts were uſed as late as the beginning of the civil wars in the time of Charles I. The lighter kind ſucceeded them, and continued till the beginning of the preſent century, when they alſo were diſuſed, and the troops throughout Europe armed with firelocks.

GUNDELIA, a genus of plants belonging to the ſyngeneſia claſs; and in the natural method ranking under the 49th order, *Compoſitæ*. See BOTANY *Index*.

GUNELLUS. See BLENNIUS, ICHTHYOLOGY *Index*.

GUNNER, an officer appointed for the ſervice of the cannon, or one ſkilled to fire the guns.

Gunnera.

In the Tower of London, and other garriſons, as well as in the field, this officer carries a field-ſtaff, and a large powder-horn in a ſtring over his left ſhoulder: he marches by the guns; and when there is any apprehenſion of danger, his field-ſtaff is armed with match. His buſineſs is to lay the gun to paſs, and to help to load and traverſe her.

Maſter GUNNER, a patent-officer of the ordnance, who is appointed to teach all ſuch as learn the art of gunnery, and to certify to the maſter-general the ability of any perſon recommended to be one of the king's gunners. To every ſcholar he adminiſters an oath not to ſerve, without leave, any other prince or ſtate; or teach any one the art of gunnery but ſuch as have taken the ſaid oath.

GUNNERA, a genus of plants belonging to the gynandria claſs. See BOTANY *Index*.

GUNNERY,

IS the art of charging, directing, and exploding fire-arms, as cannons, mortars, muſkets, &c. to the beſt advantage.—As this art depends greatly on having the guns and ſhot of a proper ſize and figure, and well adapted to each other, it hence follows that the proper dimenſions, &c. of cannon and ſmall arms come properly to be conſidered under the preſent article.

SECT. I. *Hiſtory of Gunnery.*

1 Hiſtory.

THE ancients, who knew not the uſe of gunpowder and fire-arms, had notwithſtanding machines which were capable of diſcharging ſtones, darts, and arrows, with great force. Theſe were actuated chiefly by the elaſtic force of ropes, or of ſtrong ſprings, and required a great number of men to work them; for which reaſon, the exploſion of gunpowder, as acting inſtantaneouſly, and ſeemingly with irreſiſtible force, ſeemed to be a moſt proper ſuccedaneum for all the powers by which the military engines in former times were actuated. It ſoon appeared, however, that this force was not very eaſily applied. Though the experiment of Bartholomew Schwartz, mentioned under the article GUN, had given a good hint towards this application in a ſucceſsful manner, yet the violent reaction of the inflamed powder on the containing veſſels rendered them very apt to burſt, to the great danger of thoſe who ſtood near them. The gunpowder in thoſe days, therefore, was much weaker than it is now made; though this proved a very inſufficient remedy for the inconvenience above mentioned. It was alſo ſoon diſcovered, that iron bullets of much leſs weight than ſtone ones would be more efficacious if impelled by greater quantities of ſtronger powder. This occaſioned an alteration in the matter and form of the cannon, which were now caſt of braſs. Theſe were lighter and more manageable than the former, at the ſame time that they were ſtronger in proportion to their bore. Thus they were capable of enduring greater charges of a better powder than what had been formerly uſed; and their iron bullets (which were from 40 to 60 pounds weight) being impelled with greater velocities, were more effectual than the heavieſt ſtones could ever prove. This change took place about the latter end of the 15th century.

By this means powder compounded in the manner now practiſed over all Europe came firſt in uſe. But the change of the proportion of materials was not the only improvement it received. The method of graining it is undoubtedly a conſiderable advantage. At firſt the powder was always in the form of fine meal, ſuch as it was reduced to by grinding the materials together. It is doubtful whether the firſt graining of powder was intended to increaſe its ſtrength, or only to render it more convenient for filling into ſmall charges and the charging of ſmall arms, to which alone it was applied for many years, whilſt meal-powder was ſtill made uſe of for cannon. But at laſt the additional ſtrength which the grained powder was found to acquire from the free paſſage of the air between the grains, occaſioned the meal-powder to be entirely laid aſide.

For the laſt two hundred years, the formation of cannon hath been very little improved; the beſt pieces of modern artillery differing little in their proportions from thoſe uſed in the time of Charles V. Indeed lighter and ſhorter pieces have been often propoſed and eſſayed; but though they have their advantages in particular caſes, yet it ſeems now to be agreed that they are altogether inſufficient for general ſervice. But though the proportions of the pieces have not been much varied within that period, yet their uſe and application have undergone conſiderable alterations; the ſame ends being now accompliſhed by ſmaller pieces than what were formerly thought neceſſary. Thus the battering cannon now univerſally approved of are thoſe formerly called *demi-cannons*, carrying a ball of 24 pounds weight; it being found by experience, that their ſtroke though leſs violent than that of larger pieces, is yet ſufficiently adapted to the ſtrength of the uſual profiles of fortification; and that the facility of their carriage and management, and the ammunition they ſpare, give them great advantages beyond the whole cannons formerly employed in making

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king breaches. The method alſo of making a breach, by firſt cutting off the whole wall as low as poſſible before its upper part is attempted to be beat down, ſeems alſo to be a conſiderable modern improvement in the practical part of gunnery. But the moſt conſiderable improvement in the practice is the method of firing with ſmall quantities of powder, and elevating the piece ſo that the bullet may juſt go clear of the parapet of the enemy, and drop into their works. By this means the bullet, coming to the ground at a ſmall angle, and with a ſmall velocity, does not bury itſelf, but bounds or rolls along in the direction in which it was fired: and therefore, if the piece be placed in a line with the battery it is intended to ſilence, or the front it is to ſweep, each ſhot rakes the whole length of that battery or front; and has thereby a much greater chance of diſabling the defendants, and diſmounting their cannon, than it would have if fired in the common manner. This method was invented by Vauban, and was by him ſtyled *Batterie à Ricochet*. It was firſt put in practice in the year 1692 at the ſiege of Aeth.—Something ſimilar to this was put in practice by the king of Pruſſia at the battle of Roſbach in 1757. He had ſeveral ſix-inch mortars, made with trunnions and mounted on travelling carriages, which fired obliquely on the enemy's lines, and amongſt their horſe. They were charged with eight ounces of powder, and elevated at an angle of one degree fifteen minutes, and did great execution; for the ſhells rolling along the line with burning fuſes made the ſtouteſt of the enemy not wait for their burſting.

Sect. II. *Theory of Gunnery.*

2 Theory of gunnery firſt attempted by Tartalea.

The uſe of fire-arms had been known for a long time before any theory concerning them was attempted. The firſt author who wrote profeſſedly on the flight of cannon-ſhot was Tartalea. In 1537 he publiſhed a book, at Venice, entitled *Nova Scientia;* and afterwards another, entitled *Quæſiti et Inventioni diverſi*, printed at the ſame place in 1546, in which he treats profeſſedly on theſe motions. His diſcoveries were but few, on account of the imperfect ſtate of mechanical knowledge at that time. However, he determined, that the greateſt range of cannon was with an elevation of 45 degrees. He likewiſe determined, (contrary to the opinion of practitioners), that no part of the track deſcribed by a bullet was a right line; although the curvature was in ſome caſes ſo little, that it was not attended to. He compared it to the ſurface of the ſea; which, though it appears to be a plane, is yet undoubtedly incurvated round the centre of the earth. He alſo aſſumes to himſelf the invention of the gunner's quadrant, and often gave ſhrewd gueſſes at the event of ſome untried methods. But as he had not opportunities of being converſant in the practice, and founded his opinions only on ſpeculation, he was condemned by moſt of the ſucceeding writers, though often without any ſufficient reaſon. The philoſophers of thoſe times alſo intermeddled in the queſtions hence ariſing; and many diſputes on motion were ſet on foot (eſpecially in Italy,) which continued till the time of Galileo, and probably gave riſe to his celebrated Dialogues on motion. Theſe were publiſhed in the year 1638; but in this interval, and before Galileo's doctrine was thoroughly eſtabliſhed, many theories of the motion of military projectiles, and many tables of their comparative ranges at different elevations, were publiſhed; all of them egregiouſly fallacious, and utterly irreconcileable with the motions of theſe bodies. Very few of the ancients indeed refrained from indulging themſelves in ſpeculations concerning the difference betwixt natural, violent, and mixed motions; although ſcarce any two of them could agree in their theories.

Theory.

3 Experiments by different perſons on the ranges of artillery.

It is ſtrange, however, that, during all theſe conteſts, ſo few of thoſe who were intruſted with the charge of artillery thought it worth while to bring theſe theories to the teſt of experiment. Mr Robins informs us, in his Preface to the New Principles of Gunnery, that he had met with no more than four authors who had treated on this ſubject. The firſt of theſe is Collado, who has given the ranges of a falconet carrying a three-pound ſhot to each point of the gunner's quadrant. But from his numbers it is manifeſt, that the piece was not charged with its cuſtomary allotment of gunpowder. The reſults of his trials were, that the point-blank ſhot, or that in which the path of the ball did not ſenſibly deviate from a right line, extended 268 paces. At an elevation of one point (or $7°\frac{1}{2}$ of the gunner's quadrant) the range was 594 paces; at an elevation of two points, 794 paces; at three points, 954 paces; at four, 1010; at five, 1040; and at ſix, 1053 paces. At the ſeventh point, the range fell between thoſe of the third and fourth; at the eighth point, it fell between the ranges of the ſecond and third; at the ninth point, it fell between the ranges of the firſt and ſecond; at the tenth point, it fell between the point-blank diſtance and that of the firſt point; and at the eleventh point, it fell very near the piece.—The paces ſpoke of by this author are not geometrical ones, but common ſteps.

The year after Collado's treatiſe, another appeared on the ſame ſubject by one Bourne an Engliſhman. His elevations were not regulated by the points of the gunner's quadrant, but by degrees: and he aſcertains the proportions between the ranges at different elevations and the extent of point-blank ſhot. According to him, if the extent of the point-blank ſhot be repreſented by 1, the range at 5° elevation will be $2\frac{3}{9}$, at 10° it will be $3\frac{1}{7}$, at 15° it will be $4\frac{1}{7}$, at 20° it will be $4\frac{5}{6}$, and the greateſt random will be $5\frac{1}{2}$. This laſt, he tells us, is in a calm day when the piece is elevated to 42°; but according to the ſtrength of the wind, and as it favours or oppoſes the flight of the ſhot, it may be from 45° to 36°.—He hath not informed us with what piece he made his trials; though by his proportions it ſeems to have been a ſmall one. This however ought to have been attended to, as the relation between the extent of different ranges varies extremely according to the velocity and denſity of the bullet.

After him Eldred and Anderſon, both Engliſhmen, publiſhed treatiſes on this ſubject. The firſt publiſhed his treatiſe in 1646, and has given the actual ranges of different pieces of artillery at ſmall elevations, all under ten degrees. His principles were not rigorouſly true, though not liable to very conſiderable errors; yet, in conſequence of their deviation from the truth, he-

Theory. he found it impoſſible to make ſome of his experiments agree with his principles.

4 Galileo's theory. In 1638, Galileo printed his dialogues on motion. In theſe he pointed out the general laws obſerved by nature in the production and compoſition of motion; and was the firſt who deſcribed the action and effects of gravity on falling bodies. On theſe principles he determined, that the flight of a cannon ſhot, or any other projectile, would be in the curve of a parabola, except in as far as it was diverted from that track by the reſiſtance of the air. He has alſo propoſed the means of examining the inequalities which ariſe from thence, and of diſcovering what ſenſible effects that reſiſtance would produce in the motion of a bullet at ſome given diſtance from the piece.

Though Galileo had thus ſhown, that, independent of the reſiſtance of the air, all projectiles would, in their flight, deſcribe the curve of a parabola; yet thoſe who came after him, ſeem never to have imagined that it was neceſſary to conſider how far the operations of gunnery were affected by this reſiſtance. The ſubſequent writers indeed boldly aſſerted, without making the experiment, that no conſiderable variation could ariſe from the reſiſtance of the air in the flight of ſhells or cannon ſhot. In this perſuaſion they ſupported themſelves chiefly by conſidering the extreme rarity of the air, compared with thoſe denſe and ponderous bodies; and at laſt it became an almoſt generally eſtabliſhed maxim, that the flight of theſe bodies was nearly in the curve of a parabola.

5 New theory by Anderſon. In 1674, Mr Anderſon above mentioned publiſhed his treatiſe on the nature and effects of the gun; in which he proceeds on the principles of Galileo, and ſtrenuouſly aſſerts, that the flight of all bullets is in the curve of a parabola; undertaking to anſwer all objections that could be brought to the contrary. The ſame thing was alſo undertaken by Mr Blondel, in a treatiſe publiſhed at Paris in 1683; where, after long diſcuſſion, the author concludes, that the variations from the air's reſiſtance are ſo ſlight as ſcarce to merit notice. The ſame ſubject is treated of in the Philoſophical Tranſactions, N° 216. p. 68. by Dr Halley; and he alſo, ſwayed by the very great diſproportion between the denſity of the air and that of iron or lead, thinks it reaſonable to believe, that the oppoſition of the air to large metal-ſhot is ſcarcely diſcernible; although in ſmall and light ſhot he owns that it muſt be accounted for.

But though this hypotheſis went on ſmoothly in ſpeculation; yet Anderſon, who made a great number of trials, found it impoſſible to ſupport it without ſome new modification. For though it does not appear that he ever examined the comparative ranges of either cannon or muſket ſhot when fired with their uſual velocities, yet his experiments on the ranges of ſhells thrown with ſmall velocities (in compariſon of thoſe above mentioned), convinced him that their whole track was not parabolical. But inſtead of making the proper inferences from hence, and concluding the reſiſtance of the air to be of conſiderable efficacy, he framed a new hypotheſis; which was, that the ſhell or bullet, at its firſt diſcharge, flew to a certain diſtance in a right line, from the end of which line only it began to deſcribe a parabola. And this right line, which he calls the *line* of the *impulſe* of the *fire*, he ſuppoſes to be the ſame in all elevations. Thus, by aſſigning a proper length to this line of impulſe, it was always in his power to reconcile any two ſhots made at different angles, let them differ as widely as we pleaſe to ſuppoſe. But this he could not have done with three ſhots; nor indeed doth he ever tell us the event of his experiments when three ranges were tried at one time. Theory.

6 Laws of the air's reſiſtance laid down by Newton. When Sir Iſaac Newton's *Principia* was publiſhed, he particularly conſidered the reſiſtance of the air to projectiles which moved with ſmall velocities; but as he never had an opportunity of making experiments on thoſe which move with ſuch prodigious ſwiftneſs, he did not imagine that a difference in velocity could make ſuch differences in the reſiſtance as are now found to take place. Sir Iſaac found, that, in ſmall velocities, the reſiſtance was increaſed in the duplicate proportion of the ſwiftneſs with which the body moved; that is, a body moving with twice the velocity of another of equal magnitude, would meet with four times as much reſiſtance as the firſt, with thrice the velocity it would meet with nine times the reſiſtance, &c.—This principle itſelf is now found to be erroneous with regard to military projectiles; though, if it had been properly attended to, the reſiſtance of the air might even from thence have been reckoned much more conſiderable than was commonly done. So far, however, were thoſe who treated this ſubject ſcientifically, from giving a proper allowance for the reſiſtance of the atmoſphere, that their theories differed moſt egregiouſly from the truth. Huygens alone ſeems to have attended to this principle: for, in the year 1690, he publiſhed a Treatiſe on Gravity, in which he gave an account of ſome experiments tending to prove, that the track of all projectiles moving with very ſwift motions was widely different from that of a parabola. All the reſt of the learned acquieſced in the juſtneſs of Galileo's doctrine, and very erroneous calculations concerning the ranges of cannon were accordingly given. Nor was any notice taken of theſe errors till the year 1716. At that time M. Reſſons, a French officer of artillery, diſtinguiſhed by the number of ſieges at which he had ſerved, by his high military rank, and by his abilities in his profeſſion, gave in a memoir to the Royal Academy, of which he was a member, importing, that, "although it was agreed, that theory joined with practice did conſtitute the perfection of every art; yet experience had taught him, that theory was of very little ſervice in the uſe of mortars: That the works of M. Blondel had juſtly enough deſcribed the ſeveral parabolic lines, according to the different degrees of the elevation of the piece; but that practice had convinced him, there was no theory in the effect of gunpowder; for having endeavoured, with the greateſt preciſion, to point a mortar agreeably to theſe calculations, he had never been able to eſtabliſh any ſolid foundation upon them."

7 Erroneous in military projectiles.

8 All theſe theories widely different from the truth.

From the hiſtory of the academy, it doth not appear that the ſentiments of M. Reſſons were at any time controverted, or any reaſon offered for the failure of the theory of projectiles when applied to uſe. Nothing farther, however, was done till the time of Benjamin Robins, who in 1742 publiſhed a treatiſe, entitled, New Principles of Gunnery, in which he hath treated particularly not only of the reſiſtance of the atmoſphere,

9 Mr Robins firſt introduces a true theory.

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atmoſphere, but almoſt every thing elſe relating to the flight of military projectiles, and indeed advanced the theory of gunnery much nearer perfection than ever it was before.

10 His method of determining the force of gunpowder.

The firſt thing conſidered by Mr Robins, and which is indeed the foundation of all other particulars relative to gunnery, is the exploſive force of gunpowder. This he determined to be owing to an elaſtic fluid ſimilar to our atmoſphere, having its elaſtic force greatly increaſed by the heat. "If a red-hot iron (ſays he) be included in a receiver, and the receiver be exhauſted, and gunpowder be then let fall on the iron, the powder will take fire, and the mercurial gage will ſuddenly deſcend upon the exploſion; and though it immediately aſcends again, it will never riſe to the height it firſt ſtood at, but will continue depreſſed by a ſpace proportioned to the quantity of powder which was let fall on the iron.—The ſame production likewiſe takes place when gunpowder is fired in the air: for if a ſmall quantity of powder is placed in the upper part of a glaſs tube, the lower part of which is immerſed in water, and the fluid be made to riſe ſo near the top, that only a ſmall portion of air is left in that part where the gunpowder is placed; if in this ſituation the communication of the upper part of the tube with the external air is cloſed, and the gunpowder fired, which may be eaſily done by means of a burning-glaſs, the water will in this experiment deſcend on the exploſion, as the quickſilver did in the laſt; and will always continue depreſſed below the place at which it ſtood before the exploſion. The quantity of this depreſſion will be greater if the quantity of powder be increaſed, or the diameter of the tube be diminiſhed.

"When any conſiderable quantity of gunpowder is fired in an exhauſted receiver, by being let fall on a red-hot iron, the mercurial gage inſtantly deſcends upon the exploſion, and as ſuddenly aſcends again. After a few vibrations, none of which except the firſt are of any great extent, it ſeemingly fixes at a point lower than where it ſtood before the exploſion. But even when the gage has acquired this point of apparent reſt, it ſtill continues riſing for a conſiderable time, although by ſuch imperceptible degrees, that it can only be diſcovered by comparing its place at diſtant intervals: however, it will not always continue to aſcend; but will riſe ſlower and ſlower, till at laſt it will be abſolutely fixed at a point lower than where the mercury ſtood before the exploſion. The ſame circumſtances nearly happen, when powder is fired in the upper part of an unexhauſted tube, whoſe lower part is immerſed in water.

"That the elaſticity or preſſure of the fluid produced by the firing of gunpowder is, *cæteris paribus*, directly as its denſity, may be proved from hence, that if in the ſame receiver a double quantity of powder be let fall, the mercury will ſubſide twice as much as in the firing of a ſingle quantity. Alſo the deſcents of the mercury, when equal quantities of powder are fired in different receivers, are reciprocally as the capacities of thoſe receivers, and conſequently as the denſity of produced fluid in each. But as, in the uſual method of trying this experiment, the quantities of powder are ſo very ſmall that it is difficult to aſcertain theſe proportions with the requiſite degree of exactneſs, I took a large receiver containing about 520 inches, and letting fall at once on the red-hot iron one dram or the ſixteenth part of an ounce avoirdupois of powder, the receiver being firſt nearly exhauſted; the mercury, after the exploſion, was ſubſided two inches exactly, and all the powder had taken fire. Then heating the iron a ſecond time, and exhauſting the receiver as before, two drams were let down at once, which ſunk the mercury three inches and three quarters; and a ſmall part of the powder had fallen beſide the iron, which (the bottom of the receiver being wet) did not fire, and the quantity which thus eſcaped did appear to be nearly ſufficient, had it fallen on the iron, to have ſunk the mercury a quarter of an inch more; in which caſe the two deſcents, viz. two inches and four inches, would have been accurately in the proportion of the reſpective quantities of powder; from which proportion, as it was, they very little varied.

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"As different kinds of gunpowder produce different quantities of this fluid, in proportion to their different degrees of goodneſs, before any definite determination of this kind can take place, it is neceſſary to aſcertain the particular ſpecies of powder that is propoſed to be uſed. (Here Mr Robins determines in all his experiments to make uſe of government-powder, as conſiſting of a certain and invariable proportion of materials, and therefore preferable to ſuch kinds as are made according to the fancy of private perſons.)

"This being ſettled, we muſt further premiſe theſe two principles: 1. That the elaſticity of this fluid increaſes by heat and diminiſhes by cold, in the ſame manner as that of the air; 2. That the denſity of this fluid, and conſequently its weight, is the ſame with the weight of an equal bulk of air, having the ſame elaſticity and the ſame temperature. Now from the laſt experiment it appears, that $\frac{1}{1\,6}$ of an ounce avoirdupois or about 27 grains Troy of powder, ſunk the gage, on its exploſion, two inches; and the mercury in the barometer ſtanding at near 30 inches, $\frac{1}{1\,5}$ths of an ounce avoirdupois or 410 grains Troy, would have filled the receiver with a fluid whoſe elaſticity would have been equal to the whole preſſure of the atmoſphere, or the ſame with the elaſticity of the air we breathe; and the contents of the receiver being about 520 cubic inches, it follows, that $\frac{1}{1\,5}$ths of an ounce of powder will produce 520 cubic inches of a fluid poſſeſſing the ſame degree of claſticity with the common air; whence an ounce of powder will produce near 575 cubic inches of ſuch a fluid.

"But in order to aſcertain the denſity of this fluid, we muſt conſider what part of its elaſticity, at the time of this determination, was owing to the heat it received from the included hot iron and the warm receiver. Now the general heat of the receiver being manifeſtly leſs than that of boiling water, which is known to increaſe the elaſticity of the air to ſomewhat more than $\frac{1}{4}$ of its augmented quantity; I collect from hence and other circumſtances, that the augmentation of elaſticity from this cauſe was about $\frac{1}{5}$ of the whole: that is, if the fluid ariſing from the exploſion had been reduced to the temperature of the external air, the deſcent of the mercurial gage, inſtead of two inches, would have been only $1\frac{1}{5}$ inch; whence 575, reduced in the proportion of five to four, becomes 460; and this laſt number repreſents the cubic inches of an elaſtic fluid equal in denſity and elaſticity with common air, which are produced

Theory. ced from the explosion of 1 ounce avoirdupois of gunpowder; the weight of which quantity of fluid, according to the usual estimation of the weight of air, is 131 grains; whence the weight of this fluid is $\frac{1}{4}\frac{1}{3}\frac{1}{7}$ or $\frac{1}{100}$ths nearly of the weight of the generating powder. The ratio of the bulk of gunpowder to the bulk of this fluid may be determined from considering that 17 drams avoirdupois of powder fill two cubic inches, if the powder be well shaken together: therefore, augmenting the number last found in the proportion of 16 to 17, the resulting term $488\frac{1}{4}$ is the number of cubic inches of an elastic fluid, equal in density with the air produced from two cubic inches of powder: whence the ratio of the respective bulk of the powder, and of the fluid produced from it, is in round numbers as 1 to 244."—This calculation was afterwards justified by experiments.

"If this fluid, instead of expanding when the powder was fired, had been confined in the same space which the powder filled before the explosion; then it would have had, in that confined state, a degree of elasticity 244 times greater than that of common air; and this independent of the great augmentation which this elasticity would receive from the action of the fire in that instant.

"Hence, then, we are certain, that any quantity of powder, fired in a confined space, which it adequately fills, exerts, at the instant of its explosion, against the sides of the vessel containing it, and the bodies it impels before it, a force at least 244 times greater than the elasticity of the common air, or, which is the same thing, than the pressure of the atmosphere; and this without considering the great addition which this force will receive from the violent degree of heat with which it is affected at that time.

"To determine how far the elasticity of air is augmented when heated to the extremest degree of red-hot iron, I took a piece of a musket-barrel about six inches in length, and ordered one end to be closed up entirely; but the other end was drawn out conically, and finished in an aperture of about $\frac{1}{8}$ of an inch in diameter. The tube thus fitted, was heated to the extremity of a red heat in a smith's forge; and was then immersed with its aperture downwards in a bucket of water, and kept there till it was cool; after which it was taken out carefully, and the water which had entered it in cooling was exactly weighed. The heat given to the tube at each time, was the beginning of what workmen call a *white heat;* and to prevent the rushing in of the aqueous vapour at the immersion, which would otherwise drive out great part of the air, and render the experiment fallacious, I had an iron wire filed tapering, so as to fit the aperture of the tube, and with this I always stopped it up before it was taken from the fire, letting the wire remain in till the whole was cool, when, removing it, the due quantity of water would enter. The weight of the water thus taken in at three different trials was 610 grains, 595 grains, and 600 grains, respectively. The content of the whole cavity of the tube was 796 grains of water; whence the spaces remaining unfilled in these three experiments were 186, 201, and 196 grains respectively. These spaces undoubtedly contained all the air which, when the tube was red-hot, extended through its whole concavity; consequently the elasticity of the air, when heated to the extreme heat of red-hot iron, was to the elasticity of the same air, when reduced to the temperature of the ambient atmosphere, as the whole capacity of the tube to the respective spaces taken up by the cooled air: that is, as 796 to 186, 201, 196; or taking the medium of these three trials, as 796 to $194\frac{1}{3}$. Theory.

"As air and this fluid appear to be equally affected by heat and cold, and consequently have their elasticities equally augmented by the addition of equal degrees of heat to each; if we suppose the heat with which the flame of fired powder is endowed to be the same with that of the extreme heat of red-hot iron, then the elasticity of the generated fluid will be greater at the time of the explosion than afterwards, when it is reduced to the temperature of the ambient air, in the ratio of 796 to $194\frac{1}{3}$ nearly. It being allowed then, (which surely is very reasonable), that the flame of gunpowder is not less hot than red-hot iron, and the elasticity of the air, and consequently of the fluid generated by the explosion, being augmented in the extremity of this heat in the ratio of $194\frac{1}{3}$ to 796, it follows, that if 244 be augmented in this ratio, the resulting number, which is $999\frac{1}{3}$, will determine how many times the elasticity of the flame of fired powder exceeds the elasticity of common air, supposing it to be confined in the same space which the powder filled before it was fired.—Hence then the absolute quantity of the pressure exerted by gunpowder at the moment of its explosion may be assigned; for, since the fluid then generated has an elasticity of $999\frac{1}{3}$, or in round numbers 1000 times greater than that of the atmosphere, and since common air by its elasticity exerts a pressure on any given surface equal to the weight of the incumbent atmosphere with which it is in equilibrio, the pressure exerted by fired powder before it dilated itself is 1000 times greater than the pressure of the atmosphere: and consequently the quantity of this force, on a surface of an inch square, amounts to above six tons weight; which force, however, diminishes as the fluid dilates itself. 11 Prodigious power of fired powder.

"But though we have here supposed that the heat of gunpowder, when fired in any considerable quantity, is the same with iron heated to the extremity of red heat, or to the beginning of a white heat, yet it cannot be doubted but that the fire produced in the explosion is somewhat varied (like all other fires) by a greater or less quantity of fuel; and it may be presumed, that, according to the quantity of powder fired together, the flame may have all the different degrees, from a languid red heat to that sufficient for the vitrification of metals. But as the quantity of powder requisite for the production of this last mentioned heat, is certainly greater than what is ever fired together for any military purpose, we cannot be far from our scope, if we suppose the heat of such quantities as are usually fired to be nearly the same with that of red-hot iron; allowing a gradual augmentation to this heat in larger quantities, and diminishing it when the quantities are very small.

12 Mr Robins's method of determining the velocities of balls.

Having thus determined the force of the gunpowder, Mr Robins next proceeds to determine the velocity with which the ball is discharged. The solution of this problem depends on the two following principles. 1. That the action of the powder on the bullet ceases as

Theory.

as ſoon as the bullet is got out of the piece. 2. That all the powder of the charge is fired and converted into elaſtic fluid before the bullet is ſenſibly moved from its place.

"The firſt of theſe (ſays Mr Robins) will appear manifeſt when it is conſidered how ſuddenly the flame will extend itſelf on every ſide, by its own elaſticity, when it is once got out of the mouth of the piece; for by this means its force will then be diſſipated, and the bullet no longer ſenſibly affected by it.

13 Inſtantaneous firing of powder.

"The ſecond principle is indeed leſs obvious, being contrary to the general opinion of almoſt all writers on this ſubject. It might, however, be ſufficient for the proof of this poſition, to obſerve the prodigious compreſſion of the flame in the chamber of the piece. Thoſe who attend to this circumſtance, and to the eaſy paſſage of the flame through the intervals of the grains, may ſoon ſatisfy themſelves, that no one grain contained in that chamber can continue for any time unin flamed, when thus ſurrounded and preſſed by ſuch an active fire. However, not to rely on mere ſpeculation in a matter of ſo much conſequence, I conſidered, that if part only of the powder is fired, and that ſucceſſively; then by laying a greater weight before the charge (ſuppoſe two or three bullets inſtead of one), a greater quantity of powder would neceſſarily be fired, ſince a heavier weight would be a longer time in paſſing through the barrel. Whence it ſhould follow, that two or three bullets would be impelled by a much greater force than one only. But the contrary to this appears by experiment; for, firing one, two, and three bullets laid contiguous to each other with the ſame charge reſpectively, I have found that their velocities were not much different from the reciprocal of their ſubduplicate quantities of matter; that is, if a given charge would communicate to one bullet a velocity of 1700 feet in a ſecond, the ſame charge would communicate to two bullets a velocity from 1250 to 1300 feet in a ſecond, and to three bullets a velocity from 1050 to 1110 feet in the ſame time. From hence it appears, that, whether a piece is loaded with a greater or leſs weight of bullet, the action is nearly the ſame; ſince all mathematicians know, that if bodies, containing different quantities of matter, are ſucceſſively impelled through the ſame ſpace by the ſame power acting with a determined force at each point of that ſpace; then the velocities given to theſe different bodies will be reciprocally in the ſubduplicate ratio of their quantities of matter. The exceſs of the velocities of the two and three bullets above what they ought to have been by this rule (which are that of 1200 and 980 feet in a ſecond), undoubtedly ariſes from the flame, which, eſcaping by the ſide of the firſt bullet, acts on the ſurface of the ſecond and third.

"Now, this exceſs has in many experiments been imperceptible, and the velocities have been reciprocally in the ſubduplicate ratios of the number of bullets, to ſufficient exactneſs; and where this error has been greater, it has never ariſen to an eighth part of the whole; but if the common opinion was true, that a ſmall part only of the powder fires at firſt, and other parts of it ſucceſſively as the bullet paſſes through the barrel, and that a conſiderable part of it is often blown out of the piece without firing at all; then the velocity which three bullets received from the exploſion ought to have been much greater than we have found it to be.—But the truth of the ſecond poſtulate more fully appears from thoſe experiments, by which it is ſhown, that the velocities of bullets may be aſcertained to the ſame exactneſs when they are acted on through a barrel of four inches in length only, as when they are diſcharged from one of four feet.

Theory.

14 Why ſome powder is blown out of the mouth of a cannon without being fired.

"With reſpect to the grains of powder which are often blown out unfired, and which are always urged as a proof of the gradual firing of the charge, I believe Diego Uſſano, a perſon of great experience in the art of gunnery, has given the true reaſon for this accident; which is, that ſome ſmall part of the charge is often not rammed up with the reſt, but is left in the piece before the wad, and is by this means expelled by the blaſt of air before the fire can reach it. I muſt add, that in the charging of cannon and ſmall arms, eſpecially after the firſt time, this is ſcarcely to be avoided by any method I have yet ſeen practiſed. Perhaps, too, there may be ſome few grains in the beſt powder, of ſuch an heterogeneous compoſition as to be leſs ſuſceptible of firing; which, I think, I have myſelf obſerved: and theſe, though they are ſurrounded by the flame, may be driven out unfired.

15 Demonſtration of the force of fired powder on the ball. Plate CCXLVIII. fig. 1.

"Theſe poſtulates being now allowed to be juſt, let AB repreſent the axis of any piece of artillery, A the breech, and B the muzzle; DC the diameter of its bore, and DEGC a part of its cavity filled with powder. Suppoſe the ball that is to be impelled to lie with its hinder ſurface at the line GE; then the preſſure exerted at the exploſion on the circle of which GE is the diameter, or, which is the ſame thing, the preſſure exerted in the direction FB on the ſurface of the ball, is eaſily known from the known dimenſions of that circle. Draw any line FH perpendicular to FB, and AI parallel to FH: and through the point H, to the aſymptotes IA and AB, deſcribe the hyperbola KHNQ: then, if FH repreſents the force impelling the ball at the point F, the force impelling the ball at any other point as at M, will be repreſented by the line MN, the ordinate to the hyperbola at that point. For when the fluid impelling the body along has dilated itſelf to M, its denſity will be then to its original denſity in the ſpace DEGC reciprocally as the ſpaces through which it is extended; that is, as FA to MA, or as MN to FH; but it has been ſhown, that the impelling force or elaſticity of this fluid is directly as its denſity; therefore, if FH repreſents the force at the point F, MN will repreſent the like force at the point M.

"Since the abſolute quantity of the force impelling the ball at the point F is known, and the weight of the ball is alſo known, the proportion between the force with which the ball is impelled and its own gravity is known. In this proportion take FH to FL, and draw LP parallel to FB; then, MN the ordinate to the hyperbola in any point will be to its part MR, cut off by the line LP, as the impelling force of the powder in that point M to the gravity of the ball; and conſequently the line LP will determine a line proportional to the uniform force of gravity in every point; whilſt the hyperbola HNQ determines in like manner ſuch ordinates as are proportional to the impelling force of the powder in every point; whence by the

Theory. 39th Prop. of lib. 1. of Sir Iſaac Newton's Principia, the areas FLPB and FHQB are in the duplicate proportion of the velocities which the ball would acquire when acted upon by its own gravity through the ſpace FB, and when impelled through the ſame ſpace by the force of the powder. But ſince the ratio of AF to AB and the ratio of FH to FL are known, the ratio of the area FLPB to the area FHQB is known; and thence its ſubduplicate. And ſince the line FB is given in magnitude, the velocity which a heavy body would acquire when impelled through this line by its own gravity is known; being no other than the velocity it would acquire by falling through a ſpace equal to that line: find then another velocity to which this laſt mentioned velocity bears the given ratio of the ſubduplicate of the area FLPB to the area FHQB; and this velocity thus found is the velocity the ball will acquire when impelled through the ſpace FB by the action of the inflamed powder.

"Now to give an example of this: Let us ſuppoſe AB, the length of the cylinder, to be 45 inches, its diameter DC, or rather the diameter of the ball, to be $\frac{1}{4}$ths of an inch; and AF, the extent of the powder, to be $2\frac{1}{8}$th inches; to determine the velocity which will be communicated to a leaden bullet by the exploſion, ſuppoſing the bullet to be laid at firſt with its ſurface contiguous to the powder.

"By the theory we have laid down, it appears, that at the firſt inſtant of the exploſion the flame will exert, on the bullet lying cloſe to it, a force 1000 times greater than the preſſure of the atmoſphere. The medium preſſure of the atmoſphere is reckoned equal to a column of water 33 feet in height; whence, lead being to water as 11,345 to 1, this preſſure will be equal to that of a column of lead 34,9 inches in height. Multiplying this by 1000, therefore, a column of lead 34,900 inches (upwards of half a mile) in height, would produce a preſſure on the bullet equal to what is exerted by the powder in the firſt inſtant of the exploſion; and the leaden ball being $\frac{1}{4}$ths of an inch in diameter, and conſequently equal to a cylinder of lead of the ſame baſe half an inch in height, the preſſure at firſt acting on it will be equal to 34900×2, or 69800 times its weight: whence FL to FH is as 1 to 69800; and FB to FA as $45 - 2\frac{5}{8}$, or $42\frac{3}{8}$ to $2\frac{5}{8}$, that is, as 339 to 21; whence the rectangle FLPB is to the rectangle AFHS as 339 to 21×69800, that is, as 1 to 4324.—And from the known application of the logarithms to the menſuration of the hyperbolic ſpaces it follows, that the rectangle AFHS is to the area FHQB as 43,429, &c. is to the tabular logarithm of $\frac{AB}{AF}$; that is, of $\frac{1}{4369}$ which is 1,2340579; whence the ratio of the rectangle FLPB to the hyperbolic area FHQB is compounded of the ratios of 1 to 4324— and of ,43429, &c. to 1,2340579; which together make up the ratio of 1 to 12263, the ſubduplicate of which is the ratio of 1 to 110,7; and in this ratio is the velocity which the bullet would acquire by gravity in falling through a ſpace equal to FB, to the velocity the bullet will acquire from the action of the powder impelling it through FB. But the ſpace FB being $42\frac{3}{8}$ inches, the velocity a heavy body will acquire in falling through ſuch a ſpace is known to be what would carry it nearly at the rate of 15.07 feet in a ſecond; Theory. whence the velocity to which this has the ratio of 1 to 110,7 is a velocity which would carry the ball at the rate of 1668 feet in one ſecond. And this is the velocity which, according to the theory, the bullet in the preſent circumſtances would acquire from the action of the powder during the time of its dilatation.

"Now this velocity being once computed for one caſe, is eaſily applied to any other; for if the cavity DEGC left behind the bullet be only in part filled with powder, then the line HF, and conſequently the area FHQB will be diminiſhed in the proportion of the whole cavity to the part filled. If the diameter of the bore be varied, the lengths AB and AF remaining the ſame, then the quantity of powder and the ſurface of the bullet which it acts on, will be varied in the duplicate proportion of the diameter, but the weight of the bullet will vary in the triplicate proportion of the diameter; wherefore the line FH, which is directly as the abſolute impelling force of the powder, and reciprocally as the gravity of the bullet, will change in the reciprocal proportion of the diameter of the bullet. If AF, the height of the cavity left behind the bullet, be increaſed or diminiſhed, the rectangle of the hyperbola, and conſequently the area correſponding to ordinates in any given ratio, will be increaſed or diminiſhed in the ſame proportion. From all which it follows, that the area FHQB, which is in the duplicate proportion of the velocity of the impelled body, will be directly as the logarithm $\frac{AB}{AF}$ (where AB repreſents the length of the barrel, and AF the length of the cavity left behind the bullet); alſo directly as the part of that cavity filled with powder; and inverſely, as the diameter of the bore, or rather of the bullet, likewiſe directly as AF, the height of the cavity left behind the bullet. Conſequently the velocity being computed as above, for a bullet of a determined diameter, placed in a piece of a given length, and impelled by a given quantity of powder, occupying a given cavity behind that bullet; it follows, that by means of theſe ratios, the velocity of any other bullet may be thence deduced; the neceſſary circumſtances of its poſition, quantity of powder, &c. being given. Where note, That in the inſtance of this ſuppoſition, we have ſuppoſed the diameter of the ball to be $\frac{1}{4}$ths of an inch; whence the diameter of the bore will be ſomething more, and the quantity of powder contained in the ſpace DEGC will amount exactly to 12 pennyweights, a ſmall wad of tow included.

"In order to compare the velocities communicated to bullets by the exploſion, with the velocities reſulting from the theory by computation, it is neceſſary that the actual velocities with which bullets move ſhould be diſcovered. The only methods hitherto practiſed for this purpoſe, have been either by obſerving the time of the flight of a ſhot through a given ſpace, or by meaſuring the range of a ſhot at a given elevation; and thence computing, on the parabolic hypotheſis, what degree of velocity would produce this range.—The firſt method labours under this inſurmountable difficulty, that the velocities of theſe bodies are often ſo ſwift, and conſequently the time obſerved is ſo ſhort, that an imperceptible error in that time may occaſion

Theory. occaſion an error in the velocity thus found of 2, 3, 4, 5, or 600 feet, in a ſecond. The other method is ſo fallacious, by reaſon of the reſiſtance of the atmoſphere (to which inequality the firſt is alſo liable), that the velocities thus aſſigned may not perhaps be the tenth part of the actual velocities ſought.

16 Machine diſcovering the velocities of bullets.

"The ſimpleſt method of determining this velocity is by means of the inſtrument repreſented fig. 2. where ABCD repreſents the body of the machine compoſed of the three poles B, C, D, ſpreading at bottom, and joining together at the top A; being the ſame with what is vulgarly uſed in lifting and weighing very heavy bodies, and is called by workmen the *triangles*. On two of theſe poles, towards their tops, are ſcrewed on the ſockets RS; and on theſe ſockets the pendulum EFGHIK is hung by means of its croſs-piece EF, which becomes its axis of ſuſpenſion, and on which it muſt be made to vibrate with great freedom. The body of this pendulum is made of iron, having a broad part at bottom, and its lower part is covered with a thick piece of wood GKIH, which is faſtened to the iron by ſcrews. Something lower than the bottom of the pendulum there is a brace OP, joining the two poles from which the pendulum is ſuſpended; and to this brace there is faſtened a contrivance MNU, made with two edges of ſteel, bearing on each other in the line UN, ſomething in the manner of a drawing-pen; the ſtrength with which theſe edges preſs on each other being diminiſhed or increaſed at pleaſure by means of a ſcrew Z going through the upper piece. There is faſtened to the bottom of the pendulum a narrow ribbon LN, which paſſes between theſe ſteel edges, and which afterwards, by means of an opening cut in the lower piece of ſteel, hangs looſely down, as at W.

17 Method of uſing the machine.

"This inſtrument thus fitted, if the weight of the pendulum be known, and likewiſe the reſpective diſtances of its centre of gravity, and of its centre of oſcillation from its axis of ſuſpenſion, it will thence be known what motion will be communicated to this pendulum by the percuſſion of a body of a known weight moving with a known degree of celerity, and ſtriking it in a given point; that is, if the pendulum be ſuppoſed at reſt before the percuſſion, it will be known what vibration it ought to make in conſequence of ſuch a determined blow; and, on the contrary, if the pendulum, being at reſt, is ſtruck by a body of a known weight, and the vibration which the pendulum makes after the blow is known, the velocity of the ſtriking body may from thence be determined.

"Hence then, if a bullet of a known weight ſtrikes the pendulum, and the vibration, which the pendulum makes in conſequence of the ſtroke, be aſcertained; the velocity with which the ball moved is thence to be known.

"Now the extent of the vibration made by the pendulum after the blow, may be meaſured to great accuracy by the ribbon LN. For let the preſſure of the edges UN on the ribbon be ſo regulated by the ſcrew Z, that the motion of the ribbon between them may be free and eaſy, though with ſome minute reſiſtance; then ſettling the pendulum at reſt, let the part LN between the pendulum and the edges be drawn ſtrait, but not ſtrained, and fix a pin in that part of the ribbon which is then contiguous to the edges: let now a ball impinge on the pendulum; then the pendulum Theory. ſwinging back will draw out the ribbon to the juſt extent of its vibration, which will conſequently be determined by the interval on the ribbon between the edges UN and the place of the pin.

"The weight of the whole pendulum, wood and all was 56 lb. 3 oz. its centre of gravity was 52 inches diſtant from its axis of ſuſpenſion, and 200 of its ſmall ſwings were performed in the time of 253 ſeconds; whence its centre of oſcillation (determined from hence) in $62\frac{3}{5}$d inches diſtant from that axis. The centre of the piece of wood GKIH is diſtant from the ſame axis 66 inches.

"In the compound ratio of 66 to $62\frac{3}{5}$, and 66 to 52, take the quantity of matter of the pendulum to a 4th quantity, which will be 42 lb. $\frac{1}{2}$ oz. Now geometers will know, that if the blow be ſtruck on the centre of the piece of wood GKIH, the pendulum will reſiſt to the ſtroke in the ſame manner as if this laſt quantity of matter only (42 lb. $\frac{1}{2}$ oz.) was concentrated in that point, and the reſt of the pendulum was taken away; whence, ſuppoſing the weight of the bullet impinging in that point to be the $\frac{1}{112}$th of a pound, or the $\frac{1}{5053}$th of this quantity of matter nearly, the velocity of the point of oſcillation after the ſtroke will, by the laws obſerved in the congreſs of ſuch bodies as rebound not from each other, be the $\frac{1}{505}$th of the velocity the bullet moved with before the ſtroke; whence the velocity of this point of oſcillation after the ſtroke being aſcertained, that multiplied by 505 will give the velocity with which the ball impinged.

"But the velocity of the point of oſcillation after the ſtroke is eaſily deduced from the chord of the arch, through which it aſcends by the blow; for it is a well-known propoſition, that all pendulous bodies aſcend to the ſame height by their vibratory motion as they would do, if they were projected directly upwards from their loweſt point, with the ſame velocity they have in that point; wherefore, if the verſed ſine of the aſcending arch be found (which is eaſily determined from the chord and radius being given), this verſed ſine is the perpendicular height to which a body projected upwards with the velocity of the point of oſcillation would ariſe; and conſequently what that velocity is, can be eaſily computed by the common theory of falling bodies.

"For inſtance, the chord of the arch, deſcribed by the aſcent of the pendulum after the ſtroke meaſured on the ribbon, has been ſometimes $17\frac{1}{4}$th inches; the diſtance of the ribbon from the axis of ſuſpenſion is $71\frac{1}{8}$th inches; whence reducing $17\frac{1}{4}$th in the ratio of $71\frac{1}{8}$th to 66, the reſulting number, which is nearly 16 inches, will be the chord of the arch through which the centre of the board GKIH aſcended after the ſtroke; now the verſed ſine of the arch, whoſe chord is 16 inches, and its radius 66, is 1.93939; and the velocity which would carry a body to this height, or, which is the ſame thing, the velocity which a body would acquire by deſcending through this ſpace, is nearly that of $3\frac{1}{4}$th feet in 1".

"To determine then the velocity with which the bullet impinged on the centre of the wood, when the chord of the arch deſcribed by the aſcent of the pendulum, in conſequence of the blow, was $17\frac{1}{4}$th inches meaſured on the ribbon, no more is neceſſary than to

Theory. multiply $3\frac{1}{4}$th by 505, and the resulting number 1641 will be the feet which the bullet would describe in 1″, if it moved with the velocity it had at the moment of its percussion: for the velocity of the point of the pendulum, on which the bullet struck, we have just now determined to be that of $3\frac{1}{4}$th feet in 1″; and we have before shown, that this is the $\frac{1}{505}$th of the velocity of the bullet. If then a bullet weighing $\frac{1}{14}$th of a pound strikes the pendulum in the centre of the wood GKIH, and the ribbon be drawn out $17\frac{1}{4}$th inches by the blow; the velocity of the bullet is that of 1641 feet in 1″. And since the length the ribbon is drawn is always nearly the chord of the arch described by the ascent, (it being placed so as to differ insensibly from those chords which most frequently occur), and these chords are known to be in the proportion of the velocities of the pendulum acquired from the stroke; it follows, that the proportion between the lengths of ribbon drawn out at different times, will be the same with that of the velocities of the impinging bullets; and consequently, by the proportion of these lengths of ribbon to $17\frac{1}{4}$th, the proportion of the velocity with which the bullets impinge, to the known velocity of 1641 feet in 1″, will be determined.

18 Cautions to be observed in making these experiments.

"Hence then is shown in general how the velocities of bullets of all kinds may be found out by means of this instrument; but that those who may be disposed to try these experiments may not have unforeseen difficulties to struggle with, we shall here subjoin a few observations, which it will be necessary for them to attend to, both to secure success to their trials and safety to their persons.

"And first, that they may not conceive the piece of wood GKIH to be an unnecessary part of the machine, we must inform them, that if a bullet impelled by a full charge of powder should strike directly on the iron, the bullet would be beaten into shivers by the stroke, and these shivers would rebound back with such violence, as to bury themselves in any wood they chanced to light on, as I have found by hazardous experience; and besides the danger, the pendulum will not in this instance ascertain the velocity of the bullet, because the velocity with which the parts of it rebound is unknown.

"The weight of the pendulum, and the thickness of the wood, must be in some measure proportioned to the size of the bullets which are used. A pendulum of the weight here described will do very well for all bullets under three or four ounces, if the thickness of the board be increased to seven or eight inches for the heaviest bullets; beech is the toughest and properest wood for this purpose.

"It is hazardous standing on the side of the pendulum, unless the board be so thick, that the greatest part of the bullet's force is lost before it comes at the iron; for if it strikes the iron with violence, the shivers of lead, which cannot return back through the wood, will force themselves out between the wood and iron, and will fly to a considerable distance.

"As there is no effectual way of fastening the wood to the iron but by screws, the heads of which must come through the board; the bullets will sometimes light on those screws, from whence the shivers will disperse themselves on every side.

"When in these experiments so small a quantity of powder is used, as will not give to the bullet a velocity of more than 400 or 500 feet in 1″; the bullet will not stick in the wood, but will rebound from it entire, and (if the wood be of a very hard texture) with a very considerable velocity. Indeed I have never examined any of the bullets which have thus rebounded, but I have found them indented by the bodies they have struck against in their rebound. Theory.

"To avoid then these dangers, to the braving of which in philosophical researches no honour is annexed; it will be convenient to fix whatsoever barrel is used, on a strong heavy carriage, and to fire it with a little slow match. Let the barrel too be very well fortified in all its length; for no barrel (I speak of musket barrels) forged with the usual dimensions will bear many of the experiments without bursting. The barrel I have most relied on, and which I procured to be made on purpose, is nearly as thick at the muzzel as at the breech; that is, it has in each place nearly the diameter of its bore in thickness of metal.

"The powder used in these experiments should be exactly weighed: and that no part of it be scattered in the barrel, the piece must be charged with a laddle in the same manner as is practised with cannon; the wad should be of tow, of the same weight each time, and no more than is just necessary to confine the powder in its proper place: the length of the cavity left behind the ball should be determined each time with exactness; for the increasing or diminishing that space will vary the velocity of the shot, although the bullet and quantity of powder be not changed. The distance of the mouth of the piece from the pendulum ought to be such, that the impulse of the flame may not act on the pendulum; this will be prevented in a common barrel charged with half an ounce of powder, if it be at the distance of 16 or 18 feet: in larger charges the impulse is sensible farther off; I have found it to extend to above 25 feet; however, between 25 and 18 feet is the distance I have usually chosen."

19 Account of Mr Robins's experiments.

With this instrument, or others similar to it, Mr Robins made a great number of experiments on barrels of different lengths, and with different charges of powder. He hath given us the results of 61 of these; and having compared the actual velocities with the computed ones, his theory appears to have come as near the truth as could well be expected. In seven of the experiments there was a perfect coincidence; the charges of powder being six or twelve pennyweights; the barrels 45, 24.312, and 7.06 inches in length. The diameter of the first (marked A) was $\frac{1}{4}$ths of an inch; of the second (B) was the same; and of D, 83 of an inch. In the first of these experiments, another barrel (C) was used, whose length was 12.375 inches, and the diameter of its bore $\frac{3}{4}$th inch.—In 14 more of the experiments, the difference between the length of the chord of the pendulum's arch shown by the theory and the actual experiment was $\frac{1}{10}$th of an inch over or under. This showed an error in the theory varying according to the different lengths of the chord from $\frac{1}{111}$ to $\frac{1}{417}$ of the whole; the charges of powder were the same as in the last.—In 16 other experiments the error was $\frac{2}{10}$ths of an inch, varying from $\frac{1}{83}$ to $\frac{1}{115}$ of the whole; the charges of powder were 6, 8, 9, or 12 pennyweights.—In seven other experiments, the error was $\frac{3}{10}$ths of an inch, varying from $\frac{1}{85}$ to $\frac{1}{243}$ of

Theory. $\frac{1}{25}$ of the whole; the charges of powder ſix or twelve pennyweights. In eight experiments, the difference was $\frac{4}{10}$ths of an inch, indicating an error from $\frac{1}{42}$ to $\frac{1}{23}$ of the whole; the charges being 6, 9, 12, and 24 pennyweights of powder. In three experiments, the error was $\frac{5}{10}$ths, varying from $\frac{1}{68}$th to $\frac{1}{112}$th of the whole; the charges 8 and 12 pennyweights of powder. In two experiments the error was $\frac{6}{10}$ths, in one caſe amounting to ſomething leſs than $\frac{1}{42}$, in the other to $\frac{1}{25}$ of the whole; the charges 12 and 36 pennyweights of powder. By one experiment the error was ſeven, and by another eight, tenths; the firſt amounting to $\frac{1}{10}$th nearly, the latter to almoſt $\frac{1}{9}$th of the whole: the charges of powder 6 or 12 pennyweights. The laſt errors however, Mr Robins aſcribes to the wind. The two remaining experiments varied from theory by 1.3 inches, ſomewhat more than $\frac{1}{9}$th of the whole: the charges of powder were 12 pennyweights in each; and Mr Robins aſcribes the error to the dampneſs of the powder. In another caſe, he aſcribes an error of $\frac{6}{10}$ths to the blaſt of the powder on the pendulum.

20 His concluſions from them.

From theſe experiments Mr Robins deduces the following concluſions. "The variety of theſe experiments, and the accuracy with which they correſpond to the theory, leave us no room to doubt of its certainty. This theory, as here eſtabliſhed, ſuppoſes, that, in the firing of gunpowder, about $\frac{3}{10}$ths of its ſubſtance is converted by the ſudden inflammation into a permanently elaſtic fluid, whoſe elaſticity, in proportion to its heat and denſity, is the ſame with that of common air in the like circumſtances; it farther ſuppoſes, that all the force exerted by gunpowder in its moſt violent operations, is no more than the action of the elaſticity of the fluid thus generated; and theſe principles enable us to determine the velocities of bullets impelled from fire-arms of all kinds; and are fully ſufficient for all purpoſes where the force of gunpowder is to be eſtimated.

"From this theory many deductions may be made of the greateſt conſequence to the practical part of gunnery. From hence the thickneſs of a piece, which will enable it to confine, without burſting, any given charge of powder, is eaſily determined, ſince the effort of the powder is known. From hence appears the inconcluſiveneſs of what ſome modern authors have advanced, relating to the advantages of particular forms of chambers for mortars and cannon; for all their laboured ſpeculations on this head are evidently founded on very erroneous opinions about the action of fired powder. From this theory too we are taught the neceſſity of leaving the ſame ſpace behind the bullet, when we would, by the ſame quantity of powder, communicate to it an equal degree of velocity; ſince, on the principles already laid down, it follows, that the ſame powder has a greater or leſs degree of elaſticity, according to the different ſpaces it occupies. The method which I have always practiſed for this purpoſe has been by marking the rammer; and this is a maxim which ought not to be diſpenſed with when cannon are fired at an elevation, particularly in thoſe called by the French *batteries à ricochet*.

"From the continued action of the powder, and its manner of expanding deſcribed in this theory, and the length and weight of the piece, one of the moſt eſſential circumſtances in the well directing of artillery may be eaſily aſcertained. All practitioners are agreed, that no ſhot can be depended on, unleſs the piece be placed on a ſolid platform: for if the platform ſhakes with the firſt impulſe of the powder, it is impoſſible but the piece muſt alſo ſhake: which will alter its direction, and render the ſhot uncertain. To prevent this accident, the platform is uſually made extremely firm to a conſiderable depth backwards; ſo that the piece is not only well ſupported in the beginning of its motion, but likewiſe through a great part of its recoil. However, it is ſufficiently obvious, that when the bullet is ſeparated from the piece, it can be no longer affected by the trembling of the piece or platform; and, by a very eaſy computation, it will be found, that the bullet will be out of the piece before the latter hath recoiled half an inch: whence, if the platform be ſufficiently ſolid at the beginning of the recoil, the remaining part of it may be much ſlighter; and hence a more compendious method of conſtructing platforms may be found out.

Theory.

"From this theory alſo it appears how greatly theſe authors have been miſtaken, who have attributed the force of gunpowder, or at leaſt a conſiderable part of it, to the action of the air contained either in the powder or between the intervals of the grains: for they have ſuppoſed that air to exiſt in its natural elaſtic ſtate, and to receive all its addition of force from the heat of the exploſion. But from what hath been already delivered concerning the increaſe of the air's elaſticity by heat, we may conclude that the heat of the exploſion cannot augment this elaſticity to five times its common quantity; conſequently the force ariſing from this cauſe only cannot amount to more than the 200th part of the real force exerted on the occaſion.

"If the whole ſubſtance of the powder was converted into an elaſtic fluid at the inſtant of the exploſion, then from the known elaſticity of this fluid aſſigned by our theory, and its known denſity, we could eaſily determine the velocity with which it would begin to expand, and could thence trace out its future augmentations in its progreſs through the barrel: but as we have ſhown that the elaſtic fluid, in which the activity of the gunpowder conſiſts, is only $\frac{3}{10}$ths of the ſubſtance of the powder, the remaining $\frac{7}{10}$ths will, in the exploſion, be mixed with the elaſtic part, and will by its weight retard the activity of the exploſion: and yet they will not be ſo completely united as to move with one common motion; but the unelaſtic part will be leſs accelerated than the reſt, and ſome will not even be carried out of the barrel, as appears by the conſiderable quantity of unctuous matter which adheres to the inſide of all fire-arms after they have been uſed. Theſe inequalities in the expanſive motion of the flame oblige us to recur to experiments for its accurate determination.

21 Experiments for determining the velocity of fired gunpowder.

"The experiments made uſe of for this purpoſe were of two kinds. The firſt was made by charging the barrel A with 12 pennyweights of powder, and a ſmall wad of tow only; and then placing its mouth 19 inches from the centre of the pendulum. On firing it in this ſituation, the impulſe of the flame made it aſcend through an arch whoſe chord was 13.7 inches; whence, if the whole ſubſtance of the powder was

ſuppoſed

Theory. ſuppoſed to ſtrike againſt the pendulum, and each part to ſtrike with the ſame velocity, that common velocity muſt have been at the rate of about 2650 feet in a ſecond.—But as ſome part of the velocity of the flame was loſt in paſſing through 19 inches of air; I made the remaining experiments in a manner not liable to this inconvenience.

" I fixed the barrel A on the pendulum, ſo that its axis might be both horizontal and alſo perpendicular to the plane HK; or, which is the ſame thing, that it might be in the plane of the pendulum's vibration: the height of the axis of the piece above the centre of the pendulum was ſix inches; and the weight of the piece, and of the iron that faſtened it, &c. was 12½lb. The barrel in this ſituation being charged with 12 pennyweights of powder, without either ball or wad, only put together with the rammer; on the diſcharge the pendulum aſcended through an arch whoſe chord was 10 inches, or reduced to an equivalent blow in the centre of the pendulum, ſuppoſing the barrel away, it would be 14.4 inches nearly.—The ſame experiment being repeated, the chord of the aſcending arch was 10.1 inches, which, reduced to the centre, is 14.6 inches.

" To determine what difference of velocity there was in the different parts of the vapour, I loaded the piece again with 12 pennyweights of powder, and rammed it down with a wad of tow, weighing one pennyweight. Now, I conceived that this wad being very light, would preſently acquire that velocity with which the elaſtic part of the fluid would expand itſelf when uncompreſſed; and I accordingly found, that the chord of the aſcending arch was by this means increaſed to 12 inches, or at the centre to 17.3: whence, as the medium of the other two experiments is 14.5, the pendulum aſcended through an arch 2.8 inches longer, by the additional motion of one pennyweight of matter, moving with the velocity of the ſwifteſt part of the vapour; and conſequently the velocity with which this pennyweight of matter moved, was that of about 7000 feet in a ſecond.

" It will perhaps be objected to this determination, that the augmentation of the arch through which the pendulum vibrated in this caſe was not all of it owing to the quantity of motion given to the wad, but part of it was produced by the confinement of the powder, and the greater quantity thereby fired. But if it were true that a part only of the powder fired when there was no wad, it would not happen that in firing different quantities of powder without a wad, the chord would increaſe and decreaſe nearly in the ratio of theſe quantities; which yet I have found it to do: for with nine pennyweights that chord was 7.3 inches, which with 12 pennyweights we have ſeen was only 10, and 10.1 inches; and even with three pennyweights the chord was two inches; deficient from this proportion by .5 only; for which defect two other valid reaſons are to be aſſigned.

" And there is ſtill a more convincing proof that all the powder is fired, although no wad be placed before the charge, which is, that the part of the recoil ariſing from the expanſion of powder alone is found to be no greater when it impels a leaden bullet before it, than when the ſame quantity is fired without any wad to confine it. We have ſeen that the chord of the arch through which the pendulum roſe from the expanſive force of the powder alone is 10, or 10.1; and the chord of that arch, when the piece was charged in the cuſtomary manner with a bullet and wad, I found to be the firſt time 22¼, and the ſecond 22⅞, or at a medium 22.56. Now the impulſe of the ball and wad, if they were ſuppoſed to ſtrike the pendulum in the ſame place in which the barrel was ſuſpended, with the velocity they had acquired at the mouth of the piece, would drive it through an arch whoſe chord would be about 12.3; as is known from the weight of the pendulum, the weight and poſition of the barrel, and the velocity of the bullet determined by our former experiments; whence, ſubtracting this number 12.3 from 22.56, the remainder 10.26 is nearly the chord of the arch which the pendulum would have aſcended through from the expanſion of the powder alone with a bullet laid before it. And this number, 10.26, differs but little from 10.1, which we have above found to be the chord of the aſcending arch, when the ſame quantity of powder expanded itſelf freely without either bullet or wad before it. Theory.

" Again, that this velocity of 7000 feet in a ſecond is not much beyond what the moſt active part of the flame acquires in expanding, is evinced from hence, that in ſome experiments a ball has been found to be diſcharged with a velocity of 2400 feet in a ſecond; and yet it appeared not that the action of the powder was at all diminiſhed on account of this immenſe celerity: conſequently the degree of ſwiftneſs with which, in this inſtance, the powder followed the ball without loſing any part of its preſſure, muſt have been much ſhort of what the powder alone would have expanded with, had not the ball been there.

" From theſe determinations may be deduced the force of petards; ſince their action depends entirely on the impulſe of the flame; and it appears that a quantity of powder properly diſpoſed in ſuch a machine, may produce as violent an effort as a bullet of twice its weight, moving with a velocity of 1400 or 1500 feet in a ſecond.

" In many of the experiments already recited, the ball was not laid immediately contiguous to the powder, but at a ſmall diſtance, amounting, at the utmoſt, only to an inch and a half. In theſe caſes the theory agreed very well with the experiments. But if a bullet is placed at a greater diſtance from the powder, ſuppoſe at 12, 18, or 24 inches, we cannot then apply to this ball the ſame principles which may be applied to thoſe laid in contact, or nearly ſo, with the powder; for when the ſurface of the fired powder is not confined by a heavy body, the flame dilates itſelf with a velocity far exceeding that which it can communicate to a bullet by its continued preſſure: conſequently, as at the diſtance of 12, 18, or 24 inches, the powder will have acquired a conſiderable degree of this velocity of expanſion, the firſt motion of the ball will not be produced by the continued preſſure of the powder, but by the actual percuſſion of the flame; and it will therefore begin to move with a quantity of motion proportioned to the quantity of this flame, and the velocities of its reſpective parts. 22 A bullet flies off with the greateſt velocity when laid at a diſtance from the powder.

" From hence then it follows, that the velocity of the bullet, laid at a conſiderable diſtance before the charge,

Theory. charge, ought to be greater than what would be communicated to it by the preſſure of the powder acting in the manner already mentioned: and this deduction from our theory we have confirmed by manifold experience; by which we have found, that a ball laid in the barrel A, with its hinder part $11\frac{1}{4}$ inches from its breech, and impelled by 12 pennyweights of powder, has acquired a velocity of about 1400 feet in a ſecond; when, if it had been acted on by the preſſure of the flame only, it would not have acquired a velocity of 1200 feet in a ſecond. The ſame we have found to hold true in all other greater diſtances (and alſo in leſſer, though not in the ſame degree), and in all quantities of powder: and we have likewiſe found, that theſe effects nearly correſpond with what has been already laid down about the velocity of expanſion and the elaſtic and unelaſtic parts of the flame.

"From hence too ariſes another conſideration of great conſequence in the practice of gunnery; which is, that no bullet ſhould at any time be placed at a conſiderable diſtance before the charge, unleſs the piece is extremely well fortified: for a moderate charge of powder, when it has expanded itſelf through the vacant ſpace, and reaches the ball, will, by the velocity each part has acquired, accumulate itſelf behind the ball, and thereby be condenſed prodigiouſly; whence, if the barrel be not extremely firm in that part, it muſt, by means of this reinforced elaſticity, infallibly burſt. The truth of this reaſoning I have experienced in an exceeding good Tower-muſket, forged of very tough iron; for charging it with 12 pennyweights of powder, and placing the ball 16 inches from the breech, on firing it, the part of the barrel juſt behind the bullet was ſwelled out to double its diameter like a blown bladder, and two large pieces of two inches long were burſt out of it.

"Having ſeen that the entire motion of a bullet laid at a conſiderable diſtance from the charge, is acquired by two different methods in which the powder acts on it; the firſt being the percuſſion of the parts of the flame with the velocity they had reſpectively acquired by expanding, the ſecond the continued preſſure of the flame through the remaining part of the barrel; I endeavoured to ſeparate theſe different actions, and to retain that only which aroſe from the continued preſſure of the flame. For this purpoſe I no longer placed the powder at the breech, from whence it would have full ſcope for its expanſion; but I ſcattered it as uniformly as I could through the whole cavity left behind the bullet; imagining that by this means the progreſſive velocity of the flame in each part would be prevented by the expanſion of the neighbouring parts; and I found, that the ball being laid $11\frac{1}{4}$ inches from the breech, its velocity, inſtead of 1400 feet in a ſecond, which it acquired in the laſt experiments, was now no more than 1100 feet in the ſecond, which is 100 feet ſhort of what according to the theory ſhould ariſe from the continued preſſure of the powder only.

"The reaſon of this deficiency was, doubtleſs, the inteſtine motion of the flame: for the aſcenſion of the powder thus diſtributed through ſo much larger a ſpace than it could fill, muſt have produced many reverberations and pulſations of the flame; and from theſe internal agitations of the fluid, its preſſure on the containing ſurface will (as is the caſe of all other fluids) be conſiderably diminiſhed; and in order to avoid this irregularity, in all other experiments I took care to Theory. have the powder cloſely confined in as ſmall a ſpace as poſſible, even when the bullet lay at ſome little diſtance from it.

23 Of the reſiſtance of the air to the motion of bullets.

"With regard to the reſiſtance of the air, which ſo remarkably affects all military projectiles, it is neceſſary to premiſe, that the greateſt part of authors have eſtabliſhed it as a certain rule, that while the ſame body moves in the ſame medium, it is always reſiſted in the duplicate proportion of its velocity; that is, if the reſiſted body move in one part of its track with three times the velocity with which it moved in ſome other part, then its reſiſtance to the greater velocity will be nine times the reſiſtance to the leſſer. If the velocity in one place be four times greater than in another, the reſiſtance of the fluid will be 16 times greater in the firſt than in the ſecond, &c. This rule, however, though pretty near the truth when the velocities are confined within certain limits, is exceſſively erroneous when applied to military projectiles, where ſuch reſiſtances often occur as could ſcarcely be effected, on the commonly received principles, even by a treble augmentation of its denſity.

"By means of the machine already deſcribed, I have it in my power to determine the velocity with which a ball moves in any part of its track, provided I can direct the piece in ſuch a manner as to cauſe the bullet to impinge on the pendulum placed in that part: and therefore, charging a muſket barrel three times ſucceſſively with a leaden ball three-fourths of an inch in diameter, and about half its weight of powder; and taking ſuch precaution in weighing of the powder and placing it, that I was aſſured, by many previous trials, that the velocity of the ball could not differ by 20 feet in a ſecond from its medium quantity; I fired it againſt the pendulum placed at 25, 75, and 125 feet diſtance from the mouth of the piece reſpectively; and I found that it impinged againſt the pendulum, in the firſt caſe, with a velocity of 1670 feet in a ſecond; in the ſecond caſe, with a velocity of 1550 feet in a ſecond; and in the third caſe, with a velocity of 1425 feet in a ſecond; ſo that, in paſſing through 50 feet of air, the bullet loſt a velocity of 120 or 125 feet in a ſecond; and the time of its paſſing through that ſpace being about $\frac{1}{12}$ or $\frac{1}{10}$ of a ſecond, the medium quantity of reſiſtance muſt, in theſe inſtances, have been about 120 times the weight of the ball; which (as the ball was nearly $\frac{1}{12}$ of a pound) amounts to about 10lb. avoirdupois.

"Now, if a computation be made according to the method laid down for compreſſed fluids in the 38th propoſition of Newton's *Principia*, ſuppoſing the weight of water to that of air as 850 to 1, it will be found, that the reſiſtance to a globe of three-fourths of an inch diameter, moving with a velocity of about 1600 feet in a ſecond, will not, on theſe principles, amount to any more than $4\frac{1}{8}$lb. avoirdupois; whence, as we know that the rules contained in that propoſition are very accurate with regard to ſlow motions, we may hence conclude, that the reſiſtance of the air in ſlow motions is leſs than that in ſwift motions, in the ratio of $4\frac{1}{8}$ to 10; a proportion between that of 1 to 2, and 1 to 3.

"Again, I charged the ſame piece a number of times with equal quantities of powder, and balls of the ſame weight, taking all poſſible care to give to every

Theory. every ſhot an equal velocity; and, firing three times againſt the pendulum placed only 25 feet from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in a ſecond: then removing the piece 175 feet from the pendulum, I found, taking the medium of five ſhots, that the velocity with which the ball impinged at this diſtance was 1300 feet in a ſecond; whence the ball, in paſſing through 150 feet of air, loſt a velocity of about 390 feet in a ſecond; and the reſiſtance computed from theſe numbers comes out ſomething more than in the preceding inſtance, it amounting here to between 11 and 12 pounds avoirdupois; whence, according to theſe experiments, the reſiſting power of the air to ſwift motions is greater than to ſlow ones, in a ratio which approaches nearer to that of 3 to 1 than in the preceding experiments.

"Having thus examined the reſiſtance to a velocity of 1700 feet in a ſecond, I next examined the reſiſtance to ſmaller velocities: and for this purpoſe, I charged the ſame barrel with balls of the ſame diameter, but with leſs powder, and placing the pendulum at 25 feet diſtance from the piece, I fired againſt it five times with an equal charge each time: the medium velocity with which the ball impinged, was that of 1180 feet in a ſecond; then, removing the pendulum to the diſtance of 250 feet, the medium velocity of five ſhots, made at this diſtance, was that of 950 feet in a ſecond: whence the ball, in paſſing through 225 feet of air, loſt a velocity of 230 feet in a ſecond: and as it paſſed through that interval in about $\frac{1}{14}$ of a ſecond, the reſiſtance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2lb. 10 oz. avoirdupois. Now, the reſiſtance to the ſame velocity, according to the laws obſerved in ſlower motions, amounts to $\frac{7}{11}$ of the ſame quantity; whence, in a velocity of 1065 feet in a ſecond, the reſiſting power of the air is augmented in no greater a proportion than that of 7 to 11; whereas we have ſeen in the former experiments, that to ſtill greater degrees of velocity the augmentation approached very near the ratio of one to three.

"But farther, I fired three ſhot, of the ſame ſize and weight with thoſe already mentioned, over a large piece of water; ſo that their dropping into the water being very diſcernible, both the diſtance and time of their flight might be accurately aſcertained. Each ſhot was diſcharged with a velocity of 400 feet in a ſecond; and I had ſatisfied myſelf by many previous trials of the ſame charge with the pendulum, that I could rely on this velocity to ten feet in a ſecond. The firſt ſhot flew 313 yards in four ſeconds and a quarter, the ſecond flew 319 yards in four ſeconds, and the third 373 yards in five ſeconds and a half. According to the theory of reſiſtance eſtabliſhed for ſlow motions, the firſt ſhot ought to have ſpent no more than 3.2 ſeconds in its flight, the ſecond 3.28, and the third 4 ſeconds; whence it is evident, that every ſhot was retarded conſiderably more than it ought to have been had that theory taken place in its motion; conſequently the reſiſtance of the air is very ſenſibly increaſed, even in ſuch a ſmall velocity as that of 400 feet in a ſecond.

Plate CCXLVIII. fig. 3. "As no large ſhot are ever projected in practice with velocities exceeding that of 1700 feet in a ſecond, it will be ſufficient for the purpoſes of a practical gunner to determine the reſiſtance to all leſſer velocities; which may be thus exhibited. Let AB be taken to AC, in the ratio of 1700 feet in a ſecond to the given velocity to which the reſiſting power of the air is required. Continue the line AB to D, ſo that BD may be to AD, as the reſiſting power of the air to ſlow motions is to its reſiſting power to a velocity of 1700 feet in a ſecond; then ſhall CD be to AD as the reſiſting power of the air to ſlow motions is to its reſiſting power to the given velocity repreſented by AC. Theory.

"From the computations and experiments already mentioned, it plainly appears, that a leaden ball of three-fourths of an inch diameter, and weighing nearly $1\frac{1}{3}$ oz. avoirdupois, if it be fired from a barrel of 45 inches in length, with half its weight of powder, will iſſue from that piece with a velocity which, if it were uniformly continued, would carry it near 1700 feet in a ſecond.—If, inſtead of a leaden ball, an iron one, of an equal diameter, was placed in the ſame ſituation in the ſame piece, and was impelled by an equal quantity of powder, the velocity of ſuch an iron bullet would be greater than that of the leaden one in the ſubduplicate ratio of the ſpecificate gravities of lead and iron; and ſuppoſing that ratio to be as three to two, and computing on the principles already laid down, it will appear, that an iron bullet of 24 lb. weight, ſhot from a piece of 10 feet in length, with 16lb. of powder, will acquire from the exploſion a velocity which, if uniformly continued, would carry it nearly 1650 feet in a ſecond.

"This is the velocity which, according to our theory, a cannon-ball of 24lb. weight is diſcharged with when it is impelled by a full charge of powder; but if, inſtead of a quantity of powder weighing two-thirds of the ball, we ſuppoſe the charge to be only half the weight of it, then its velocity will on the ſame principles be no more than 1490 feet in a ſecond. The ſame would be the velocities of every leſſer bullet fired with the ſame proportions of powder, if the lengths of all pieces were conſtantly in the ſame ratio with the diameters of their bore; and although, according to the uſual dimenſions of the ſmaller pieces of artillery, this proportion does not always hold, yet the difference is not great enough to occaſion a very great variation from the velocities here aſſigned; as will be obvious to any one who ſhall make a computation thereon. But in theſe determinations we ſuppoſe the windage to be no more than is juſt ſufficient for putting down the bullet eaſily; whereas in real ſervice, either through negligence or unſkilfulneſs, it often happens, that the diameter of the bore ſo much exceeds the diameter of the bullet, that great part of the inflamed fluid eſcapes by its ſide; whence the velocity of the ſhot in this caſe may be conſiderably leſs than what we have aſſigned. However, this perhaps may be compenſated by the greater heat which in all probability attends the firing of theſe large quantities of powder.

24 Solution of the difficulty concerning point-blank ſhot. "From this great velocity of cannon ſhot we may clear up the difficulty concerning the point-blank ſhot which occaſioned the invention of Anderſon's ſtrange hypotheſis *. Here our author was deceived by his not knowing how greatly the primitive velocity of the heavieſt ſhot is diminiſhed in the courſe of its flight by the

* See N° 5.

Theory. the resistance of the air. And the received opinion of practical gunners is not more difficult to account for; since, when they agree that every shot flies in a straight line to a certain distance from the piece, which imaginary distance they have called the *extent of the point-blank shot*, we need only suppose, that, within that distance which they thus determine, the deviation of the path of the shot from a straight line is not very perceptible in their method of pointing. Now, as a shot of 24lb. fired with two-thirds of its weight of powder, will, at the distance of 500 yards from the piece, be separated from the line of its original direction by an angle of little more than half a degree; those who are acquainted with the inaccurate methods often used in the directing of cannon will easily allow, that so small an aberration may not be attended to by the generality of practitioners, and the path of the shot may consequently be deemed a straight line; especially as other causes of error will often intervene much greater than what arises from the incurvation of this line by gravity.

25 By increasing the quantity of powder, the velocity of the shot will not continually increase.

"We have now determined the velocity of the shot both when fired with two-thirds of its weight and with half its weight of powder respectively; and on this occasion I must remark, that on the principles of our theory, the increasing the charge of powder will increase the velocity of the shot till the powder arrives at a certain quantity; after which, if the powder be increased, the velocity of the shot will diminish. The quantity producing the greatest velocity, and the proportion between that greatest velocity and the velocity communicated by greater and lesser charges, may be thus assigned. Let AB represent the axis of the piece; draw AC perpendicular to it, and to the asymptotes AC and AB draw any hyperbola LF, and draw BF parallel to AC; find out now the point D, where the rectangle ADEG is equal to the hyperbolic area DEFB; then will AD represent that height of the charge which communicates the greatest velocity to the shot: whence AD being to AB as 1 to 2.71828, as appears from the table of logarithms, from the length of the line AD thus determined, and the diameter of the bore, the quantity of powder contained in this charge is easily known. If, instead of this charge, any other filling the cylinder to the height AI, be used, draw IH parallel to AC, and through the point H to the same asymptotes AC and AB describe the hyperbola HK; then the greatest velocity will be to the velocity communicated by the charge AI, in the subduplicate proportion of the rectangle ADEG to the same rectangle diminished by the trilinear space KHE.

Fig. 3.

26 Exceeding great resistance of the air.

"It hath been already shown, that the resistance of the air on the surface of a bullet of three-fourths of an inch diameter, moving with a velocity of 1670 feet in a second, amounted to about 10lb. It hath also been shown, that an iron bullet weighing 24lb. if fired with 16lb. of powder (which is usually esteemed its proper battering charge), acquires a velocity of about 1650 feet in a second, scarcely differing from the other: whence, as the surface of this last bullet is more than 54 times greater than the surface of a bullet of three-fourths of an inch diameter, and their velocities are nearly the same, it follows, that the resistance on the larger bullet will amount to more than 5401b. which is near 23 times its own weight.

"The two last propositions are principally aimed against those theorists who have generally agreed in supposing the flight of shot and shells to be nearly in the curve of a parabola. The reason given by those authors for their opinion is the supposed inconsiderable resistance of the air; since as it is agreed on all sides that the track of projectiles would be a perfect parabola if there was no resistance, it has from thence been too rashly concluded, that the interruption which the ponderous bodies of shells and bullets would receive from such a rare medium as air would be scarcely sensible, and consequently that their parabolic flight would be hereby scarcely affected. Theory.

"Now the prodigious resistance of the air to a bullet of 24lb. weight, such as we have here established it, sufficiently confutes this reasoning; for how erroneous must that hypothesis be, which neglects as inconsiderable a force amounting to more than 20 times the weight of the moving body?" But here it is necessary to assume a few particulars, the demonstrations of which, on the commonly received principles, may be seen under the article PROJECTILES.

27 Common maxims concerning the motion of projectiles.

"1. If the resistance of the air be so small that the motion of a projected body is in the curve of a parabola, then the axis of that parabola will be perpendicular to the horizon, and consequently the part of the curve in which the body ascends will be equal and similar to that in which it descends.

"2. If the parabola in which the body moves be terminated on a horizontal plane, then the vertex of the parabola will be equally distant from its own extremities.

"3. Also the moving body will fall on that horizontal plane in the same angle, and with the same velocity with which it was first projected.

"4. If a body be projected in different angles but with the same velocity, then its greatest horizontal range will be when it is projected in an angle of 45° with the horizon.

"5. If the velocity with which the body is projected be known, then this greatest horizontal range may be thus found. Compute, according to the common theory of gravity, what space the projected body ought to fall through to acquire the velocity with which it is projected: then twice that space will be the greatest horizontal range, or the horizontal range when the body is projected in an angle of 45° with the horizon.

"6. The horizontal ranges of a body, when projected with the same velocity at different angles, will be between themselves as the sines of twice the angle in which the line of projection is inclined to the horizon.

"7. If a body is projected in the same angle with the horizon, but with different velocities, the horizontal ranges will be in the duplicate proportion of those velocities.

28 Prodigious errors of the common theory.

"These postulates, which contain the principles of the modern art of gunnery, are all of them false; for it hath been already shown, that a musket ball of three-fourths of an inch in diameter, fired with half its weight of powder, from a piece 45 inches long, moves with a velocity of near 1700 feet in a second. Now, if this ball flew in the curve of a parabola, its horizontal range at 45° would be found by the fifth postulate to be

Theory. be about 17 miles. But all the practical writers aſſure us, that this range is really ſhort of half a mile. Diego Ufano aſſigns to an arquebuſs, four feet in length, and carrying a leaden ball of 1½oz. weight (which is very near our dimenſions), a horizontal range of 797 common paces, when it is elevated between 40 and 50 degrees, and charged with a quantity of fine powder equal in weight to the ball. Merſennus alſo tells us, that he found the horizontal range of an arquebuſs at 45° to be leſs than 400 fathoms, or 800 yards; whence, as either of theſe ranges are ſhort of half an Engliſh mile, it follows, that a muſket ſhot, when fired with a reaſonable charge of powder at the elevation of 45°, flies not one-thirty-fourth part of the diſtance it ought to do if it moved in a parabola. Nor is this great contraction of the horizontal range to be wondered at, when it is conſidered that the reſiſtance of this bullet when it firſt iſſues from the piece amounts to 120 times its gravity, as hath been experimentally demonſtrated, N° 23.

"To prevent objections, our next inſtance ſhall be in an iron bullet of 24lb. weight, which is the heavieſt in common uſe for land-ſervice. Such a bullet fired from a piece of the common dimenſions with its greateſt allotment of powder hath a velocity of 1650 feet in a ſecond, as already ſhown. Now, if the horizontal range of this ſhot at 45° be computed on the parabolic hypotheſis by the fifth poſtulate, it will come out to be about 16 miles, which is between five and ſix times its real quantity; for the practical writers all agree in making it leſs than three miles.

"But farther, it is not only when projectiles move with theſe very great velocities that their flight ſenſibly varies from the curve of a parabola; the ſame aberration often takes place in ſuch as move ſlow enough to have their motion traced out by the eye; for there are few projectiles that can be thus examined, which do not viſibly diſagree with the firſt, ſecond, and third poſtulates; obviouſly deſcending through a curve, which is ſhorter and leſs inclined to the horizon than that in which they aſcended. Alſo the higheſt point of their flight, or the vertex of the curve, is much nearer the place where they fall to the ground than to that from whence they were at firſt diſcharged.

"I have found too by experience, that the fifth, ſixth, and ſeventh poſtulates are exceſſively erroneous when applied to the motions of bullets moving with ſmall velocities. A leaden bullet three-fourths of an inch in diameter, diſcharged with a velocity of about 400 feet in a ſecond, and in an angle of 19° 5′ with the horizon, ranged on the horizontal plane no more than 448 yards: whereas its greateſt horizontal range being found by the fifth poſtulate to be at leaſt 1700 yards, the range at 19° 5′ ought by the ſixth poſtulate to have been 1050 yards; whence, in this experiment, the range was not three-ſevenths of what it muſt have been, had the commonly received theory been true."

29 Rotatory motion of bullets a great ſource of deflection.

From this and other experiments it is clearly proved, that the track deſcribed by the flight even of the heavieſt ſhot, is neither a parabola, nor approaching to a parabola, except when they are projected with very ſmall velocities. The nature of the curve really deſcribed by them is explained under the article PROJECTILES. But as a ſpecimen of the great complication of that ſubject, we ſhall here inſert an account of a very extraordinary circumſtance which frequently takes place therein. Theory.

"As gravity acts perpendicularly to the horizon, it is evident, that if no other power but gravity deflected a projected body from its courſe, its motion would be conſtantly performed in a plane perpendicular to the horizon, paſſing through the line of its original direction; but we have found, that the body in its motion often deviates from this plane, ſometimes to the right hand and at other times to the left: and this in an incurvated line, which is convex towards that plane, ſo that the motion of a bullet is frequently in a line having a double curvature, it being bent towards the horizon by the force of gravity, and again bent out of its original direction to the right or left by ſome other force: in this caſe no part of the motion of the bullet is performed in the ſame plane, but its track will lie in the ſurface of a kind of cylinder, whoſe axis is perpendicular to the horizon.

"This propoſition may be indiſputably proved by the experience of every one in the leaſt converſant with the practice of gunnery. The ſame piece which will carry its bullet within an inch of the intended mark at 10 yards diſtance, cannot be relied on to 10 inches in 100 yards, much leſs to 30 inches in 300 yards. Now this inequality can only ariſe from the track of the bullet being incurvated ſidewiſe as well as downwards: for by this means the diſtance between that incurvated line and the line of direction will increaſe in a much greater ratio than that of the diſtance; theſe lines being coincident at the mouth of the piece, and afterwards ſeparating in the manner of a curve and its tangent, if the mouth of the piece be conſidered as the point of contact. To put this matter out of all doubt, however, I took a barrel carrying a ball three-fourths of an inch diameter, and fixing it on a heavy carriage, I ſatisfied myſelf of the ſteadineſs and truth of its direction, by firing at a board 1½ feet ſquare, which was placed at 180 feet diſtance; for I found that in 16 ſucceſſive ſhots I miſſed the mark but once. Now, the ſame barrel being fixed on the ſame carriage, and fired with a ſmaller quantity of powder, ſo that the ſhock on the diſcharge would be much leſs, and conſequently the direction leſs changed, I found, that at 760 yards diſtance the ball flew ſometimes 100 yards to the right of the line it was pointed on, and ſometimes as much to the left. I found, too, that its direction in the perpendicular line was not leſs uncertain, it falling one time above 200 yards ſhort of what it did at another; although, by the niceſt examination of the piece after the diſcharge, it did not appear to have ſtarted in the leaſt from the poſition it was placed in.

"The reality of this doubly curvated track being thus demonſtrated, it may perhaps be aſked, What can be the cauſe of a motion ſo different from what has been hitherto ſuppoſed? And to this I anſwer, That the deflection in queſtion muſt be owing to ſome power acting obliquely to the progreſſive motion of the body; which power can be no other than the reſiſtance of the air. If it be farther aſked, how the reſiſtance of the air can ever come to be oblique to the progreſſive motion of the body? I farther reply, that it may ſometimes ariſe from inequalities in the reſiſted ſurface; but that its general cauſe is doubtleſs a whirling motion

Theory. tion acquired by the bullet about its axis: for by this motion of rotation, combined with the progreſſive motion, each part of the bullet's ſurface will ſtrike the air very differently from what it would do if there was no ſuch whirl; and the obliquity of the action of the air ariſing from this cauſe will be greater, as the motion of the bullet is greater in proportion to its progreſſive one.

"This whirling motion undoubtedly ariſes from the friction of the bullet againſt the ſides of the piece; and as the rotatory motion will in ſome part of its revolution conſpire with the progreſſive one, and in another part be equally oppoſed to it, the reſiſtance of the air on the fore part of the bullet will be hereby affected, and will be increaſed in that part where the whirling motion conſpires with the progreſſive one, and diminiſhed where it is oppoſed to it; and by this means the whole effort of the reſiſtance, inſtead of being oppoſite to the direction of the body, will become oblique thereto, and will produce thoſe effects already mentioned. If it was poſſible to predict the poſition of the axis round which the bullet ſhould whirl, and if that axis was unchangeable during the whole flight of the bullet, then the aberration of the bullet by this oblique force would be in a given direction; and the incurvation produced thereby would regularly extend the ſame way from one end of its track to the other. For inſtance, if the axis of the whirl was perpendicular to the horizon, then the incurvation would be to the right or left. If that axis was horizontal, and perpendicular to the direction of the bullet, then the incurvation would be upwards or downwards. But as the firſt poſition of this axis is uncertain, and as it may perpetually ſhift in the courſe of the bullet's flight; the deviation of the bullet is not neceſſarily either in one certain direction, or tending to the ſame ſide in one part of its track more than it does in another, but more uſually is continually changing the tendency of its deflection, as the axis round which it whirls muſt frequently ſhift its poſition to the progreſſive motion by many inevitable accidents.

"That a bullet generally acquires ſuch a rotatory motion, as here deſcribed, is, I think, demonſtrable: however, to leave no room for doubt or diſpute, I confirmed it, as well as ſome other parts of my theory, by the following experiments.

30 Machine for meaſuring the air's reſiſtance.

"I cauſed the machine to be made repreſented fig. 4. BCDE is a braſs barrel, moveable on its axis, and ſo adjuſted by means of friction-wheels, not repreſented in the figure, as to have no friction worth attending to. The frame in which this barrel is fixed is ſo placed that its axis may be perpendicular to the horizon. The axis itſelf is continued above the upper plate of the frame, and has faſtened on it a light hollow cone, AFG. From the lower part of this cone there is extended a long arm of wood, GH, which is very thin, and cut feather-edged. At its extremity there is a contrivance for fixing on the body, whoſe reſiſtance is to be inveſtigated (as here the globe P); and to prevent the arm GH from ſwaying out of its horizontal poſition by the weight of the annexed body P, there is a brace, AH, of fine wire, faſtened to the top of the cone which ſupports the end of the arm.

"Round the barrel BCDE, there is wound a fine ſilk line, the turns of which appear in the figure; and after this line hath taken a ſufficient number of turns, it is conducted nearly in a horizontal direction to the pully L, over which it is paſſed, and then a proper weight M is hung to its extremity. If this weight be left at liberty, it is obvious that it will deſcend by its own gravity, and will, by its deſcent, turn round the barrel BCDE, together with the arm GH, and the body P faſtened to it. And whilſt the reſiſtance on the arm GH and on the body P is leſs than the weight M, that weight will accelerate its motion; and thereby the motion of GH and P will increaſe, and conſequently their reſiſtance will increaſe, till at laſt this reſiſtance and the weight M become nearly equal to each other. The motion with which M deſcends, and with which P revolves, will not then ſenſibly differ from an equable one. Whence it is not difficult to conceive, that, by proper obſervations made with this machine, the reſiſtance of the body P may be determined. The moſt natural method of proceeding in this inveſtigation is as follows: Let the machine firſt have acquired its equable motion, which it will uſually do in about five or ſix turns from the beginning; and then let it be obſerved, by counting a number of turns, what time is taken up by one revolution of the body P: then taking off the body P and the weight M, let it be examined what ſmaller weight will make the arm GH revolve in the ſame time as when P was fixed to it: this ſmaller weight being taken from M, the remainder is obviouſly equal in effort to the reſiſtance of the revolving body P; and this remainder being reduced in the ratio of the length of the arm to the ſemidiameter of the barrel, will then become equal to the abſolute quantity of the reſiſtance. And as the time of one revolution is known, and conſequently the velocity of the revolving body, there is hereby diſcovered the abſolute quantity of the reſiſtance to the given body P moving with a given degree of celerity.

Theory.

"Here, to avoid all objections, I have generally choſen, when the body P was removed, to fix in its ſtead a thin piece of lead of the ſame weight, placed horizontally: ſo that the weight which was to turn round the arm GH, without the body P, did alſo carry round this piece of lead. But mathematicians will eaſily allow that there was no neceſſity for this precaution. The diameter of the barrel BCDE, and of the ſilk ſtring wound round it, was 2.06 inches. The length of the arm GH, meaſured from the axis to the ſurface of the globe P, was 49.5 inches. The body P, the globe made uſe of, was of paſteboard; its ſurface very neatly coated with marbled paper. It was not much diſtant from the ſize of a 12lb. ſhot, being in diameter 4.5 inches, ſo that the radius of the circle deſcribed by the centre of the globe was 51.75 inches. When this globe was fixed at the end of the arm, and a weight of half a pound was hung at the end of the ſtring at M, it was examined how ſoon the motion of the deſcending weight M, and of the revolving body P, would become equable as to ſenſe. With this view, three revolutions being ſuffered to elapſe, it was found that the next 10 were performed in $27\frac{3}{4}''$, 20 in leſs than $55''$, and 30 in $82\frac{1}{2}''$; ſo that the firſt 10 were performed in $27\frac{3}{4}''$, the ſecond in $27\frac{1}{4}''$, and the third in $27\frac{1}{2}''$.

"Theſe experiments ſufficiently evince, that even with half a pound, the ſmalleſt weight made uſe of,

Theory. the motion of the machine was ſufficiently equable after the firſt three revolutions.

"The globe above mentioned being now fixed at the end of the arm, there was hung on at M a weight of $3\frac{1}{4}$lb; and 10 revolutions being ſuffered to elapſe, the ſucceeding 20 were performed in $21\frac{1}{2}''$. Then the globe being taken off, and a thin plate of lead, equal to it in weight, placed in its room; it was found, that inſtead of $3\frac{1}{4}$lb. a weight of one pound would make it revolve in leſs time than it did before; performing now 20 revolutions after 10 were elapſed in the ſpace of 19″.

"Hence then it follows, that from the $3\frac{1}{4}$ lb. firſt hung on, there is leſs than 1 lb. to be deducted for the reſiſtance on the arm; and conſequently the reſiſtance on the globe itſelf is not leſs than the effort of $2\frac{1}{4}$ lb. in the ſituation M; and it appearing from the former meaſures, that the radius of the barrel is nearly $\frac{1}{30}$ of the radius of the circle, deſcribed by the centre of the globe; it follows, that the abſolute reſiſtance of the globe, when it revolves 20 times in $21\frac{1}{2}''$, (about 25 feet in a ſecond), is not leſs than the 50th part of two pounds and a quarter, or of 36 ounces: and this being conſiderably more than half an ounce, and the globe nearly the ſize of a twelve-pound ſhot, it irrefragably confirms a propoſition I had formerly laid down from theory, that the reſiſtance of the air to a 12 lb. iron ſhot, moving with a velocity of 25 feet in a ſecond, is not leſs than half an ounce.

"The reſt of the experiments were made in order to confirm another propoſition, namely, that the reſiſtance of the air within certain limits is nearly in the duplicate proportion of the velocity of the reſiſted body. To inveſtigate this point, there were ſucceſſively hung on at M, weights in the proportion of the numbers 1, 4, 9, 16; and letting 10 revolutions firſt elapſe, the following obſervations were made on the reſt.—With $\frac{1}{2}$ lb. the globe went 20 turns in $54\frac{1}{2}''$, with 2 lb. it went 20 turns in $27\frac{1}{4}''$, with $4\frac{1}{2}$ lb. it went 30 turns in $27\frac{1}{2}$, and with 8 lb. it went 40 turns in $27\frac{1}{2}''$.—Hence it appears, that to reſiſtances proportioned to the numbers 1, 4, 9, 16, there correſpond velocities of the reſiſted body in the proportion of the numbers 1, 2, 3, 4; which proves, with great nicety, the propoſition above mentioned.

"With regard to the rotatory motion, the firſt experiment was to evince, that the whirling motion of a ball combining with its progreſſive motion would produce ſuch an oblique reſiſtance and deflective power as already mentioned. For this purpoſe a wooden ball of $4\frac{1}{2}$ inches diameter was ſuſpended by a double ſtring, about eight or nine feet long. Now, by turning round the ball and twiſting the double ſtring, the ball when left to itſelf would have a revolving motion given it from the untwiſting of the ſtring again. And if, when the ſtring was twiſted, the ball was drawn to a conſiderable diſtance from the perpendicular, and there let go; it would at firſt, before it had acquired its revolving motion, vibrate ſteadily enough in the ſame vertical plane in which it firſt began to move: but when, by the untwiſting of the ſtring, it had acquired a ſufficient degree of its whirling motion, it conſtantly deflected to the right or left of its firſt track; and ſometimes proceeded ſo far as to have its direction at right angles to that in which it began its motion; and this deviation was not produced by the ſtring itſelf, but appeared to be entirely owing to the reſiſtance being greater on the one part of the leading ſurface of the globe than the other. For the deviation continued when the ſtring was totally untwiſted; and even during the time that the ſtring, by the motion the globe had received, was twiſting the contrary way. And it was always eaſy to predict, before the ball was let go, which way it would deflect, only by conſidering on which ſide the whirl would be combined with the progreſſive motion; for on that ſide always the deflective power acted, as the reſiſtance was greater here than on the ſide where the whirl and progreſſive motion were oppoſed to one another." Theory.

Though Mr Robins conſidered this experiment as an inconteſtable proof of the truth of his theory, he undertook to give ocular demonſtration of this deflection of muſket-bullets even in the ſhort ſpace of 100 yards.

"As all projectiles (ſays he), in their flight, are acted upon by the power of gravity, the deflection of a bullet from its primary direction, ſuppoſes that deflection to be upwards or downwards in a vertical plane; becauſe, in the vertical plane, the action of gravity is compounded and entangled with the deflective force. And for this reaſon my experiments have been principally directed to the examination of that deflection which carries the bullet to the right or left of that plane in which it began to move. For if it appears at any time that the bullet has ſhifted from that vertical plane in which the motion began, this will be an inconteſtable proof of what we have advanced. Now, by means of ſcreens of exceeding thin paper, placed parallel to each other at proper diſtances, this deflection in queſtion may be many ways inveſtigated. For by firing bullets which ſhall traverſe the ſcreens, the flight of the bullet may be traced; and it may eaſily appear whether they do or do not keep invariably to one vertical plane. This examination may proceed on three different principles, which I ſhall here ſeparately explain.

"For firſt, an exactly vertical plane may be traced out upon all theſe ſcreens, by which the deviation of any ſingle bullet may be more readily inveſtigated, only by meaſuring the horizontal diſtance of its trace from the vertical plane thus delineated; and by this means the abſolute quantity of its aberration may be known. Or if the deſcription of ſuch a vertical plane ſhould be eſteemed a matter of difficulty and nicety, a ſecond method may be followed; which is that of reſting the piece in ſome fixed notch or ſocket, ſo that though the piece may have ſome little play to the right and left, yet all the lines in which the bullet can be directed ſhall interſect each other in the centre of that fixed ſocket: by this means, if two different ſhots are fired from the piece thus ſituated, the horizontal diſtances made by the two bullets on any two ſcreens ought to be in the ſame proportion to each other as the reſpective diſtances of the ſcreens from the ſocket in which the piece was laid. And if theſe horizontal diſtances differ from that proportion, then it is certain that one of the ſhots at leaſt hath deviated from a vertical plane, although the abſolute quantity of that deviation

Theory. viation cannot hence be aſſigned; becauſe it cannot be known what part of it is to be imputed to one bullet, and what to the other.

" But if the conſtant and invariable poſition of the notch or ſocket in which the piece was placed, be thought too hard an hypotheſis in this very nice affair; the third method, and which is the ſimpleſt of all, requires no more than that two ſhot be fired through three ſcreens without any regard to the poſition of the piece each time: for in this caſe, if the ſhots diverge from each other, and both keep to a vertical plane, then if the horizontal diſtances of their traces on the firſt ſcreen be taken from the like horizontal diſtances on the ſecond and third, the two remainders will be in the ſame proportion with the diſtances of the ſecond and third ſcreen from the firſt. And if they are not in this proportion, then it will be certain that one of them at leaſt hath been deflected from the vertical plane; though here, as in the laſt caſe, the quantity of that deflection in each will not be known.

31 Remarkable deviations of bullets to the right and left.

" All theſe three methods I have myſelf made uſe of at different times, and have ever found the ſucceſs agreeable to my expectation. But the moſt eligible method ſeemed to be a compound of the two laſt. The apparatus was as follows.—Two ſcreens were ſet up in the larger walk in the Charter-houſe garden; the firſt of them at 250 feet diſtance from the wall, which was to ſerve for a third ſcreen; and the ſecond 200 feet from the ſame wall. At 50 feet before the firſt ſcreen, or at 300 feet from the wall, there was placed a large block weighing about 200 lb. weight, and having fixed into it an iron bar with a ſocket at its extremity, in which the piece was to be laid. The piece itſelf was of a common length, and bored for an ounce ball. It was each time loaded with a ball of 17 to the pound, ſo that the windage was extremely ſmall, and with a quarter of an ounce of good powder. The ſcreens were made of the thinneſt iſſue paper; and the reſiſtance they gave to the bullet (and conſequently their probability of deflecting it) was ſo ſmall, that a bullet lighting one time near the extremity of one of the ſcreens, left a fine thin fragment of it towards the edge entire, which was ſo very weak that it was difficult to handle it without breaking. Theſe things thus prepared, five ſhots were made with the piece reſted in the notch above mentioned; and the horizontal diſtances between the firſt ſhot, which was taken as a ſtandard, and the four ſucceeding onces, both on the firſt and ſecond ſcreen and on the wall, meaſured in inches, were as follows:

	1ſt Screen.	2d Screen.	Wall.
1 to 2	1.75 R.	3.15 R.	16.7 R.
3	10 L.	15.6 L.	69.25 L.
4	1.25 L.	4.5 L.	1 0 L
5	2.15 L.	5.1 L.	19.0 L.

" Here the letters R and L denote that the ſhot in queſtion went either to the right or left of the firſt.

" If the poſition of the ſocket in which the piece was placed be ſuppoſed fixed, then the horizontal diſtances meaſured above on the firſt and ſecond ſcreen, and on the wall, ought to be in proportion to the diſtances of the firſt ſcreen, the ſecond ſcreen, and the wall, from the ſocket. But by only looking over theſe numbers, it appears, that none of them are in that proportion; the horizontal diſtance of the firſt and third, for inſtance, on the wall being above nine inches more than it ſhould be by this analogy. Theory.

" If, without ſuppoſing the invariable poſition of the ſocket, we examine the comparative horizontal diſtances according to the third method deſcribed above, we ſhall in this caſe diſcover divarications ſtill more extraordinary; for by the numbers ſet down, it appears, that the horizontal diſtances of the ſecond and third ſhot on the two ſcreens, and on the wall, are as under.

1ſt Screen.	2d Screen.	Wall.
11.75	18.75	83.95

Here, if, according to the rule given above, the diſtance on the firſt ſcreen be taken from the diſtances on the other two, the remainder will be 7, and 72.2: and theſe numbers, if each ſhot kept to a vertical plane, ought to be in the proportion of 1 to 5; that being the proportion of the diſtances of the ſecond ſcreen, and of the wall, from the firſt: but the laſt number 72.2 exceeds what it ought to be by this analogy by 37.2; ſo that between them there is a deviation from the vertical plane of above 37 inches, and this too in a tranſit of little more than 80 yards.

" But farther, to ſhow that theſe irregularities do not depend on any accidental circumſtance of the balls fitting or not fitting the piece, there were five ſhots more made with the ſame quantity of powder as before; but with ſmaller bullets, which ran much looſer in the piece. And the horizontal diſtances being meaſured in inches from the trace of the firſt bullet to each of the ſucceeding ones, the numbers were as under.

	1ſt Screen.	2d Screen.	Wall.
1 to 2	15.6 R.	31.1 R.	94.0 R.
3	6.4 L.	12.75 L.	23.0 L.
4	4.7 R.	8.5 R.	15.5 R.
5	12.6 R.	24.0 R.	63.5 R.

Here, again, on the ſuppoſed fixed poſition of the piece, the horizontal diſtance on the wall between the firſt and third will be found above 15 inches leſs than it ſhould be if each kept to a vertical plane; and like irregularities, though ſmaller, occur in every other experiment. And if they are examined according to the third method ſet down above, and the horizontal diſtances of the third and fourth, for inſtance, are compared, thoſe on the firſt and ſecond ſcreen, and on the wall, appear to be thus.

1ſt Screen.	2d Screen.	Wall.
11.1	21.25	38.5

" And if the horizontal diſtance on the firſt ſcreen be taken from the other two, the remainders will be 10.15, and 27.4; where the leaſt of them, inſtead of being five times the firſt, as it ought to be, is 45.35 ſhort of it; ſo that here is a deviation of 45 inches.

" From all theſe experiments, the deflection in queſtion ſeems to be inconteſtably evinced. But to give ſome farther light to this ſubject, I took a barrel of the ſame bore with that hitherto uſed, and bent it at about three or four inches from its muzzle to the left, the bend making an angle of three or four degrees, with

Theory. with the axis of the piece. This piece thus bent was fired with a looſe ball, and the ſame quantity of powder hitherto uſed, the ſcreens of the laſt experiment being ſtill continued. It was natural to expect, that if this piece was pointed by the general direction of its axis, the ball would be canted to the left of that direction by the bend near its mouth. But as the bullet, in paſſing through that bent part would, as I conceived, be forced to roll upon the right-hand ſide of the barrel, and thereby its left ſide would turn up againſt the air, and would increaſe the reſiſtance on that ſide; I predicted to the company then preſent, that if the axis on which the bullet whirled, did not ſhift its poſition after it was ſeparated from the piece; then, notwithſtanding the bent of the piece to the left, the bullet itſelf might be expected to incurvate towards the right; and this, upon trial, did moſt remarkably happen. For one of the bullets fired from this bent piece paſſed through the firſt ſcreen about $1\frac{1}{2}$ inch diſtant from the trace of one of the ſhots fired from the ſtraight piece in the laſt ſet of experiments. On the ſecond ſcreen, the traces of the ſame bullets were about three inches diſtant; the bullet from the crooked piece paſſing on both ſcreens to the left of the other: but comparing the places of theſe bullets on the wall, it appeared that the bullet from the crooked piece, though it diverged from the track on the two ſcreens, had now croſſed that track, and was deflected conſiderably to the right of it: ſo that it was obvious, that though the bullet from the crooked piece might firſt be canted to the left, and had diverged from the track of the other bullet with which it was compared, yet by degrees it deviated again to the right, and a little beyond the ſecond ſcreen croſſed that track from which it before diverged, and on the wall was deflected 14 inches, as I remember, on the contrary ſide. And this experiment is not only the moſt convincing proof of the reality of this deflection here contended for; but is likewiſe the ſtrongeſt confirmation that it is brought about in the very manner and by the very circumſtances which we have all along deſcribed.

"I have now only to add, that as I ſuſpected the conſideration of the revolving motion of the bullet, compounded with its progreſſive one, might be conſidered as a ſubject of mathematical ſpeculation, and that the reality of any deflecting force thence ariſing might perhaps be denied by ſome computiſts upon the principles hitherto received of the action of fluids; I thought proper to annex a few experiments, with a view of evincing the ſtrange deficiency of all theories of this ſort hitherto eſtabliſhed, and the unexpected and wonderful varieties which occur in theſe matters: The propoſition which I advanced for this purpoſe being, That two equal ſurfaces meeting the air with the ſame degree of obliquity, may be ſo differently reſiſted, that though in one of them the reſiſtance is leſs than that of a perpendicular ſurface meeting the ſame quantity of air, yet in another it ſhall be conſiderably greater.

32 Strange anomaly in the reſiſtance of the air. "To make out this propoſition, I made uſe of the machine already deſcribed: and having prepared a paſteboard pyramid, whoſe baſe was four inches ſquare, and whoſe planes made angles of 45° with the plane of its baſe; and alſo a parallelogram four inches in breadth, and $5\frac{7}{8}$ in length, which was equal to the ſurface of the pyramid, the globe P was taken off from the machine, and the pyramid was firſt fixed on; and 2lb. being hung at M, and the pyramid ſo fitted as to move with its vertex forwards, it performed 20 revolutions after the firſt ten were elapſed in 33″. Then the pyramid being turned, ſo that its baſe, which was a plane of four inches ſquare, went foremoſt, it now performed 20 revolutions with the ſame weight in $38\frac{1}{4}$″.—After this, taking off the pyramid, and fixing on the parallelogram with its longer ſide perpendicular to the arm, and placing its ſurface in an angle of 45° with the horizon by a quadrant, the parallelogram, with the ſame weight, performed 20 revolutions in $43\frac{1}{2}$″.

Theory. "Now here this parallelogram and the ſurface of the pyramid are equal to each other, and each of them met the air in an angle of 45°; and yet one of them made 20 revolutions in 33″, whilſt the other took up $43\frac{1}{2}$″. And at the ſame time it appears, that a flat ſurface, ſuch as the baſe of a pyramid, which meets the ſame quantity of air perpendicularly, makes 20 revolutions in $38\frac{1}{4}$″, which is the medium between the other two.

"But to give another and ſtill more ſimple proof of this principle: there was taken a parallelogram four inches broad and $8\frac{1}{4}$ long. This being fixed at the end of the arm, with its long ſide perpendicular thereto, and being placed in an angle of 45° with the horizon, there was a weight hung on at M of $3\frac{1}{2}$lb. with which the parallelogram made 20 revolutions in $40\frac{1}{4}$″. But after this, the poſition of the parallelogram was ſhifted, and it was placed with its ſhorter ſide perpendicular to the arm, though its ſurface was ſtill inclined to an angle of 45° with the horizon; and now, inſtead of going ſlower, as might have been expected from the greater extent of part of its ſurface from the axis of the machine, it went round much faſter: for in this laſt ſituation it made 20 revolutions in $35\frac{1}{4}$″, ſo that there were 5″ difference in the time of 20 revolutions; and this from no other change of circumſtance than as the larger or ſhorter ſide of the oblique plane was perpendicular to the line of its direction."

In the 73d volume of the Philoſophical Tranſactions, ſeveral experiments on this ſubject, but upon a larger ſcale, are related by Lovell Edgeworth, Eſq. They confirm the truth of what Mr Robins advances, but nothing is ſaid to explain the reaſon of it.

33 Why the art of gunnery cannot become perfect. Theſe are the principal experiments made by Mr Robins in confirmation of his theory, and which not only far exceed every thing that had been formerly done, but even bid fair for advancing the art of gunnery to its *ne plus ultra*. It muſt be obſerved, however, that in this art it is impoſſible we ſhould ever arrive at abſolute perfection; that is, it can never be expected that a gunner, by any method of calculation whatever, can be enabled to point his guns in ſuch a manner, that the ſhot ſhall hit the mark if placed any where within its range. Aberrations, which can by no means be either foreſeen or prevented, will take place from a great number of different cauſes. A variation in the denſity of the atmoſphere, in the dampneſs of the powder, or in the figure of the ſhot, will cauſe variations in the range of the bullet, which cannot by any means be reduced to rules, and conſequently muſt

Theory. must render the event of each ſhot very precarious. The reſiſtance of the atmoſphere ſimply conſidered, without any of thoſe anomalies ariſing from its denſity at different times, is a problem, which, notwithſtanding the labours of Mr Robins and others, hath not been completely ſolved: and indeed if we conſider the matter in a phyſical light, we ſhall find, that without ſome other data than thoſe which are yet obtained, an exact ſolution of it is impoſſible.

34 The air acts as a moving power as well as a reſiſting one.

It is an objection that hath been made to the mathematical philoſophy, and to which in many caſes it is moſt certainly liable, that it conſiders the *reſiſtance* of matter more than its capacity of giving motion to other matter. Hence, if in any caſe matter acts both as a reſiſting and a moving power, and the mathematician overlooks its effort towards motion, founding his demonſtrations only upon its property of reſiſting, theſe demonſtrations will certainly be falſe, though they ſhould be ſupported by all the powers of geometry. It is to an error of this kind that we are to attribute the great differences already taken notice of between the calculations of Sir Iſaac Newton, with regard to the reſiſting force of fluids, and what actually takes place upon trial. Theſe calculations were made upon the ſuppoſition that the fluid through which a body moved could do nothing elſe but reſiſt it; yet it is certain that the air (the fluid with which we have to do at preſent) proves a ſource of *motion*, as well as reſiſtance, to all bodies which move in it.

To underſtand this matter fully, let ABC (fig. 5.) repreſent a crooked tube made of any ſolid matter, and *a*, *b*, two piſtons which exactly fill the cavity. If the ſpace between theſe piſtons is full of air, it is plain they cannot come into contact with each other on account of the elaſticity of the included air, but will remain at ſome certain diſtance as repreſented in the figure. If the piſton *b* is drawn up, the air which preſſes in the direction C *b* acts as a reſiſting power, and the piſton will not be drawn up with ſuch eaſe as if the whole was *in vacuo*. But though the column of air preſſing in the direction C *b* acts as a reſiſting power on the piſton *b*, the column preſſing in the direction A *a* will act as a moving power upon the piſton *a*. It is therefore plain, that if *b* is moved upwards till it comes to the place marked *d*, the other will deſcend to that marked *c*. Now, if we ſuppoſe the piſton *a* to be removed, it is plain, that when *b* is pulled upwards to *d*, the air deſcending through the leg A *a* CB will preſs on the under ſide of the piſton *b*, as ſtrongly as it would have done upon the upper ſide of the piſton *a*, had it been preſent. Therefore, though the air paſſing down through the leg CB reſiſts the motion of the piſton *b* when drawn upwards, the air preſſing down through the leg AB forwards it as much; and accordingly the piſton *b* may be drawn up or puſhed down at pleaſure, and with very little trouble. But if the orifice at A is ſtopped, ſo that the air can only exert its reſiſting power on the piſton *b*, it will require a conſiderable degree of ſtrength to move the piſton from *b* to *d*.

If now we ſuppoſe the tube to be entirely removed (which indeed anſwers no other purpoſe than to render the action of the air more evident), it is plain, that if the piſton is moved either up or down, or in any other direction we can imagine, the air preſſes as much upon the back part of it as it reſiſts it on the fore part; and of conſequence a ball moving through the air with any degree of velocity, ought to be as much accelerated by the action of the air behind, as it is retarded by the action of that before.—Here then it is natural to aſk, If the air accelerates a moving body as much as it retards it, how comes it to make any reſiſtance at all? yet certain it is, that this fluid doth reſiſt, and that very conſiderably. To this it may be anſwered, that the air is always kept in ſome certain ſtate or conſtitution by another power which rules all its motions, and it is this power undoubtedly which gives the reſiſtance. It is not to our purpoſe at preſent to inquire what that power is; but we ſee that the air is often in very different ſtates; one day, for inſtance, its parts are violently agitated by a ſtorm; and another, perhaps, they are comparatively at reſt in a calm. In the firſt caſe, nobody heſitates to own, that the ſtorm is occaſioned by ſome cauſe or other, which violently reſiſts any other power that would prevent the agitation of the air. In a calm the caſe is the ſame; for it would require the ſame exertion of power to excite a tempeſt in a calm day, as to allay a tempeſt in a ſtormy one. Now it is evident, that all projectiles, by their motion, agitate the atmoſphere in an unnatural manner; and conſequently are reſiſted by that power, whatever it is, which tends to reſtore the equilibrium, or bring back the atmoſphere to its former ſtate. Theory.

If no other power beſides that above mentioned acted upon projectiles, it is probable, that all reſiſtance to their motion would be in the duplicate proportion of their velocities; and accordingly, as long as the velocity is ſmall, we find it generally is ſo. But when the velocity comes to be exceedingly great, other ſources of reſiſtance ariſe. One of theſe is a ſubtraction of part of the moving power; which though not properly a *reſiſtance*, or oppoſing another power to it, is an equivalent thereto. This ſubtraction ariſes from the following cauſe. The air, as we have already obſerved, preſſes upon the hinder part of the moving body by its gravity, as much as it reſiſts the fore part of it by the ſame property. Nevertheleſs, the velocity with which the air preſſes upon any body by means of its gravity, is limited; and it is poſſible that a body may change its place with ſo great velocity that the air hath not time to ruſh in upon the back part of it in order to aſſiſt its progreſſive motion. When this happens to be the caſe, there is in the firſt place a deficiency of the moving power equivalent to 15 pounds on every ſquare inch of ſurface; at the ſame time that there is a poſitive reſiſtance of as much more on the fore part, owing to the gravity of the atmoſphere, which muſt be overcome before the body can move forward.

This deficiency of moving power, and increaſe of reſiſtance, do not only take place when the body moves with a very great degree of velocity, but in all motions whatever. It is not in all caſes perceptible, becauſe the velocity with which the body moves, frequently bears but a very ſmall proportion to the velocity with which the air preſſes in behind it. Thus, ſuppoſing the velocity with which the air ruſhes into a vacuum to be 1200 feet in a ſecond, if a body moves with a velocity of 40, or 50 feet in a ſecond, the force with which the air preſſes on the back part is but $\frac{1}{225}$ at the utmoſt leſs than that which reſiſts on the fore part of it, which

Theory. which will not be perceptible: but if, as in the caſe of bullets, the velocity of the projectile comes to have a conſiderable proportion to the velocity wherewith the air ruſhes in behind it; then a very perceptible and otherwiſe unaccountable reſiſtance is obſerved, as we have ſeen in the experiments already related by Mr Robins. Thus, if the air preſſes in with a velocity of 1200 feet in a ſecond, if the body changes its place with a velocity of 600 feet in the ſame time, there is a reſiſtance of 15 pounds on the fore part, and a preſſure of only $7\frac{1}{2}$ on the back part. The reſiſtance therefore not only overcomes the moving power of the air by $7\frac{1}{2}$ pounds, but there is a deficiency of other $7\frac{1}{2}$ pounds owing to the want of half the preſſure of the atmoſphere on the back part, and thus the whole loſs of the moving power is equivalent to 15 pounds; and hence the exceeding great increaſe of reſiſtance obſerved by Mr Robins beyond what it ought to be according to the common computations.—The velocity with which the air ruſhes into a vacuum is therefore a deſideratum in gunnery. Mr Robins ſuppoſes that it is the ſame with the velocity of ſound; and that when a bullet moves with a velocity greater than that of 1200 feet in a ſecond, it leaves a perfect vacuum behind it. Hence he accounts for the great increaſe of reſiſtance to bullets moving with ſuch velocities; but as he doth not take notice of the loſs of the air's moving power, the anomalies of all leſſer velocities are inexplicable on his principles. Nay, he even tells us, that Sir Iſaac Newton's rule for computing reſiſtances may be applied in all velocities leſs than 1100 or 1200 feet in a ſecond, though this is expreſsly contradicted by his own experiments mentioned N° 23.

35
It reſiſts by its elaſticity as well as gravity.

Though for theſe reaſons it is evident how great difficulties muſt occur in attempting to calculate the reſiſtance of the air to military projectiles, we have not even yet diſcovered all the ſources of reſiſtance to theſe bodies when moving with immenſe velocities. Another power by which they are oppoſed (and which at laſt becomes greater than any of thoſe hitherto mentioned) is the air's elaſticity. This, however, will not begin to ſhow itſelf in the way of reſiſtance till the velocity of the moving body becomes conſiderably greater than that by which the air preſſes into a vacuum. Having therefore firſt aſcertained this velocity, which we ſhall ſuppoſe to be 1200 feet in a ſecond, it is plain, that if a body moves with a velocity of 1800 feet in a ſecond, it muſt compreſs the air before it; becauſe the fluid hath neither time to expand itſelf in order to fill the vacuum left behind the moving body, nor to ruſh in by its gravity. This compreſſion it will reſiſt by its elaſtic power, which thus becomes a new ſource of reſiſtance, increaſing, without any limit, in proportion to the velocity of the moving body. If now we ſuppoſe the moving body to ſet out with a velocity of 2400 feet in a ſecond, it is plain, that there is not only a vacuum left behind the body, but the air before it is compreſſed into half its natural ſpace. The loſs of motion in the projectile therefore is now very conſiderable. It firſt loſes 15 pounds on every ſquare inch of ſurface on account of the deficiency of the moving power of the air behind it; then it loſes 15 pounds more on acount of the reſiſtance of the air before it; again it loſes 15 pounds on account of the elaſticity of the compreſſed air; and laſtly another 15 pounds on account of the vacuum behind, which takes off the weight of the atmoſphere, that would have been equivalent to one half of the elaſticity of the air before it. The whole reſiſtance therefore upon every ſquare inch of ſurface moving with this velocity is 60 pounds, beſides that which ariſes from the power tending to preſerve the general ſtate of the atmoſphere, and which increaſes in the duplicate proportion of the velocity as already mentioned. If the body is ſuppoſed to move with a velocity of 4800 feet in a ſecond, the reſiſtance from the air's elaſticity will then be quadrupled, or amount to 60 pounds on the ſquare inch of ſurface; which added to the other cauſes, produces a reſiſtance of 105 pounds upon the ſquare inch; and thus would the reſiſtance from the elaſticity of the air go on continually increaſing, till at laſt the motion of the projectile would be as effectually ſtopped as if it was fired againſt a wall. This obſtacle therefore we are to conſider as really *inſuperable* by any art whatever, and therefore it is not adviſable to uſe larger charges of powder than what will project the ſhot with a velocity of 1200 feet in a ſecond. To this velocity the elaſticity of the air will not make great reſiſtance, if indeed it makes any at all: for though Mr Robins hath conjectured that air ruſhes into a vacuum with the velocity of ſound, or between 11 and 1200 feet in a ſecond; yet we have no deciſive proof of the truth of this ſuppoſition. At this velocity indeed, according to Mr Robins, a very ſudden increaſe of reſiſtance takes place: but this is denied by Mr Glenie *, who ſuppoſes that the reſiſtance proceeds gradually; and indeed it ſeems to be pretty obvious, that the reſiſtance cannot very *ſuddenly* increaſe, if the velocity is only increaſed in a ſmall degree. Yet it is certain, that the ſwifteſt motions with which cannon-balls can be projected are very ſoon reduced to this ſtandard; for Mr Robins acquaints us, that "a 24-pound ſhot, when diſcharged with a velocity of 2000 feet in a ſecond, will be reduced to that of 1200 feet in a ſecond in a flight of little more than 500 yards."

Theory.

* *Hiſt. of Gunnery*, p. 48. 50.

In the 71ſt volume of the Philoſophical Tranſactions, Count Rumford has propoſed a new method of determining the velocities of bullets, by meaſuring the force of the recoil of the piece. As in all caſes action and re-action are ſuppoſed to be equal to one another, it appears that the momentum of a gun, or the force of its recoil backwards, muſt always be equivalent to the force of its charge: that is, the velocity with which the gun recoils, multiplied into its weight, is equal to the velocity of the bullet multiplied into its weight; for every particle of matter, whether ſolid or fluid, that iſſues out of the mouth of a piece, muſt be impelled by the action of ſome power, which power muſt *re-act* with equal force againſt the bottom of the bore.—Even the fine inviſible elaſtic fluid that is generated from the powder in its inflammation, cannot put itſelf in motion without re-acting againſt the gun at the ſame time. Thus we ſee pieces, when they are fired with powder alone, recoil as well as when their charges are made to impel a weight of ſhot, though the recoil is not in the ſame degree in both caſes. It is eaſy to determine the velocity of the recoil in any given caſe, by ſuſpending the gun in an horizontal poſition by two pendulous rods, and meaſuring the arc of its aſcent by means of a ribbon, as mentioned under the

Theory. the article GUNPOWDER; and this will give the momentum of the gun, its weight being known, and consequently the momentum of its charge. But in order to determine the velocity of the bullet from the momentum of the recoil, it will be neceſſary to know how much the weight and velocity of the elaſtic fluid contributes to it.

"That part of the recoil which ariſes from the expanſion of the fluid is always very nearly the ſame, whether the powder is fired alone, or whether the charge is made to impel one or more bullets, as has been determined by a great variety of experiments.—If therefore a gun, ſuſpended according to the method preſcribed, is fired with any given charge of powder, but without any bullet or wad, and the recoil is obſerved, and if the ſame piece is afterwards fired with the ſame quantity of powder, and a bullet of a known weight, the exceſs of the velocity of the recoil in the latter caſe, over that in the former, will be proportional to the velocity of the bullet; for the difference of theſe velocities, multiplied into the weight of the gun, will be equal to the weight of the bullet multiplied into its velocity.—Thus, if W is put equal to the weight of the gun, U = the velocity of the bullet when fired with a given charge of powder without any bullet; V = the velocity of the recoil, when the ſame charge is made to impel a bullet; B = the weight of the bullet, and v = its velocity; it will be $v = \frac{V-U+W}{B}$."

To determine how far this theory agreed with practice, an experiment was made with a charge of 165 grains of powder without any bullet, which produced a recoil of 5.5 inches; and in another, with a bullet, the recoil was 5.6 inches; the mean of which is 5.55 inches; anſwering to a velocity of 1.1358 feet in a ſecond. In five experiments with the ſame charge of powder, and a bullet weighing 580 grains, the mean was 14.6 inches; and the velocity of the recoil anſwering to the length juſt mentioned, is 2.9880 feet in a ſecond: conſequently V—U, or 2.9880—1.1358, is equal to 1.8522 feet in a ſecond. But as the velocities of recoil are known to be as the chords of the arcs through which the barrel aſcends, it is not neceſſary, in order to determine the velocity of the bullet, to compute the velocities V and U; but the quantity V—U, or the difference of the velocities of the recoil when the given charge is fired with and without a bullet, may be computed from the value of the difference of the chords by one operation.—Thus the velocity anſwering to the chord 9.05 is that of 1.8522 feet in a ſecond, is juſt equal to V—U, as was before found.

In this experiment the weight of the barrel with its carriage was juſt 47¼ pounds, to which ¼ of a pound were to be added on account of the weight of the rods by which it was ſuſpended; which makes W=48 pounds, or 336,000 grains. The weight of the bullet was 580 grains; whence B is to W as 580 to 336,000; that is, as 1 to 579.31 very nearly. The value of V—U, anſwering to the experiments before mentioned, was found to be 1.8522; conſequently the velocity of the bullets = v, was 1.8522 × 579.31 = 1073 feet, which differs only by 10 from 1083, the velocities found by the pendulum.

The velocities of the bullets may be found from the recoil by a ſtill more ſimple method; for the velocities of the recoil being as the chords meaſured upon the ribbon, if c is put equal to the chord of the recoil expreſſed in Engliſh inches, when the piece is fired with powder only, and C = the chord when the ſame piece is charged with a bullet: then C—c will be as V—U; and conſequently as $\frac{V-U+W}{B}$, which meaſures the velocity of the bullet, the ratio of W to B remaining the ſame.—If therefore we ſuppoſe a caſe in which C—c is equal to one inch, and the velocity of the bullet is computed from that chord, the velocity in any other caſe, wherein C—c is greater or leſs than one inch, will be found by multiplying the difference of the chords C and c by the velocity that anſwers to the difference of one inch.—The length of the parallel rods, by which the piece was ſuſpended being 64 inches, the velocity of the recoil, = C—c = 1 inch meaſured upon the ribbon, is 0.204655 parts of a foot in one ſecond; which in this caſe is alſo the value of V—U: the velocity of the bullet, or v, is therefore 0.204655 × 579.31 = 118.35 feet in a ſecond. Hence the velocity of the bullet may in all caſes be found by multiplying the difference of the chords C and c by 118.35; the weight of the barrel, the length of the rods by which it is ſuſpended, and the weight of the bullet remaining the ſame; and this whatever the charge of powder made uſe of may be, and however it may differ in ſtrength and goodneſs.

Theory.

The exactneſs of this ſecond method will appear from the following experiments. On firing the piece with 145 grains of powder and a bullet, the mean of three ſets of experiments was 13.25, 13.15, and 13.2; and with the ſame charge of powder without a bullet, the recoil was 4.5, 4.3, or 4.4: C—c therefore was 13.2—4.4 = 8.8 inches; and the velocity of the bullets, = 8.8 × 118.35 = 1045 feet in a ſecond; the velocities by the pendulum coming out 10.40 feet in the ſame ſpace of time.

In the far greateſt number of experiments to determine the comparative accuracy of the two methods, a ſurpriſing agreement was found betwixt the laſt mentioned one and that by the pendulum; but in ſome few the differences were very remarkable. Thus, in two where the recoil was 12.92 and 13.28, the velocity, by computation from the chords, is 1030 feet per ſecond; but in computing by the pendulum it amounted only to 900; but in theſe ſome inaccuracy was ſuſpected in the experiment with the pendulum, and that the computation from the recoil was moſt to be depended upon. In another experiment, the velocity by the recoil exceeded that by the pendulum by no leſs than 346 feet; the former ſhowing 2109, and the latter only 1763 feet in a ſecond. In two others the pendulum was alſo deficient, though not in ſuch a degree. In all theſe it is remarkable, that where the difference was conſiderable, it was ſtill in favour of the recoil. The deficiency in theſe experiments appears to have been ſomewhat embarraſſing to our author. "It cannot be ſuppoſed, ſays he, that it aroſe from any imperfection in Mr Robins's method of determining the velocities of bullets; for that method is founded upon ſuch principles as leave no room to doubt of its accura-

Theory. cy; and the practical errors that occur in making the experiments, and which cannot be entirely prevented, or exactly compenſated, are in general ſo ſmall, that the difference in the velocities cannot be attributed to them. It is true, the effect of thoſe errors is more likely to appear in experiments made under ſuch circumſtances as the preſent; for the bullet being very light (A), the arc of the aſcent of the pendulum was but ſmall; and a ſmall miſtake in meaſuring the chord upon the ribbon would have produced a very conſiderable error in computing the velocity of the bullet: Thus a difference of one-tenth of an inch, more or leſs, upon the ribbon, in that experiment where the difference was greateſt, would have made a difference in the velocity of more than 120 feet in a ſecond. But, independent of the pains that were taken to prevent miſtakes, the ſtriking agreement of the velocities in ſo many other experiments, affords abundant reaſon to conclude, that the errors ariſing from thoſe cauſes were in no caſe very conſiderable.—But if both methods of determining the velocities of bullets are to be relied on, then the difference of the velocities, as determined by them in theſe experiments, can only be accounted for by ſuppoſing that it aroſe from their having been diminiſhed by the reſiſtance of the air in the paſſage of the bullets from the mouth of the piece to the pendulum: and this ſuſpicion will be much ſtrengthened, when we conſider how great the reſiſtance of the air is to bodies that move very ſwiftly in it; and that the bullets in theſe experiments were not only projected with great velocities, but were alſo very light, and conſequently more liable to be retarded by the reſiſtance on that account.

"To put the matter beyond all doubt, let us ſee what the reſiſtance was that theſe bullets met with, and how much their velocities were diminiſhed by it. The weight of the bullet in the moſt erroneous experiment was 90 grains; its diameter 0.78 of an inch; and it was projected with a velocity of 2109 feet in a ſecond. If now a computation be made according to the law laid down by Sir Iſaac Newton for compreſſed fluids, it will be found, that the reſiſtance to this bullet was not leſs than $8\frac{1}{2}$ pounds avoirdupois, which is ſomething more than 660 times its own weight. But Mr Robins has ſhewn by experiment, that the reſiſtance of the air to bodies moving in it with very great velocity, is near three times greater than Sir Iſaac has determined it; and as the velocity with which this bullet was impelled is conſiderably greater than any in Mr Robins's experiments, it is highly probable, that the reſiſtance in this inſtance was at leaſt 2000 times greater than the weight of the bullet.

"The diſtance from the mouth of the piece to the pendulum was 12 feet; but, as there is reaſon to think that the blaſt of the powder, which always follows the bullet, continues to act upon it for ſome ſenſible ſpace of time after it is out of the bore, and, by urging it on, counterbalances, or at leaſt counteracts in a great meaſure, the reſiſtance of the air, we will ſuppoſe that the reſiſtance does not begin, or rather that the motion of the bullet does not begin to be retarded, till it has got to the diſtance of two feet from the muzzle. Theory. The diſtance, therefore, between the barrel and the pendulum, inſtead of 12 feet, is to be eſteemed at 10 feet; and as the bullet took up about $\frac{1}{170}$ part of a ſecond in running over that ſpace, it muſt in that time have loſt a velocity of about 335 feet in a ſecond, as will appear upon making the computation; and this will very exactly account for the apparent diminution of the velocity in the experiment: for the difference of the velocities, as determined by the recoil and the pendulum $=2109-1763=346$ feet in a ſecond, is extremely near 335 feet in a ſecond, the diminution of the velocity by the reſiſtance as here determined.

"If the diminution of the velocities of the bullets in the two ſubſequent experiments be computed in like manner, it will turn out in one 65, and in the other 33, feet in a ſecond: and, making theſe corrections, the compariſon of the two methods of aſcertaining the velocities will ſtand thus:

Velocities by the pendulum,	1763	1317	1136
Reſiſtance of air to be added,	335	65	33
	2098	1382	1169
Velocity by the recoil,	2109	1430	1288
Difference after correction,	+11	+48	+119

"It appears, therefore, that notwithſtanding theſe corrections, the velocities as determined by the pendulum, particularly in the laſt, were conſiderably deficient. But the manifeſt irregularity of the velocities in thoſe inſtances, affords abundant reaſon to conclude, that it muſt have ariſen from ſome accidental cauſe, and therefore that little dependence is to be put upon the reſult of thoſe experiments. I cannot take upon me to determine poſitively what the cauſe was which produced this irregularity, but I ſtrongly ſuſpect that it aroſe from the breaking of the bullets in the barrel by the force of the exploſion: for theſe bullets, as has already been mentioned, were formed of lead, incloſing leſſer bullets of plaſter of Paris; and I well remember to have obſerved at the time ſeveral ſmall fragments of the plaſter which had fallen down by the ſide of the pendulum. I confeſs I did not then pay much attention to this circumſtance, as I naturally concluded that it aroſe from the breaking of the bullet in penetrating the target of the pendulum; and that the ſmall pieces of plaſter I ſaw upon the ground, had fallen out of the hole by which the bullet entered. But if the bullets were not abſolutely broken in pieces in firing, yet if they were conſiderably bruiſed, and the plaſter, or a part of it, were ſeparated from the lead, ſuch a change in the form might produce a great increaſe in the reſiſtance, and even their initial velocities might be affected by it; for their form being changed from that of a globe to ſome other figure, they might not fit the bore; and a part of the force of the charge might be loſt by the windage.—That this actually happened in the experiment laſt mentioned, ſeems very probable, as the velocity with which the bullet was projected, as it

(A) They were made of lead incloſing a nucleus of Paris plaſter.

Theory. it was determined by the recoil, was conſiderably leſs in proportion in that experiment than in many others which preceded and followed it in the ſame ſet.

"As allowance has been made for the reſiſtance of the air in theſe caſes, it may be expected that the ſame ſhould be done in all other caſes: but it will probably appear, upon inquiry, that the diminution of the velocities of the bullets, on that account, was ſo inconſiderable, that it might ſafely be neglected: thus, for inſtance, in the experiments with an ounce of powder, when the velocity of the bullet was more than 1750 feet in a ſecond, the diminution turns out no more than 25 or 30 feet in a ſecond, though we ſuppoſe the full reſiſtance to have begun ſo near as two feet from the mouth of the piece; and in all caſes where the velocity was leſs, the effect of the reſiſtance was leſs in a much greater proportion: and even in this inſtance, there is reaſon to think, that the diminution of the velocity, as we have determined it, is too great: for the flame of gunpowder expands with ſuch amazing rapidity, that it is ſcarcely to be ſuppoſed but that it follows the bullet, and continues to act upon it more than two feet, or even four feet, from the gun; and when the velocity of the bullet is leſs, its action upon it muſt be ſenſible at a ſtill greater diſtance."

As this method of determining the velocities of bullets by the recoil of the piece did not occur to Count Rumford till after he had finiſhed his experiments with a pendulum, and taken down his apparatus, he had it not in his power to determine the comparative ſtrength of the recoil without and with a bullet; and conſequently the velocity with which the flame iſſues from the mouth of a piece. He is of opinion, however, that every thing relative to theſe matters may be determined with greater accuracy by the new method than by any other formerly practiſed; and he very juſtly remarks, that the method of determining the velocity by the recoil, gives it originally as the bullet ſets out; while that by the pendulum ſhows it only after a part has been deſtroyed by the reſiſtance of the air. In the courſe of his remarks, he criticiſes upon a part of Mr Robins's theory, that when bullets of the ſame diameter, but different weights, are diſcharged from the ſame piece by the ſame quantity of powder, their velocities are in the ſub-duplicate ratio of their weight. This theory, he obſerves, is manifeſtly defective, as being founded upon a ſuppoſition, that the action of the elaſtic fluid, generated from the powder, is always the ſame in any and every given part of the bore when the charge is the ſame, whatever may be the weight of the bullet; and as no allowance is made for the expenditure of force required to put the fluid itſelf in motion, nor for the loſs of it by the vent. "It is true (ſays he) Dr Hutton in his experiments found this law to obtain without any great error; and poſſibly it may hold good with ſufficient accuracy in many caſes; for it ſometimes happens, that a number of errors or actions, whoſe operations have a contrary tendency, ſo compenſate each other, that their effects when united are not ſenſible. But when this is the caſe, if any one of the cauſes of error is removed, thoſe which remain will be detected.—When any given charge is loaded with a heavy bullet, more of the powder is inflamed in any very ſhort ſpace of time than when the bullet is lighter, and the action of the powder ought upon that account to be greater; but a heavy bullet takes up longer time in paſſing through the bore than a light one; and conſequently more of the elaſtic fluid generated from the powder eſcapes by the vent and by windage. It may happen that the augmentation of the force, on account of one of theſe circumſtances, may be juſt able to counterbalance the diminution of it ariſing from the other; and if it ſhould be found upon trial, that this is the caſe in general, in pieces as they are now conſtructed, and with all the variety of ſhot that are made uſe of in practice, it would be of great uſe to know the fact; but when, with Mr Robins, concluding too haſtily from the reſult of a partial experiment, we ſuppoſe, that becauſe the ſum total of the preſſure of the elaſtic fluid upon the bullet, during the time of its paſſage through the bore, happens to be the ſame when bullets of different weights are made uſe of, that therefore it is always ſo, our reaſonings may prove very inconcluſive, and lead to very dangerous errors."

Practice.

In the proſecution of his ſubject Count Rumford proves mathematically, as well as by actual experiment, that the theory laid down by Mr Robins in this reſpect is erroneous. The exceſs is in favour of heavy bullets, which acquire a velocity greater than they ought to do according to Mr Robins's rule; and ſo conſiderable are the errors, that in one of Count Rumford's experiments, the difference was no leſs than 2042 feet in a ſecond. When the weight of the bullet was increaſed four times, the action of the powder was found to be nearly doubled; for in one experiment, when four bullets were diſcharged at once, the collective preſſure was as 1; but when only a ſingle bullet was made uſe of, it was no more than 0.5825; and on the whole he concludes, that the velocity of bullets is in the reciprocal ſub-triplicate ratio of their weights. Our author obſerves alſo, that Mr Robins is not only miſtaken in the particular juſt mentioned, but in his concluſions with regard to the abſolute force of gunpowder compared with the preſſure of the atmoſphere; the latter being to the force of gunpowder as 1 to 1000 according to Mr Robins; but as 1 to 1308 according to Count Rumford.

Sect. III. *Practice of Gunnery.*

With regard to the practical part of gunnery, which ought to conſiſt in directing the piece in ſuch a manner as always to hit the object againſt which it is pointed, there can be no certain rules given. The following maxims are laid down by Mr Robins as of uſe in practice.

1. In any piece of artillery whatever, the greater the quantity of powder it is charged with, the greater will be the velocity of the bullet.

2. If two pieces of the ſame bore, but of different lengths, are fired with the ſame charge of powder, the longer will impel the bullet with a greater celerity than the ſhorter.

3. If two pieces of artillery different in weight, and formed of different metals, have yet their cylinders of equal bores and equal lengths; then with like charges of powder and like bullets they will each of them diſcharge their ſhot with nearly the ſame degree of celerity.

4. The ranges of pieces at a given elevation are no

Practice. juſt meaſures of the velocity of the ſhot; for the ſame pieee fired ſucceſſively at an invariable elevation, with the powder, bullet, and every other circumſtance as nearly the ſame as poſſible, will yet range to very different diſtances.

5. The greateſt part of that uncertainty in the ranges of pieces which is deſcribed in the preceding maxim, can only ariſe from the reſiſtance of the air.

6. The reſiſtance of the air acts upon projectiles in a twofold manner; for it oppoſes their motion, and by that means continually diminiſhes their celerity; and it beſides diverts them from the regular track they would otherwiſe follow; whence ariſe thoſe deviations and inflections already treated of.

7. That action of the air by which it retards the motion of projectiles, though much neglected by writers on artillery, is yet, in many inſtances, of an immenſe force; and hence the motion of theſe reſiſted bodies is totally different from what it would otherwiſe be.

8. This retarding force of the air acts with different degrees of violence, according as the projectile moves with a greater or leſs velocity; and the reſiſtances obſerve this law, That to a velocity which is double another, the reſiſtance within certain limits is fourfold; to a treble velocity, ninefold; and ſo on.

9. But this proportion between the reſiſtances to two different velocities, does not hold if one of the velocities be leſs than that of 1200 feet in a ſecond, and the other greater. For in that caſe the reſiſtance to the greater velocity is near three times as much as it would come out by a compariſon with the ſmaller, according to the law explained in the laſt maxim.

10. To the extraordinary power exerted by the reſiſtance of the air it is owing, that when two pieces of different bores are diſcharged at the ſame elevation, the piece of the largeſt bore uſually ranges fartheſt, provided they are both fired with fit bullets, and the cuſtomary allotment of powder.

11. The greateſt part of military projectiles will at the time of their diſcharge acquire a whirling motion round their axis by rubbing againſt the inſide of their reſpective pieces; and this whirling motion will cauſe them to ſtrike the air very differently from what they would do had they no other than a progreſſive motion. By this means it will happen, that the reſiſtance of the air will not always be directly oppoſed to their flight; but will frequently act in a line oblique to their courſe, and will thereby force them to deviate from the regular track they would otherwiſe deſcribe. And this is the true cauſe of the irregularities deſcribed in maxim 4.

12. From the ſudden trebling the quantity of the air's reſiſtance, when the projectile moves ſwifter than at the rate of 1200 feet in a ſecond (as hath been explained in maxim 9), it follows, that whatever be the regular range of a bullet diſcharged with this laſt mentioned velocity, that range will be but little increaſed how much ſoever the velocity of the bullet may be ſtill farther augmented by greater charges of powder.

13. If the ſame piece of cannon be ſucceſſively fired at an invariable elevation, but with various charges of powder, the greateſt charge being the whole weight of the bullet in powder, and the leaſt not leſs than the fifth part of that weight; then if the elevation be not leſs than eight or ten degrees, it will be found, that ſome of the ranges with the leaſt charge will exceed ſome of thoſe with the greateſt. Practice.

14. If two pieces of cannon of the ſame bore, but of different lengths, are ſucceſſively fired at the ſame elevation with the ſame charge of powder; then it will frequently happen, that ſome of the ranges with the ſhorter piece will exceed ſome of thoſe with the longer.

15. In diſtant cannonadings, the advantages ariſing from long pieces and large charges of powder are but of little moment.

16. In firing againſt troops with grape-ſhot, it will be found, that charges of powder much leſs than thoſe generally uſed, are the moſt advantageous.

17. The principal operations in which large charges of powder appear to be more efficacious than ſmall ones, are the ruining of parapets, the diſmounting of batteries covered by ſtout merlins, or battering in breach; for, in all theſe caſes, if the object be but little removed from the piece, every increaſe of velocity will increaſe the penetration of the bullet.

18. Whatever operations are to be performed by artillery, the leaſt charges of powder with which they can be effected are always to be preferred.

19. Hence, then, the proper charge of any piece of artillery is not that allotment of powder which will communicate the greateſt velocity to the bullet (as moſt practitioners formerly maintained; nor is it to be determined by an invariable proportion of its weight to the weight of the ball: but, on the contrary, it is ſuch a quantity of powder as will produce the leaſt velocity for the purpoſe in hand; and, inſtead of bearing always a fixed ratio to the weight of the ball, it muſt be different according to the different buſineſs which is to be performed.

20. No field-piece ought at any time to be loaded with more than $\frac{1}{6}$, or at the utmoſt $\frac{1}{3}$, of the weight of its bullet in powder, nor ſhould the charge of any battering piece exceed $\frac{1}{3}$ of the weight of its bullet.

21. Although precepts very different from thoſe we have here given have been often advanced by artilleriſts, and have been ſaid to be derived from experience; yet is that pretended experience altogether fallacious; ſince from our doctrine of reſiſtance eſtabliſhed above, it follows, that every ſpeculation on the ſubject of artillery, which is only founded on the experimental ranges of bullets diſcharged with conſiderable velocities, is liable to great uncertainty.

36 Deſcription and uſe of rifled barrels.

The greateſt irregularities in the motion of bullets are, as we have ſeen, owing to the whirling motion on their axis, acquired by the friction againſt the ſides of the piece. The beſt method hitherto known of preventing theſe is by the uſe of pieces with *rifled barrels*. Theſe pieces have the inſides of their cylinders cut with a number of ſpiral channels: ſo that it is in reality a female ſcrew, varying from the common ſcrews only in this, that its threads or rifles are leſs deflected, and approach more to a right line; it being uſual for the threads with which the rifled barrel is indented, to take little more than one turn in its whole length. The numbers of theſe threads are different in each barrel, according to the ſize of the piece and the fancy of the workman; and in like manner the depth

to

Practice. to which they are cut is not regulated by any invariable rule.

The uſual method of charging theſe pieces is this: When the proper quantity of powder is put down, a leaden bullet is taken, a ſmall matter larger than the bore of the piece was before the rifles were cut: and this bullet being laid on the mouth of the piece, and conſequently too large to go down of itſelf, it is forced by a ſtrong rammer impelled by a mallet, and by repeated blows is driven home to the powder; and the ſoftneſs of the lead giving way to the violence with which the bullet is impelled, that zone of the bullet which is contiguous to the piece varies its arcular form, and takes the ſhape of the inſide of the barrel; ſo that it becomes part of a male ſcrew exactly anſwering to the indents of the rifle.

In ſome parts of Germany and Switzerland, however, an improvement is added to this practice; eſpecially in the larger pieces which are uſed for ſhooting at great diſtances. This is done by cutting a piece of very thin leather, or of thin fuſtian, in a circular ſhape, ſomewhat larger than the bore of the barrel. This circle being greaſed on one ſide, is laid upon the muzzle with its greaſy ſide downwards; and the bullet being then placed upon it, is forced down the barrel with it: by which means the leather or fuſtian incloſes the lower half of the bullet, and, by its interpoſition between the bullet and the rifles, prevents the lead from being cut by them. But it muſt be remembered, that in the barrels where this is practiſed, the rifles are generally ſhallow, and the bullet ought not to be too large.—But as both theſe methods of charging at the mouth take up a good deal of time; the rifled barrels which have been made in Britain are contrived to be charged at the breech, where the piece is for this purpoſe made larger than in any other part. The powder and bullet are put in through the ſide of the barrel by an opening, which, when the piece is loaded, is then filled up with a ſcrew. By this means, when the piece is fired, the bullet is forced through the rifles, and acquires the ſpiral motion already deſcribed; and perhaps ſomewhat of this kind, ſays Mr Robins, though not in the manner now practiſed, would be of all others the moſt perfect method for the conſtruction of theſe kinds of barrels.

From the whirling motion communicated by the rifles, it happens, that when the piece is fired, that indented zone of the bullet follows the ſweep of the rifles; and thereby, beſides its progreſſive motion, acquires a circular motion round the axis of the piece; which circular motion will be continued to the bullet, after its ſeparation from the piece; and thus a bullet diſcharged from a rifled barrel is conſtantly made to whirl round an axis which is coincident with the line of its flight. By this whirling on its axis, the aberration of the bullet, which proves ſo prejudicial to all operations in gunnery, is almoſt totally prevented. The reaſon of this may be eaſily underſtood from conſidering the ſlow motion of an arrow through the air. For example, if a bent arrow, with its wings not placed in ſome degree in a ſpiral poſition, ſo as to make it revolve round its axis as it flies through the air, were ſhot at a mark with a true direction, it would conſtantly deviate from it, in conſequence of being preſſed to one ſide by the convex part oppoſing the air obliquely. Let us now ſuppoſe this deflection in Practice. a flight of 100 yards to be equal to 10 yards. Now, if the ſame bent arrow were made to revolve round its axis once every two yards of its flight, its greateſt deviation would take place when it had proceeded only one yard, or made half a revolution; ſince at the end of the next half revolution it would again return to the ſame direction it had at firſt; the convex ſide of the arrow having been once in oppoſite poſitions. In this manner it would proceed during the whole courſe of its flight, conſtantly returning to the true path at the end of every two yards; and when it reached the mark, the greateſt deflection to either ſide that could happen would be equal to what it makes in proceeding one yard, equal to $\frac{1}{100}$th part of the former, or 3.6 inches, a very ſmall deflection when compared with the former one. In the ſame manner, a cannon-ball which turns not round its axis, deviates greatly from the true path, on account of the inequalities on its ſurface; which, although ſmall, cauſe great deviations by reaſon of the reſiſtance of the air, at the ſame time that the ball acquires a motion round its axis in ſome uncertain direction occaſioned by the friction againſt its ſides. But by the motion acquired from the rifles, the error is perpetually corrected in the manner juſt now deſcribed; and accordingly ſuch pieces are much more to be depended on, and will do execution at a much greater diſtance, than the other.

The reaſons commonly alleged for the ſuperiority of rifle-barrels over common ones, are, either that the inflammation of the powder is greater, by the reſiſtance which the bullet makes by being thus forced into the barrel, and that hereby it receives a much greater impulſe; or that the bullet by the compounding of its circular and revolving motions, did as it were bore the air, and thereby flew to a much greater diſtance than it would otherwiſe have done; or that by the ſame boring motion it made its way through all ſolid ſubſtances, and penetrated into them much deeper than when fired in the common manner. But Mr Robins hath proved theſe reaſons to be altogether erroneous, by a great number of experiments made with rifle-barrelled pieces. "In theſe experiments (ſays he), I have found that the velocity of the bullet fired from a rifled barrel was uſually leſs than that of the bullet fired from a common piece with the ſame proportion of powder. Indeed it is but reaſonable to expect that this ſhould be the caſe; for if the rifles are very deep, and the bullet is large enough to fill them up, the friction bears a very conſiderable proportion to the effort of the powder. And that in this caſe the friction is of conſequence enough to have its effects obſerved, I have diſcovered by the continued uſe of the ſame barrel. For the metal of the barrel being ſoft, and wearing away apace, its bore by half a year's uſe was conſiderably enlarged, and conſequently the depth of its rifles diminiſhed; and then I found that the ſame quantity of powder would give to the bullet a velocity near a tenth part greater than what it had done at firſt. And as the velocity of the bullet is not increaſed by the uſe of rifled barrels, ſo neither is the diſtance to which it flies, nor the depth of its penetration into ſolid ſubſtances. Indeed theſe two laſt ſuppoſitions ſeem at firſt ſight too chimerical to deſerve a formal confutation. But I cannot help obſerving,

Practice. ſerving, that thoſe who have been habituated to the uſe of rifled pieces are very excuſable in giving way to theſe prepoſſeſſions. For they conſtantly found, that with them they could fire at a mark with tolerable ſucceſs, though it were placed at three or four times the diſtance to which the ordinary pieces were ſuppoſed to reach. And therefore, as they were ignorant of the true cauſe of this variety, and did not know that it aroſe only from preventing the deflection of the ball; it was not unnatural for them to imagine that the ſuperiority of effect in the rifled piece was owing either to a more violent impulſe at firſt, or to a more eaſy paſſage through the air.

"In order to confirm the foregoing theory of rifle-barrelled pieces, I made ſome experiments by which it might be ſeen whether one ſide of the ball diſcharged from them uniformly keeps foremoſt during the whole courſe. To examine this particular, I took a rifled barrel carrying a bullet of ſix to the pound; but inſtead of its leaden bullet I uſed a wooden one of the ſame ſize, made of a ſoft ſpringy wood, which bent itſelf eaſily into the rifles without breaking. And firing the piece thus loaded againſt a wall at ſuch a diſtance as the bullet might not be ſhivered by the blow, I always found, that the ſame ſurface which lay foremoſt in the piece continued foremoſt without any ſenſible deflection during the time of its flight. And this was eaſily to be obſerved, by examining the bullet; as both the marks of the rifles, and the part that impinged on the wall, were ſufficiently apparent. Now, as theſe wooden bullets were but the 16th part of the weight of the leaden ones; I conclude, that if there had been any unequal reſiſtance or deflective power, its effects muſt have been extremely ſenſible upon this light body, and conſequently in ſome of the trials I made, the ſurface which came foremoſt from the piece muſt have been turned round into another ſituation.

"But again, I took the ſame piece, and, loading it now with a leaden ball, I ſet it nearly upright, ſloping it only three or four degrees from the perpendicular in the direction of the wind; and firing it in this ſituation, the bullet generally continued about half a minute in the air, it riſing by computation to near three quarters of a mile perpendicular height. In theſe trials I found that the bullet commonly came to the ground to the leeward of the piece; and at ſuch a diſtance from it, as nearly correſponded to the angle of its inclination, and to the effort of the wind; it uſually falling not nearer to the piece than 100, nor farther from it than 150, yards. And this is a ſtrong confirmation of the almoſt ſteady flight of this bullet for about a mile and a half: for were the ſame trial made with a common piece, I doubt not but the deviation would often amount to half a mile, or perhaps conſiderably more; though this experiment would be a very difficult one to examine, on account of the little chance there would be of diſcovering where the ball fell.

37 Balls from rifled pieces will at length deviate from their true courſe.

"It muſt be obſerved, however, that though the bullet impelled from a rifle-barrelled piece keeps for a time to its regular track with ſufficient nicety; yet if its flight be ſo far extended that the track becomes conſiderably incurvated, it will then undergo conſiderable deflections. This, according to my experiments, ariſes from the angle at laſt made by the axis on which the bullet turns, and the direction in Practice. which it flies: for that axis continuing nearly parallel to itſelf, it muſt neceſſarily diverge from the line of the flight of the bullet, when that line is bent from its original direction: and when it once happens that the bullet whirls on an axis which no longer coincides with the line of its flight, then the unequal reſiſtance formerly deſcribed will take place, and the deflecting power hence ariſing will perpetually increaſe as the track of the bullet, by having its range extended, becomes more and more incurvated.—This matter I have experienced in a ſmall rifle-barrelled piece, carrying a leaden ball of near half an ounce weight. For this piece, charged with one dram of powder, ranged about 550 yards at an angle of 12 degrees with ſufficient regularity; but being afterwards elevated to an angle of 24 degrees, it then ranged very irregularly, generally deviating from the line of its direction to the left, and in one caſe not leſs than 100 yards. This apparently aroſe from the cauſe above mentioned, as was confirmed from the conſtant deviation of the bullet to the left; for by conſidering how the revolving motion was continued with the progreſſive one; it appeared that a deviation that way was to be expected.

"The beſt remedy I can think of for this defect is the making uſe of bullets of an egg-like form inſtead of ſpherical ones. For if ſuch a bullet hath its ſhorter axis made to fit the piece, and it be placed in the barrel with its ſmaller end downwards, then it will acquire by the rifles a rotation round its larger axis; and its centre of gravity lying nearer to its fore than its hinder part, its longer axis will be conſtantly forced by the reſiſtance of the air into the line of its flight; as we ſee, that by the ſame means arrows conſtantly lie in the line of their direction, however that line be incurvated.

"But, beſides this, there is another circumſtance in the uſe of theſe pieces, which renders the flight of their bullets uncertain when fired at a conſiderable elevation. For I find by my experiments, that the velocity of a bullet fired with the ſame quantity of powder from a rifled barrel, varies much more from itſelf in different trials than when fired from a common piece. This, as I conceive, is owing to the great quantity of friction, and the impoſſibility of rendering it equal in each experiment. Indeed, if the rifles are not deeply cut, and if the bullet is nicely fitted to the piece, ſo as not to require a great force to drive it down, and if leather or fuſtian well greaſed is made uſe of between the bullet and barrel, perhaps, by a careful attention to all theſe particulars, great part of the inequality in the velocity of the bullet may be prevented, and the difficulty in queſtion be in ſome meaſure obviated: but, till this be done, it cannot be doubted, that the range of the ſame piece, at an elevation, will vary conſiderably in every trial; although the charge be each time the ſame. And this I have myſelf experienced, in a number of diverſified trials, with a rifle-barrelled piece loaded at the breech in the Engliſh manner. For here the rifles being indented very deep, and the bullet ſo large as to fill them up completely, I found, that though it flew with ſufficient exactneſs to the diſtance of 400 or 500 yards; yet when it was raiſed to an angle of about 12 degrees (at which angle, being fired with one-fifth of its weight in

Practice. in powder, its medium range is nearly 1000 yards); in this caſe, I ſay, I found that its range was variable; although the greateſt care was taken to prevent any inequalities in the quantity of powder, or in the manner of charging. And as, in this caſe, the angle was too ſmall for the firſt mentioned irregularity to produce the obſerved effects; they can only be imputed to the different velocities which the bullet each time received by the unequal action of the friction."

Thus we ſee, that it is in a manner impoſſible entirely to correct the aberrations ariſing from the reſiſtance of the atmoſphere; as even the rifle-barrelled pieces cannot be depended upon for more than one-half of their actual range at any conſiderable elevation. It becomes therefore a problem very difficult of ſolution to know, even within a very conſiderable diſtance, how far a piece will carry its ball with any probability of hitting its mark, or doing any execution. The beſt rules hitherto laid down on this ſubject are thoſe of Mr Robins. The foundation of all his calculations is the velocity with which the bullet flies off from the mouth of the piece. Mr Robins himſelf had not opportunities of making many experiments on the velocities of cannon-balls, and the calculations from ſmaller ones cannot always be depended upon. In the 68th volume of the Phil. Tranſ. Mr Hutton hath recited a number of experiments made on cannon carrying balls from one to three pounds weight. His machine for diſcovering the velocities of theſe balls was the ſame with that of Mr Robins, only of a larger ſize. His charges of powder were two, four, and eight ounces; and the reſults of 15 experiments which ſeem to have been the moſt accurate, are as follow.

38 Mr Hutton's experiments on the velocity of cannon balls.

Velocity with two ounces.	Velocity with four ounces.	Velocity with eight ounces.
702 feet in 1″	1068 feet in 1″	1419 feet in 1″
682	1020	1352
695	948	1443
703	973	1360
725	957	1412
5)3507	5)4966	5)6986
Mean velocities 701	993	1397

In another courſe, the mean velocities, with the ſame charges of powder, were 613, 873, 1162. "The mean velocities of the balls in the firſt courſe of experiments (ſays Mr Hutton) with two, four, and eight ounces of powder, are as the numbers 1, 1.414, and 1.993; but the ſubduplicate ratio of the weights (two, four, and eight) give the numbers 1, 1.414, and 2, to which the others are ſufficiently near. It is obvious, however, that the greateſt difference lies in the laſt number, which anſwers to the greateſt velocity. It will ſtill be a little more in defect if we make the allowance for the weights of the balls; for the mean weights of the balls with the two and four ounces is $18\frac{3}{4}$ ounces, but of the eight ounces it is $18\frac{1}{2}$; diminiſhing therefore the number 1.993 in the reciprocal ſubduplicate ratio of $18\frac{1}{2}$ to $18\frac{3}{4}$, it becomes 1.985, which falls ſhort of the number 2 by .015, or the 133d part of itſelf. A ſimilar defect was obſerved in the other courſe of experiments; and both are owing to three evident cauſes, viz. 1. The leſs length of cylinder through which the ball was impelled; for with the eight ounce charge it lay three or four inches nearer to the muzzle of the piece than with the others. 2. The greater quantity of elaſtic fluid which eſcaped in this caſe than in the others by the windage. This happens from its moving with a greater velocity; in conſequence of which, a greater quantity eſcapes by the vent and windage than in ſmaller velocities. 3. The greater quantity of powder blown out unfired in this caſe than in that of the leſſer velocities; for the ball which was impelled with the greater velocity, would be ſooner out of the piece than the others, and the more ſo as it had a leſs length of the bore to move through; and if powder fire in time, which cannot be denied, though indeed that time is manifeſtly very ſhort, a greater quantity of it muſt remain unfired when the ball with the greater velocity iſſues from the piece, than when that which has the leſs velocity goes out, and ſtill the more ſo as the bulk of powder which was at firſt to be inflamed in the one caſe ſo much exceeded that in the others. Practice.

"Let us now compare the correſponding velocities in both caſes. In the one they are 701, 993, 1397; in the other, 613, 873, 1162. Now the ratio of the firſt two numbers, or the velocities with two ounces of powder, is that of 1 to 1.1436, the ratio of the next two is that of 1 to 1.1375, and the ratio of the laſt is that of 1 to 1.2022. But the mean weight of the ſhot for two and four ounces of powder was $28\frac{1}{3}$ ounces in the firſt courſe and $18\frac{3}{4}$ in this; and for eight ounces of powder it was $28\frac{1}{2}$ in the firſt and $18\frac{1}{2}$ in this. Taking therefore the reciprocal ſubduplicate ratios of theſe weights of ſhot, we obtain the ratio of 1 to 1.224 for that of the balls which were fired with 2 ounces and four ounces of powder, and the ratio of 1 to 1.241 for the balls which were fired with eight ounces. But the real ratios above found are not greatly different from theſe; and the variation of the actual velocities from this law of the weights of ſhot inclines the ſame way in both courſes of experiments. We may now collect into one view the principal inferences that have reſulted from theſe experiments.

1. "It is evident from them that powder fires almoſt inſtantaneouſly.

2. "The velocities communicated to balls or ſhot of the ſame weight with different quantities of powder, are nearly in the ſubduplicate ratio of theſe quantities; a very ſmall variation in defect taking place when the quantities of powder become great.

3. "When ſhot of different weights are fired with the ſame quantity of powder, the velocities communicated to them are nearly in the reciprocal ſubduplicate ratio of their weights.

4. "Shot which are of different weights, and impelled by different quantities of powder, acquire velocities which are directly as the ſquare roots of the quantities of powder, and inverſely as the ſquare roots of the weights of the ſhot nearly.

The velocities of the bullets being thus found as nearly as poſſible, the ranges may be found by the following rules laid down by Mr Robins.

39 Mr Robin's method of finding the ranges of bullets.

1. "Till the velocity of the projectile ſurpaſſes that of 1100 feet in a ſecond, the reſiſtance may be reckoned to be in the duplicate proportion of the velocity, and its mean quantity may be reckoned about

Practice. bout half an ounce avoirdupois on a 12 pound ſhot, moving with a velocity of about 25 or 26 feet in a ſecond.

2. " If the velocity be greater than that of 1100 or 1200 feet in a ſecond, then the abſolute quantity of the reſiſtance in theſe greater velocities will be near three times as great as it ſhould be by a compariſon with the ſmaller velocities.—Hence then it appears, that if a projectile begins to move with a velocity leſs than that of 1100 feet in 1″, its whole motion may be ſuppoſed to be conſidered on the hypotheſis of a reſiſtance in the duplicate ratio of the velocity. And if it begins to move with a velocity greater than this laſt mentioned, yet if the firſt part of its motion, till its velocity be reduced to near 1100 feet in 1″, be conſidered ſeparately from the remaining part in which the velocity is leſs than 1100 feet in 1″; it is evident, that both parts may be truly aſſigned on the ſame hypotheſis; only the abſolute quantity of the reſiſtance is three times greater in the firſt part than in the laſt. Wherefore, if the motion of a projectile on the hypotheſis of a reſiſtance in the duplicate ratio of the velocity be truly and generally aſſigned, the actual motions of reſiſted bodies may be thereby determined, notwithſtanding the increaſed reſiſtances in the great velocities. And, to avoid the diviſion of the motion into two, I ſhall ſhow how to compute the whole at one operation with little more trouble than if no ſuch increaſed reſiſtance took place.

" To avoid frequent circumlocutions, the diſtance to which any projectile would range in a vacuum on the horizontal plane at 45° of elevation, I ſhall call the potential random of that projectile; the diſtance to which the projectile would range *in vacuo* on the horizontal plane at any angle different from 45°, I ſhall call the potential range of the projectile at that angle; and the diſtance to which a projectile really ranges, I ſhall call its actual range.

" If the velocity with which a projectile begins to move is known, its potential random and its potential range at any given angle are eaſily determined from the common theory of projectiles *; or more generally, if either its original velocity, its potential random, or its potential range, at a given angle, are known, the other two are eaſily found out.

* See *Projectiles.*

" To facilitate the computation of reſiſted bodies, it is neceſſary, in the conſideration of each reſiſted body, to aſſign a certain quantity, which I ſhall denominate F, adapted to the reſiſtance of that particular projectile. To find this quantity F to any projectile given, we may proceed thus: Firſt find, from the principles already delivered, with what velocity the projectile muſt move, ſo that its reſiſtance may be equal to its gravity. Then the height from whence a body muſt deſcend in a vacuum to acquire this velocity is the magnitude of F ſought. But the conciſeſt way of finding this quantity F to any ſhell or bullet is this. If it be of ſolid iron, multiply its diameter meaſured in inches by 300, the product will be the magnitude of F expreſſed in yards. If, inſtead of a ſolid iron bullet, it is a ſhell or a bullet of ſome other ſubſtance; then, as the ſpecific gravity of iron is to the ſpecific gravity of the ſhell or bullet given, ſo is the F correſponding to an iron bullet of the ſame diameter to the proper F for the ſhell or bullet given. The quantity F being thus aſſigned, the neceſſary computations of theſe reſiſted motions may be diſpatched by the three following propoſitions, always remembering that theſe propoſitions proceed on the hypotheſis of the reſiſtance being in the duplicate proportion of the velocity of the reſiſted body. How to apply this principle, when the velocity is ſo great as to have its reſiſtance augmented beyond this rate, ſhall be ſhewn in a corrollary to be annexed to the firſt propoſition. Practice.

Actual ranges expreſſed in F	Correſponding potential ranges expreſſed in F.	Actual ranges expreſſed in F.	Correſponding potential ranges expreſſed in F	Actual ranges expreſſed in F	Correſponding potential ranges expreſſed in F.
0.01	0.0100	1.55	2.7890	3.3	13.8258
0.02	0.0201	1.6	2.9413	3.35	14.4195
0.04	0.0405	1.65	3.0994	3.4	15.0377
0.06	0.0612	1.7	3.2635	3.45	15.6814
0.08	0.0822	1.75	3.4338	3.5	16.3517
0.1	0.1034	1.8	3.6107	3.55	17.0497
0.12	0.1249	1.85	3.7944	3.6	17.7768
0.14	0.1468	1.9	3.9851	3.65	18.5341
0.15	0.1578	1.95	4.1833	3.7	19.3229
0.2	0.2140	2.	4.3890	3.75	20.1446
0.25	0.2722	2.05	4.6028	3.8	21.0006
0.3	0.3324	2.1	4.8249	3.85	21.8925
0.35	0.3947	2.15	5.0557	3.9	22.8218
0.4	0.4591	2.2	5.2955	3.95	23.7901
0.45	0.5258	2.25	5.5446	4.0	24.7991
0.5	0.5949	2.3	5.8036	4.05	25.8506
0.55	0.6664	2.35	6.0728	4.1	26.9465
0.6	0.7404	2.4	6.3526	4.15	28.0887
0.65	0.8170	2.45	6.6435	4.2	29.2792
0.7	0.8964	2.5	6.9460	4.25	30.5202
0.75	0.9787	2.55	7.2605	4.3	31.8138
0.8	1.0638	2.6	7.5875	4.35	33.1625
0.85	1.1521	2.65	7.9276	4.4	34.5686
0.9	1.2436	2.7	8.2813	4.45	36.0346
0.95	1.3383	2.75	8.6492	4.5	37.5632
1.0	1.4366	2.8	9.0319	4.55	39.1571
1.05	1.5384	2.85	9.4300	4.6	40.8193
1.1	1.6439	2.9	9.8442	4.65	42.4527
1.15	1.7534	2.95	10.2752	4.7	44.3605
1.2	1.8669	3.0	10.7237	4.75	46.2460
1.25	1.5845	3.05	11.1904	4.8	48.2127
1.3	2.1066	3.1	11.6761	4.85	50.2641
1.35	2.2332	3.15	12.1816	4.9	52.4040
1.4	2.3646	3.2	12.7078	4.95	54.6363
1.45	2.5008	3.25	13.2556	5.0	56.9653
1.5	2.6422				

" PROP. I. Given the actual range of a given ſhell or bullet at any ſmall angle not exceeding 8° or 10°, to determine its potential range, and conſequently its potential random and original velocity.

" SOL. Let the actual range given be divided by the F correſponding to the given projectile, and find the quote in the firſt column of the preceding Table: then the correſponding number in the ſecond column multiplied into F will be the potential range ſought: and thence, by the methods already explained, the potential random and the original velocity of the projectile is given.

" EXAM.

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" EXAM. An 18 pounder, the diameter of whose shot is about 5 inches,, when loaded with 2 lb. of powder, ranged at an elevation of 3° 30′ to the distance of 975 yards.

" The F corresponding to this bullet is 1500 yards; and the quote of the actual range by this number is 65; corresponding to which, in the second column, is .817; whence 817 F, or 1225 yards, is the potential range sought; and this, augmented in the ratio of the sine of twice the angle of elevation to the radius, gives 10050 yards for the potential random: whence it will be found, that the velocity of this projectile was that of 984 feet in a second.

" COR. 1st. If the converse of this proposition be desired; that is, if the potential range in a small angle be given, and thence the actual range be sought; this may be solved with the same facility by the same table: for if the given potential range be divided by its correspondent F, then opposite to the quote sought in the second column, there will be found in the first column a number which multiplied into F will give the actual range required. And from hence it follows, that if the actual range be given at one angle, it may be found at every other angle not exceeding 8° or 10°.

" COR. 2d. If the actual range at a given small angle be given, and another actual range be given, to which the angle is sought; this will be determined by finding the potential ranges corresponding to the two given actual ranges; then the angle corresponding to one of these potential ranges being known, the angle corresponding to the other will be found by the common theory of projectiles.

" COR. 3d. If the potential random deduced from the actual range by this proposition exceeds 13000 yards; then the original velocity of the projectile was so great, as to be affected by the treble resistance described above; and consequently the real potential random will be greater than what is here determined. However, in this case, the true potential random may be thus nearly assigned. Take a 4th continued proportional to 13000 yards, and the potential random found by this proposition, and the 4th proportional thus found may be assumed for the true potential random sought. In like manner, when the true potential random is given greater than 13000 yards, we must take two mean proportionals between 13000 and this random *; and the first of these mean proportionals must be assumed instead of the random given, in every operation described in these propositions and their corollaries. And this method will nearly allow for the increased resistance in large velocities, the difference only amounting to a few minutes in the angle of direction of the projected body, which, provided that angle exceeds two or three degrees, is usually scarce worth attending to.

* The operations directed in this corollary are best performed by the table of logarithms.

" Of this process take the following example.

" A 24 pounder fired with 12 pounds of powder, when elevated at 7° 15′, ranged about 2500 yards. Here the F being near 1700 yards, the quote to be sought in the first column is 147, to which the number corresponding in the second column is 2.556; whence the potential range is near 4350 yards, and the potential random thence resulting 17400. But this being more than 13000, we must, to get the true potential random, take a 4th continued proportional to 13000 and 17400; and this 4th proportional, which is about 31000 yards, is to be esteemed the true potential random sought; whence the velocity is nearly that of 1730 feet in a second.

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" SCHOLIUM. This proposition is confined to small angles, not exceeding 8° or 10°. In all possible cases of practice, this approximation, thus limited, will not differ from the most rigorous solution by so much as what will often intervene from the variation of the density of the atmosphere in a few hours time; so that the errors of the approximation are much short of other inevitable errors, which arise from the nature of this subject.

" PROP. II. Given the actual range of a given shell or bullet, at any angle not exceeding 45°, to determine its potential range at the same angle; and thence its potential random and original velocity.

" SOL. Diminish the F corresponding to the shell or bullet given in the proportion of the radius to the cosine of $\frac{1}{4}$ of the angle of elevation. Then, by means of the preceding table, operate with this reduced F in the same manner as is prescribed in the solution of the last proposition, and the result will be the potential range sought; whence the potential random, and the original velocity, are easily determined.

" EXAM. A mortar for sea-service, charged with 30lb. of powder, has sometimes thrown its shell, of $12\frac{1}{2}$ inches diameter, and of 231lb. weight, to the distance of 2 miles, or 5450 yards. This at an elevation of 45°.

" The F to this shell, if it were solid, is 3825 yards; but as the shell is only $\frac{4}{5}$ of a solid globe, the true F is no more than 3060 yards. This, diminished in the ratio of the radius to the cosine of $\frac{1}{4}$ of the angle of elevation, becomes 2544. The quote of the potential range by this diminished F is 1.384; which sought in the first column of the preceding table gives 2.280 for the corresponding number in the second column; and this multiplied into the reduced F, produces 5800 yards for the potential range sought, which, as the angle of elevation was 45°, is also the potential random; and hence the original velocity of this shell appears to be that of about 748 feet in a second.

" COR. The converse of this proposition, that is, the determination of the actual range from the potential range given, is easily deduced from hence by means of the quote of the potential range divided by the reduced F; for this quote searched out in the second column, will give a corresponding number in the first column, which multiplied into the reduced F, will be the actual range sought.

" Also, if the potential random of a projectile be given, or its actual range at a given angle of elevation; its actual range at any other angle of elevation, not greater than 45°, may hence be known. For the potential random will assign the potential range at any given angle; and thence, by the method of this corollary, the actual range may be found.

" EXAM. A fit musquet-bullet fired from a piece of the standard dimensions, with $\frac{1}{3}$ of its weight in good powder, acquires a velocity of near 900 feet in a second: that is, it has a potential random of near 8400 yards. If now the actual range of this bullet at 15° was sought, we must proceed thus:

Practice.

" From the given potential random it follows, that the potential range at 15° is 4200 yards; the diameter of the bullet is $\frac{1}{4}$ of an inch; and thence, as it is of lead, its proper F is 337.5 yards, which, reduced in the ratio of the radius to the cosine of $\frac{1}{4}$ of 15°, becomes 331 yards. The quote of 4200 by this number is 12.7 nearly; which being sought in the second column, gives 3.2 nearly for the corresponding number in the first column; and this multiplied into 331 yards (the reduced F) makes 1059 yards for the actual range sought.

" EXAM. II. The same bullet, fired with its whole weight in powder, acquires a velocity of about 2100 feet in a second, to which there corresponds a potential random of about 45700 yards. But this number greatly exceeding 13000 yards, it must be reduced by the method described in the third corollary of the first proposition, when it becomes 19700 yards. If now the actual range of this bullet at 15° be required, we shall from hence find, that the potential range at 15° is 9850 yards; which, divided by the reduced F of the last example, gives for a quote 2975: and thence following the steps prescribed above, the actual range of this bullet comes out 1396 yards, exceeding the former range by no more than 337 yards; whereas the difference between the two potential ranges is above ten miles. Of such prodigious efficacy is the resistance of the air, which hath been hitherto treated as too insignificant a power to be attended to in laying down the theory of projectiles!

" SCHOL. I must here observe, that as the density of the atmosphere perpetually varies, increasing and diminishing often by $\frac{1}{10}$ part, and sometimes more, in a few hours; for that reason I have not been over rigorous in forming these rules, but have considered them as sufficiently exact when the errors of the approximation do not exceed the inequalities which would take place by a change of $\frac{1}{10}$ part in the density of the atmosphere. With this restriction, the rules of this proposition may be safely applied in all possible cases of practice. That is to say, they will exhibit the true motions of all kinds of shells and cannon-shot, as far as 45° of elevation, and of all musket bullets fired with their largest customary charges, if not elevated more than 30°. Indeed, if experiments are made with extraordinary quantities of powder, producing potential randoms greatly surpassing the usual rate; then in large angles some farther modifications may be necessary. And though, as these cases are beyond the limits of all practice, it may be thought unnecessary to consider them; yet, to enable those who are so disposed to examine these uncommon cases, I shall here insert a proposition, which will determine the actual motion of a projectile at 45°, how enormous soever its original velocity may be. But as this proposition will rather relate to speculative than practical cases, instead of supposing the actual range known, thence to assign the potential random, I shall now suppose the potential random given, and the actual range to be thence investigated.

" PROP. III. Given the potential random of a given shell or bullet; to determine its actual range at 45°.

SOL. Divide the given potential random by the F corresponding to the shell or bullet given, and call the quotient q, and let l be the difference between the tabular logarithms of 25 and of q, the logarithm of 10 being supposed unity; then the actual range sought is

$3.4\ F \mp 2\ l\ F - \frac{\|}{10} F$, where the double sine of $2\ l\ F$ is

to be thus understood; that if q be less than 25, it must be $-2\ l\ F$; if it be greater, then it must be $+2\ l\ F$. In this solution, q may be any number not less than 3, nor more than 2500.

" COR. Computing in the manner here laid down, we shall find the relation between the potential randoms, and the actual range at 45°, within the limits of this proposition, to be as expressed in the following table.

Potential Randoms.	Actual Range at 45°.
3 F	1.5 F
6 F	2.1 F
10 F	2.6 F
20 F	3.2 F
30 F	3.6 F
40 F	3.8 F
50 F	4.0 F
100 F	4.6 F
200 F	5.1 F
500 F	5.8 F
1000 F	6.4 F
2500 F	7.0 F

Whence it appears, that, when the potential random is increased from 3 F to 2500 F, the actual range is only increased from $1\frac{1}{2}$ F to 7 F; so that an increase of 2497 F in the potential random produces no greater an increase in the actual range than $5\frac{1}{2}$ F, which is not its $\frac{1}{400}$ part; and this will again be greatly diminished on account of the increased resistance, which takes place in great velocities. So extraordinary are the effects of this resistance, which we have been hitherto taught to regard as inconsiderable.

" That the justness of the approximations laid down in the 2d and 3d propositions may be easier examined; I shall conclude these computations by inserting a table of the actual ranges at 45° of a projectile, which is resisted in the duplicate proportion of its velocity. This table is computed by methods different from those hitherto described, and is sufficiently exact to serve as a standard with which the result of our other rules may be compared. And since whatever errors occur in the application of the preceding propositions, they will be most sensible at 45° of elevation, it follows, that hereby the utmost limits of those errors may be assigned.

Potential Randoms.	Actual Range at 45°.
.1 F	.0963 F
.25 F	.2282 F
.5 F	.4203 F
.75 F	.5868 F
1.0 F	.7323 F
1.25 F	.860 F
1.5 F	.978 F
1.75 F	1.083 F
2.0 F	1.179 F
2.5 F	1.349 F
3.0 F	1.495 F

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Potential Randoms.					Actual Range at 45°	
3.5	F	——	——	——	1.624	F
4.0	F	——	——	——	1.738	F
4.5	F	——	——	——	1.840	F
5.0	F	——	——	——	1.930	F
5.5	F	——	——	——	2.015	F
6.0	F	——	——	——	2.097	F
6.5	F	——	——	——	2.169	F
7.0	F	——	——	——	2.237	F
7.5	F	——	——	——	2.300	F
8.0	F	——	——	——	2.359	F
8.5	F	——	——	——	2.414	F
9.0	F	——	——	——	2.467	F
9.5	F	——	——	——	2.511	F
10.0	F	——	——	——	2.564	F
11.0	F	——	——	——	2.651	F
13.0	F	——	——	——	2.804	F
15.0	F	——	——	——	2.937	F
20.0	F	——	——	——	3.196	F
25.0	F	——	——	——	3.396	F
30.0	F	——	——	——	3.557	F
40.0	F	——	——	——	3.809	F
50.0	F	——	——	——	3.998	F

40 Of the different parts and propotions of guns.

We have now only to conſider that part of practical gunnery which relates to the proportions of the different parts of cannon, the metal of which they are made, &c.

Formerly the guns were made of a very great length, and were on that account extremely troubleſome and unmanageable. The error here was firſt diſcovered by accident; for ſome cannon, having been caſt by miſtake two feet and an half ſhorter than the common ſtandard, were found to be equally efficacious in ſervice with the common ones, and much more manageable. This ſoon produced very conſiderable alterations in the form of the artillery throughout Europe: but in no country have greater improvements in this reſpect been made than in our own. For a long time braſs, or rather a kind of bell-metal, was thought preferable to caſt iron for making of cannon. The compoſition of this metal is generally kept a ſecret by each particular founder.

41 Compoſition for guns.

The author of the Military Dictionary gives the following proportions as the moſt common, viz. "To 240 lb. of metal fit for caſting they put 68 lb. of copper, 52 lb. of braſs, and 12 lb. of tin. To 4200 lb. of metal fit for caſting, the Germans put 3687$\frac{3}{11}$ lb. of copper, 204$\frac{12}{11}$ lb. of braſs, and 307$\frac{9}{11}$ lb. of tin. Others uſe 100 lb. of copper, 6 lb. of braſs, and 9 lb. of tin; while ſome make uſe of 100 lb. of copper, 10 lb. of braſs, and 15 lb. of tin. This compoſition was both found to be very expenſive, and alſo liable to great inconveniences in the uſing. A few years ago, therefore, a propoſal was made by Mr Muller for uſing iron guns of a lighter conſtruction than the braſs ones, by which he ſuppoſed that a very great ſaving would be made in the expence; and likewiſe, that the guns of the new conſtruction would be more manageable, and even efficacious, than the old ones. "The reduction of the expence (ſays Mr Muller) of the very large artillery neceſſary for ſea and land ſervice, is to be conſidered under two heads: the one, To diminiſh the weight; and the other, Not to uſe any braſs field-artillery, but only iron, to leſſen the great burden of our ſhips of war, and to carry larger calibers than thoſe of other nations of the ſame rate. If the weights of our guns are diminiſhed, they will require fewer hands to manage them, and of conſequence a ſmaller number will be expoſed to danger at a time: and if we carry larger calibers, our rates will be a match for larger ſhips.

42 Mr Muller's propoſal for reducing the weight of guns.

"The advantage of uſing iron guns in the field inſtead of braſs, will be that the expences are leſſened in proportion to the coſt of braſs to that of iron, which is as 8 to 1.

"The only objection againſt iron is, its pretended brittleneſs: but as we abound in iron that is ſtronger and tougher than any braſs, this objection is invalid. This I can aſſert, having ſeen ſome that cannot be broken by any force, and will flatten like hammered iron: if then we uſe ſuch iron, there can be no danger of the guns burſting in the moſt ſevere action.

"Though braſs guns are not liable to burſt, yet they are ſooner rendered unſerviceable in action than iron. For by the ſoftneſs of the metal, the vent widens ſo ſoon, and they are ſo liable to bend at the muzzle, that it would be dangerous to fire them; as we found by experience at Belleiſle, and where we were obliged to take guns from the ſhips to finiſh the ſiege.

"Theſe being undeniable facts, no poſſible reaſon can be aſſigned againſt uſing iron guns in both ſea and land ſervice, and thereby leſſen the expences of artillery ſo conſiderably as will appear by the following tables.

Lengths and Weights of Iron Ship-Guns.

Old Pieces.						New Pieces.					
Calib.	Length.		Weight.			Calib.	Length.		Weight.		
	Ft.	*In.*	*Cwt*	*qrs.*	*lb.*		*Ft.*	*In.*	*Cwt.*	*qrs.*	*lb.*
3	4	6	7	1	7	3	3	6	3	3	0
4	6	0	12	2	13	6	4	4	7	2	0
6	7	0	17	1	14	9	5	0	11	1	0
9	7	0	23	2	2	12	5	6	15	0	0
12	9	0	32	3	3	18	6	4	22	2	0
18	9	0	41	1	8	24	7	0	30	0	0
24	9	0	48	0	0	32	7	6	40	0	0
32	9	6	53	3	23	42	8	4	52	2	0
42	10	0	55	1	12	48	8	6	60	0	0

"Guns of this conſtruction appear ſufficiently ſtrong from the proof of two three-pounders made for Lord Egmont, and they even may be made lighter and of equal ſervice.

Practice.

Length and Weight of Battering Pieces.

Old Brass. Calib.	Length. Ft. In.	Weight. Cwt. qrs. lb.	New Iron. Calib.	Length. Ft. In.	Weight. Cwt. qrs. lb.
6	8 0	19 1 0	6	6 1	9 1 0
9	9 0	25 0 0		7 0	14 0 0
12	9 0	29 0 0	12	7 8	18 0 0
18	9 6	48 0 0	18	9 0	2 1 0
24	9 6	51 0 0	24	9 8	37 3 0
32	10 0	55 2 0	32	9 0	42 0 0
Total 227.			Total 151.		
			Diff. 72.		

"That theſe guns are ſufficiently ſtrong, is evident from the former trial; beſides, there are ſeveral 32 pounders of the ſame dimenſions and weight now exiſting and ſerviceable; though caſt in King Charles II.'s time.

N. B. Theſe battering pieces may ſerve in garriſons.

"It appears from theſe tables, that no proportion has been obſerved in any guns hitherto made, in reſpect to their length or weight, but merely by gueſs.

Some Examples to ſhow what may be ſaved by this Scheme.

The old Royal George carried 100 braſs guns, which weighed together 218.2 tons; the ton coſts 130 pounds, workmanſhip included.

The expence of theſe guns is then	28366 pounds
A ſet of iron guns of the ſame number and calibers, according to my conſtruction, weighs	127.8 tons
The ton coſt 16 pounds, and the whole ſet - -	2044.8 pounds
The Royal George carries then 90.4 tons more than is neceſſary, and the difference between the expence is - -	26321.2 pounds

That is, 12.5 times more than the new iron ſet coſts: or 12 ſhips of the ſame rate may be fitted out at leſs charge.

A ſet of the {Old / New} iron guns for a firſt rate weighs {204.4 / 127.8} tons	
The difference between the weight of the old and new is -	76.6 tons
The difference between the expence is then - -	1225.6 pounds
A ſet of braſs battering pieces weighs	11.36 tons
A ton coſts 130 pounds, and the ſet	1476.8 pounds
A ſet of the new weighs -	7.55 tons
The ton coſts 16 pounds, and the ſet	117.8 pounds

That is, the old ſet coſts 11 times, and 632 over, more than the new ſet; or 11 ſets of the new could be made at leſs expence than one of the old. Practice.

"This table ſhows what may be ſaved in the navy; and if we add thoſe on board ſloops, the different garriſons, and the field train, with the great expence of their carriage in the field, it may be found pretty near as much more.

Num. of Guns.	Weight of Old.	Weight of New.	Differ.	Num. of Ships	Total Difference.
100	4367 3	2556 0	1811 3	5	9058 0
90	3537 3	2001 0	1536 3	9	13827 3
80	3108 3	1821 0	1287 3	7	9014 1
74	3091 0	1840 2	1250 8	32	40016 0
70	2997 0	1796 2	1200 8	10	12005 0
64	2543 3	1305 0	1258 3	23	28485 2
60	2177 3	1185 0	992 3	30	29782 2
50	1881 1	1035 0	846 1	19	16078 3
44	1365 2	705 0	660 2	8	5284 0
40	1234 2	312 2	922 0	9	8298 0
36	963 3	450 0	513 3	7	3596 1
32	956 2	435 0	521 2	28	14602 0
28	593 2	285 0	308 2	23	7095 1
24	531 3	255 0	276 3	12	3321 0
20	421 2	191 1	230 1	15	3453 3

Difference between the weights	203918 3 0	
Expences of the {Braſs guns of two firſt rates	203918 15 0	
Iron ditto - -	43109 5 0	
We get	L. 257028 0 0	

To this and other propoſals for reducing the weight and expence of guns great attention has been paid; and the Carron Company in Scotland have not only greatly improved thoſe of the old conſtruction, but a gun of a different conſtruction, invented by Mr Charles Gaſcoigne, formerly director of that work, has been of more effectual ſervice than any hitherto made uſe of.——Fig. 6. repreſents the form and proportions of the guns made at Carron, and which ſerve for thoſe of all ſizes, from one-half pounders and upwards. The proportions are meaſured by the diameters of the caliber, or bore of the gun, divided into 16 equal parts, as repreſented in the figure. The following are the names of the different parts of a cannon. Plate CCXLVIII. 43 Proportions, &c. of the guns made at Carron.

AB, the length of the cannon.
AE, the firſt reinforce.
EF, the ſecond reinforce.
FB, the chaſe.
HB, the muzzle.
A *o*, the caſcabel, or pomiglion.
AC, the breech.
CD, the vent-field.
FI, the chaſe-girdle.
r s, the baſe-ring and ogee.
t, the vent-aſtragal and fillets.
p q, the firſt reinforce-ring and ogee.
V W, the ſecond reinforce-ring and ogee.
X, the chaſe-aſtragal and fillets.

z, the

Practice.

z, the muzzle-aſtragal and fillets.
n, the muzzle mouldings.
m, the ſwelling of the muzzle.
A *i*, the breech-mouldings.
TT, the trunnions.

The dotted lines along the middle of the piece ſhow the dimenſions of the caliber, and the dotted circle ſhows the ſize of the ball. Fig. 7. ſhows a cohorn made alſo at Carron, and which may be meaſured by the ſame ſcale.

44 Uſe and deſcription of carriages.

As the breech of the cannon receives an equal impulſe with the bullet from the action of the inflamed gunpowder, it thence follows, that at the moment the bullet flies off, the piece itſelf puſhes backward with very great force. This is called the *recoil* of the cannon; and if the piece is not of a very conſiderable weight, it would fly upwards, or to a ſide, with extreme violence. If again it was firmly faſtened down, ſo that it could not move in the leaſt, it would be very apt to burſt, on account of the extreme violence with which the powder would then act upon it. For this reaſon it hath been found neceſſary to allow the recoil to take place, and conſequently all large pieces of artillery are mounted upon carriages with wheels, which allow them to recoil freely; and thus they may be fired without any danger. There are ſeveral ſorts of carriages for ordnance, viz. baſtard carriages, with low wheels and high wheels; ſea-carriages, made in imitation of thoſe for ſhip-guns; and carriages for field-pieces, of which there are two kinds. The carriages muſt be proportioned to the pieces mounted on them. The ordinary proportion is for the carriage to have once and a half the length of the gun, the wheels to be half the length of the piece in height. Four times the diameter or caliber gives the depth of the planks in the fore end; in the middle $3\frac{1}{2}$.

45 Deſcription of the carronade. * See *Carronade.*

Fig. 8. ſhows the gun called a *carronade** invented or rather improved by Mr Gaſcoigne; and which, in June 1779, was by the king and council inſtituted a ſtandard navy-gun, and 10 of them appointed to be added to each ſhip of war, from a firſt-rate to a ſloop. Of this gun the Carron Company have publiſhed the following account.

"The carronade is made ſo ſhort, that it is worked with its carriage in the ſhip's port; the trunnions lying immediately over the fill of the port: it is correctly bored; and the ſhot being perfectly round, fills the caliber with ſuch exactneſs, that the leaſt poſſible of the impulſe of the powder eſcapes, upon exploſion, between the cylinder and the ſhot; which laſt alſo is thereby more truly directed in its flight. The bottom of the cylinder is a hemiſphere, to which the end of the cartridge is not liable to ſtick, and in which the ſmalleſt charge of powder envelopes the ſhot, exhauſting nearly the whole of its impelling force upon it: the trunnions are placed ſo as to leſſen the recoil, and that the gun cannot reſt againſt the ſides of the carriage, and is balanced with the utmoſt facility. There are views caſt upon the vent and muzzle, to point the gun quickly to an object at 250 and 500 yards diſtance. There is a handle A fixed upon the pommel-end of the gun, by which it is horizontally ranged and pointed; and there is a ring caſt upon the caſcabel, through which the breechin rope is reeved, the only rope uſed about theſe guns. Practice.

"The carronade is mounted upon a carriage B, with a perfectly ſmooth bottom of ſtrong plank, without trucks; inſtead of which there is fixed on the bottom of the carriage, perpendicular from the trunnions, a gudgeon C of proper ſtrength, with an iron waſher D and pin E at the lower end thereof. This gudgeon is let into a correſponding groove F, cut in a ſecond carriage G, called a *ſlide-carriage;* the waſher ſupported by the pin over-reaching the under edges of the groove H. This ſlide-carriage is made with a ſmooth upper ſurface, upon which the gun-carriage is moved, and by the gudgeon always kept in its right ſtation to the port; the groove in the ſlide-carriage being of a ſufficient length to allow the gun to recoil and be loaded within board. The ſlide-carriage, the groove included, is equally broad with the fore part of the gun-carriage, and about four times the length; the fore part of the ſlide-carriage is fixed by hinge-bolts I, to the quick-work of the ſhip below the port, the end lying over the fill, cloſe to the outſide plank, and the groove reaching to the fore end; the gudgeon of the gun-carriage, and conſequently the trunnions of the gun, are over the fill of the port when the gun is run out; and the port is made of ſuch breadth, with its ſides bevelled off within board, that the gun and carriage may range from bow to quarter. The ſlide-carriage is ſupported from the deck at the hinder end, by a wedge K, or ſtep-ſtool; which being altered at pleaſure, and the fore end turning upon the hinge-bolts, the carriage can be conſtantly kept upon a horizontal plane, for the more eaſy and quick working of the gun when the ſhip lies along.

"The gun and carriages being in their places, the breechin rope, which muſt be ſtrong and limber, is reeved through the ring on the breech, then led through an eye-bolt drove downwards, the eye ſtanding upright upon the upper edge of each cheek of the gun-carriage; from theſe eye-bolts the ends of the breechin rope are ſeized down as uſual to an eye-bolt driven into the quick-work on each ſide, in a line with the lower ſurface of the ſlide-carriage.

"The gun being mounted and ready for action, is loaded with one-twelfth part of the weight of its ball in ſervice charge of powder put into a woollen cartridge; and the end tied up with a worſted yarn, and placed next to the ſhot; and with a ſingle ball, well rammed home upon the powder, without a wadding between them: the gun being then run out in the port, is ranged and elevated with great facility, by means of the handle on the pommel; and, by the views, very quickly pointed.—Upon diſcharge, the gun attempts to kick upwards, which being prevented by the waſher of the gudgeon bearing hard againſt the under part of the ſlide-carriage, the recoil takes place; and the gudgeon ſliding backwards in the groove (the waſher ſtill bearing againſt an iron plate on the under edge of the groove), till the gun is brought up by the breechin rope, as much re-action ſucceeds as ſlackens the rope, ſo that the gun and carriage may be inſtantly turned fore and aft by the handle, and loaded again.

"This gun has many ſingular advantages over the

Practice. others of light conſtruction.—It is ſo extremely light, that the ſmalleſt ſhips can carry almoſt any weight of ſhot (the 12 pounder weighing under 500 wt. and the other calibers in proportion), and that without being attended with the inconveniences imputed generally to light guns, ſince it cannot injure its carriage, or jump out of its ſtation in the port upon recoil; and it will never heat.

"It can be eaſily managed and worked of all calibers, from the 12 pounders downwards with two hands, and the 18 and 24 pounders with three hands. It may be readily ranged, pointed, and diſcharged, twice in three minutes, which doubles the ſtrength of the ſhip againſt an enemy of equal force. It is wrought upon a horizontal plane to windward or to leeward how much ſoever the ſhip lies along under a preſſure of ſail; and therefore, beſides being hampered with no tackles or other ropes, except the breechin rope, it may be worked with as much eaſe and expedition in chace or in a gale of wind as in lying to for action.—It can be ranged from bow to quarter, ſo as to bring a broadſide to bear in a circuit of above 10 points of the compaſs on each ſide.—It is no more expenſive in ammunition than the old guns of two-thirds leſs weight of ſhot; and it requires very few hands above the complement neceſſary for navigating merchant-ſhips; and increaſes the ſtrength of privateers crews, by expoſing few hands at the guns, and augmenting the number at ſmall arms.

"Though the carronade cannot, ſtrictly ſpeaking, throw its ſhot to an equal diſtance with a longer gun; yet, from the fitneſs of the ſhot to its cylinder, the powers of this gun will greatly ſurpaſs the expectations of ſuch as are not intimately acquainted with the effects of the elaſtic force of fired powder, ſince, with one-twelfth part of the weight of its ball, at very ſmall elevations, it will range its ſhot to triple the diſtance at which ſhips generally engage, with ſufficient velocity for the greateſt execution, and with all the accuracy in its direction that can be attained from guns of greater lengths.

46 Objections to its uſe anſwered.

"There have been two ſeeming diſadvantages imputed to this gun, which it does not merit, viz. the nicety of fitting the ſhot to the bore of the gun, and its incapacity to hold more than two ſhot at one charge. But as ſeamen have few opportunities of confirming themſelves in juſt opinions by experiments made on ſhore, and cannot, in that caſe, be fully converſant with the ſubject; the following looſe hints may not be inept towards removing theſe objections.

"It is an axiom in projectiles, That a ſhot cannot be impelled from a gun to any diſtance in a direction truly parallel to the axis of the cylinder of the piece, or what is commonly called *point blank*, ariſing from ſeveral well known cauſes: for, however juſt may be the cylinder, and however perfect and ſmooth may be the ſphere of its correſponding ſhot, and admitting that the impulſe of the powder acts through the centre of gravity of the ſhot, and alſo that the ſhot conſequently leaves the piece *in a direction parallel to the axis of its cylinder*; yet the ſhot is no ſooner diſcharged, but it becomes more or leſs inflected by its *gravity*, and deflected, according to its velocity, by the *reſiſtance of the air and wind*.

"These irregularities are of little importance in cloſe ſea-fights, and being the effect of natural cauſes are common to all. Beſides theſe, the deviation of a ſhot from its true direction, is further augmented by the windage between the cylinder and its ſhot; but the greateſt uncertainty in the flight of a ſhot, making allowance for the action of its gravity, and the air's reſiſtance, ſprings from the defects of the ſhot itſelf. Round-ſhot for ſhip-guns are ſeldom nicely examined; and, unleſs they are caſt *ſolid and truly globular*, and free of all hollows, roughneſs, and other outſide blemiſhes, and well fitted to the gun, it cannot even *be diſcharged in the direction of the axis of the piece*; to the diſappointment of thoſe that uſe ſuch, and to the diſcredit of the gun-founder, however juſtly the piece is viewed, or diſparted; but being impelled againſt the ſurface of the cylinder, bounds and rebounds from ſide to ſide, acquires a rotatory motion, and when caſt hollow withal, and breaking within the cylinder before diſcharge, (which ſometimes happens, eſpecially with double charges), never fails to injure, and when often repeated may at laſt burſt, the very beſt guns. Round-ſhot ſhould not be taken on board a ſhip, without being examined as to its ſhape and ſurface, gaged for its ſize to the caliber of the gun, and weighed that it be not above or below the ſtandard more than half an ounce in the pound of its reſpective caliber: good ſhot then, being of the ſame importance to all guns, removes the firſt objection. Practice.

"If the direction of the flight of a ſhot to its object is affected by ſo many ſeeming trivial cauſes, how much more uncertain muſt it be, when two or more ſhot are diſcharged together from one gun: for the ſhot next the powder being impelled with more celerity than that immediately before it, ſtrikes againſt it after diſcharge, and ſometimes ſhivers itſelf to pieces, and never fails to change obliquely the direction of both; and this happens with round and double-headed, &c. and all double charges; and which, from their various figures, cannot reach an object at the ſame elevations with the round-ſhot; eſpecially when theſe other ſhots are of greater weight than the round, which is often the caſe. However frightful a broadſide with double charges may appear at ſea, more confuſion is created by them, and more time loſt, *within board*, by the ſtrain and exceſſive recoil, than real damage done *without board* by the additional charge: for upon a trial on ſhore, where the effect can be traced, it will be found, that, at 100 yards diſtance, more ſhot will take place within a ſmall compaſs by ſingle than by double charges; and the charges will be oftener repeated in a given time, without heating the gun: and theſe facts being eſtabliſhed, remove alſo the ſecond objection."

The following account of the proof of one of theſe guns will perhaps ſerve to give a more adequate idea of the great uſefulneſs of them, than any deſcription:

"On Monday, Oct. 4. 1779, there was an experiment made at Carron, before the earl of Dunmore, &c. &c. with a 68 pounder carronade, nearly of the weight of a Britiſh navy 12-pounder gun, and charged with the ſame quantity, (viz. 6lb.) of powder.—The carronade was mounted, on its proper carriages, into a port of the dimenſions of a 74 gun ſhip's lower deck-port; was pointed without elevation, at a centre of eight inches diameter, marked on a bulk's head of the thickneſs

Practice. thickneſs of two feet five inches ſolid wood, at 163 yards diſtance; behind which, at 168 yards, there was another bulk's head of two feet four inches thick; and behind that again, at 170 yards diſtance, a bank of earth. The ſhot pierced the bulk's heads each time, and was buried from three to four feet into the bank, and the ſplinters were thrown about to a conſiderable diſtance on all ſides. Practice.

1ſt ſhot ſtruck	1 foot 7 inches	below the horizontal line,		and 5 feet	——	from the mark.
2d	ditto	2 feet	ditto,	——	ditto,	and 2 ditto	——	from	ditto.
3d	do.	through the horizontal line				and 3 do. 4 inches	from	do.
4th	do.	ditto	——	——	do.	and 2 do. 4 ditto	from	do.
5th	do.	ditto	——	——	do.	2 do. 10 do.	from	do.
6th	do.	2 inches	below ——	——	do.	—— 10 do.	from	do.
7th	do.	touched the lower part of	ditto		do.	—— 7 do.	from	do.
8th	do.	2 inches	below ——	——	do.	—— 10 do.	from	do.
9th	do.	2 feet	below ——	——	do.	1 foot 9 do.	from	do.
10th	do.	3 inches	below ——	——	do.	—— 3 do.	from	do.

"The carronade was laid each time by the views without an inſtrument; and the ſhot were all to the left of the mark, owing to a ſmall error in diſparting the views; the third, fourth, and fifth ſhot, made one fracture, as did alſo ſixth, ſeventh, and eighth, and the ſixth and eighth ſtruck the ſame ſpot.

"The carronade was eaſily worked with four men, and may be readily worked and diſcharged on board a ſhip twice a-minute with ſix men.—With ſix pounds weight of powder the ſhot was impelled with a velocity of 1400 feet a ſecond."

47 Deſcription of rifled ordnance. We have already ſeen of how much conſequence rifle-barrels are in order to bring the art of gunnery to perfection; as they enlarge the ſpace in which the ball will fly without any lateral deflection to three or four times its uſual quantity. This improvement, however, till very lately, only took place in muſket-barrels. But in the beginning of the year 1774, Dr Lind, and Captain Alexander Blair of the 69th regiment of foot, invented a ſpecies of rifled field-pieces. They are made of caſt iron, and are not bored like the common pieces, but have the rifles moulded on the core, after which they are cleaned out and finiſhed with proper inſtruments.

Guns of this conſtruction, which are intended for the field, ought never to be made to carry a ball of above one or two pounds weight at moſt; a leaden bullet of that weight being ſufficient to deſtroy either man or horſe.—A pound gun, of this conſtruction, of good metal, ſuch as is now made by the Carron Company, need not weigh above an hundred pounds weight, and its carriage about another hundred. It can therefore be eaſily tranſported from place to place, by a few men; and a couple of good horſes may tranſport ſix of theſe guns and their carriages, if put into a cart.

But, for making experiments, in order to determine the reſiſtance which bodies moving with great velocities meet with from the air, a circumſtance to which theſe guns are particularly well adapted, or for annoying an enemy's ſappers that are carrying on their approaches towards a beſieged place, a larger caliber may be uſed.

Fig. 9. The length of the gun being divided into ſeven equal parts, the length of the firſt reinforce AB is two of theſe parts; the ſecond BC, one and $\frac{15}{16}$ of the diameter of the caliber; the chaſe CD, four wanting $\frac{15}{16}$ of the diameter of the caliber.

The diſtance from the hind part of the baſe-ring A to the beginning of the bore, is one caliber and $\frac{1}{16}$ of a caliber. The trunnions TT are each a caliber in breadth, and the ſame in length; their centres are placed three-ſevenths of the gun's length from the hind part of the baſe ring, in ſuch a manner that the axis of the trunnions paſſes through the centre line of the bore, which prevents the gun from kicking, and breaking its carriage. The length of the caſcabel is one caliber and $\frac{13}{16}$ of a caliber.

The caliber of the gun being divided into 16 equal parts;

The thickneſs of metal at the baſe-ring A from the bore, is - - -	18.5
At the end of the firſt reinforce ring B	17
At the ſame place, for the beginning of the ſecond reinforce - - -	17
At the end of the ſecond reinforce C	15
At the ſame place for the beginning of the chaſe *c* - - - -	13.75
At the end of the chaſe or muzzle, the mouldings *a* D excluded - -	9
At the ſwelling of the muzzle *b* -	12
At the muzzle-fillet *c* - -	9.5
At the extreme moulding D -	8
Baſe-ring - - -	5.5
Ogee next the baſe-ring *d* -	5.5
The aſtragal or half-round -	4.75
Its fillet - - -	1
Total aſtragal and fillets at the ventfield *c*	4
Firſt reinforce ring B - -	4.5
Second reinforce ring C - -	3.5
Its ogee - - -	3
Its aſtragal - -	1.5
And its fillet - - -	1
The muzzle aſtragal, and fillet *a* -	4
Breadth of the fillet at the baſe-ring	1
Diſtance of the fillet at the button from the fillet at the baſe-ring - -	5
Breadth of the fillet at the button -	1
Diameter of the fillet at the button -	18
Diſtance of the centre of the button from its fillet - - -	12
Diameter of the button E -	18
Diameter of its neck - -	10.5

The vent ſhould be placed about half an inch from the bottom of the chamber or bore, that the cartridge may be pricked, leſt ſome of the bottoms of the cartridges

Practice. tridges ſhould be left in when the gun is ſponged, a circumſtance which might retard the firing till the ſhot be again drawn (which is no eaſy matter), and the gun be cleaned out. From ſome experiments of Colonel Deſaguliers and Mr Muller, it has been imagined, that the powder never has ſo ſtrong an effect as when it is fired cloſe to the bottom of the bore; yet it is found, by the experiments of Count de la Lippe, to have the greateſt effect when fired near to the middle of the charge. This he proved by firing it with tubes, introduced at a vent bored through the button and breech of the gun, of different lengths, ſo as to reach the different parts of the powder. In the ſame manner, a muſket or fowling-piece is found to puſh more when the touch-hole is placed at ſome little diſtance from the bottom of the bore; which ariſes from nothing but the powder's acting with more force, by being inflamed to greater advantage; conſequently, in this caſe, the ſame quantity of powder will have a greater effect, than when the touch-hole is placed at the bottom of the bore, which may be of ſome uſe in huſbanding the powder.

The above dimenſions are taken from ſome elegant one-half pound guns, which were made for the prince of Aſturias by the Carron Company.

The rifles make one ſpiral turn in the length of the bore; but go no nearer to the breech, in their full ſize, than two calibers; and then terminate with a gentle ſlope in half a caliber more, ſo as not to prevent the cartridge with the powder from being eaſily ſent home to the bottom of the gun, which would otherwiſe conſtantly happen with the flannel cartridges, and even ſometimes with paper ones, if not made to enter very looſely. The ſhape of the rifles is ſemicircular, their breadth being equal to the diameter, which is $\frac{3}{16}$ of a caliber, and their depth equal to the ſemidiameter, or $\frac{15}{16}$ of a caliber.

The bullets, fig. 10. are of lead, having ſix knobs caſt on them to fit the rifles of the gun. Being thus made of ſoft metal, they do not injure the rifles; and may alſo ſave an army the trouble of carrying a great quantity of ſhot about with them, ſince a ſupply of lead may be had in moſt countries from roofs, &c. which can be caſt into balls as occaſion requires. Lead likewiſe being of greater ſpecific gravity than caſt iron, flies to a much greater diſtance.

Rifled ordnance of any caliber may be made to carry iron-ſhot for battering or for other purpoſes; provided holes, that are a little wider at their bottoms than at their upper parts, be caſt in a zone round the ball, for receiving afterwards leaden knobs to fit the rifles of the cannon; by which means, the iron-ſhot will have its intended line of direction preſerved, without injuring the rifles more than if the whole ball was of lead, the rotatory motion round its axis, in the line of its direction (which corrects the aberration) being communicated to it by the leaden knobs, following the ſpiral turn of the rifles in its progreſs out of the gun. It is particularly to be obſerved, that the balls muſt be made to go eaſily down into the piece, ſo that the cartridge with the powder and the bullet may be both ſent home together, with a ſingle puſh of the hand, without any wadding above either powder or ball; by which means, the gun is quickly loaded, and the ball flies farther than when it is forcibly driven into the gun, as was found from many experiments. The only reaſon why, in common rifled muſkets, the bullets are rammed in forcibly, is this, that the zone of the ball which is contiguous to the inſide of the bore may have the figure of the rifles impreſſed upon it, in ſuch a manner as to become part of a male ſcrew, exactly fitting the indents of the rifle, which is not at all neceſſary in the preſent caſe, the figure of the rifles being originally caſt upon the ball. Theſe knobs retard the flight of the bullet in ſome degree; but this ſmall diſadvantage is fully made up by the eaſe with which the gun is loaded, its ſervice being nearly as quick as that of a common field-piece; and the retardation and quantity of the whirling motion which is communicated to the bullet being conſtantly the ſame, it will not in the leaſt affect the experiments made with them, in order to determine the reſiſtance of the air. Practice.

48 Sector and teleſcope belonging to this kind of ordnance.

In order to hit the mark with greater certainty than can be done in the common random method, theſe guns are furniſhed with a ſector, the principal parts of which are, 1. The limb, which is divided in ſuch a manner as to ſhow elevations to 15 or 20 degrees. The length of the radius is five inches and an half, and its nonius is ſo divided as to ſhow minutes of a degree. 2. The teleſcope, AB, fig. 11. an achromatic refractor, is ſeven inches in length (ſuch as is uſed on Hadley's quadrants, that are fitted for taking diſtances of the moon from the ſun or ſtars, in order to obtain the longitude at ſea), having croſs hairs in it. 3. The parallel cylindric bar, CD, is $\frac{4}{16}$ of an inch in diameter, having two rectangular ends EF, each half an inch ſquare and an inch long. On one ſide of the end next the limb of the ſector, is a mark correſponding to a ſimilar one in the hinder cock of the gun, with which it muſt always coincide when placed on the gun. The length of the parallel bar, together with its ends, is ſeven inches. The bar is fixed to the ſector by means of two hollow cylinders, G, H, which allow the ſector a motion round the bar. There is a finger-ſcrew *a* upon the hollow cylinder G, which is ſlit, in order to tighten it at pleaſure upon the bar. 4. The circular level I, fig. 11. and 12. for ſetting the plane of the ſector always perpendicular when placed upon the gun, is $\frac{1}{4}$ of an inch in diameter. There is a ſmall ſcrew *d*, to adjuſt the level at right angles to the plane of the ſector. 5. The finger ſcrew *b*, for fixing the index of the ſector at any particular degree of elevation propoſed.

The line of collimation (that is, the line of viſion cut by the interſecting point of the two croſs-hairs in the teleſcope) muſt be adjuſted truly parallel to the bar of the ſector when at 0 degrees. This is done by placing the ſector ſo that the vertical hair may exactly cover ſome very diſtant perpendicular line. If it again covers it when the ſector is inverted, by turning it half round upon the bar, which has all the while been kept ſteady and firm, that hair is correct; if not, correct half the error by means of the ſmall ſcrews, *c d e*, fig. 11. and 13. at the eye-end of the teleſcope, and the other half by moving the bar; place it again to cover the perpendicular line, and repeat the above operation till the hair covers it in both poſitions of the ſector. Then turn the ſector, till the horizontal hair cover

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N. B. Of the four ſmall ſcrews at the eye-end of the teleſcope, thoſe at the right and left hand move whatever hair is vertical, and thoſe at top or underneath move whatever hair is horizontal.

On the ſide of the gun upon the firſt reinforce, are caſt two knobs, F, fig. 9. and 14. having their middle part diſtant from each other ſix inches, for fixing on the braſs-cocks, A, fig. 14. and 15. which receive the rectangular ends of the parallel cylindric bar of the ſector, when placed on the gun.

The next adjuſtment is to make the parallel bar, and line of collimation of the teleſcope, when ſet at 0 degrees, parallel to the bore of the gun, and conſequently to the direction of the ſhot. The gun being loaded, the cartridge pricked, and the gun primed, place the ſector on the cocks of the gun; and having firſt ſet the ſector to what elevation you judge neceſſary, bring the interſection of the croſs hairs in the teleſcope upon the centre of the mark, the limb of the ſector being ſet vertical by means of the circular level, and then take off the ſector without moving the gun. Fire the gun; and if the bullet hits any where in the perpendicular line, paſſing through the centre of the mark, the line of collimation of the teleſcope and direction of the ſhot agree: but if it hit to the right of the mark, ſo much do they differ. In order to correct which, bring the gun into the ſame poſition it was in before firing, and ſecure it there. Then file away as much of the fore cock, on the ſide next the gun, as will let the interſection of the croſs-hair fall ſomewhere on the line paſſing perpendicularly through the point where the ſhot fell; and it is then adjuſted in that poſition, ſo much being filed off the ſide of the cock at *a*, fig. 14. and 15. as will allow the ſide *b* to be ſcrewed cloſer, that the ends of the parallel bar may have no ſhake in the cocks. To correct it in the other poſition, and ſo to find the true 0 degrees of the gun, that is, to bring the line of collimation of the teleſcope, parallel bar, and bore of the gun, truly parallel to each other, repeat the above with the trunnions perpendicular to the horizon, the ſector being turned a quarter round upon its bar, ſo as to bring its plane vertical. The deviation of the ſhot found in this way is corrected by deepening one of the cocks, ſo that the vertical hair of the teleſcope may be brought to cover the line paſſing perpendicularly through the point where the bullet hits; the gun being placed in the ſame poſition it was in before it was fired. This adjuſtment being repeated two or three times, and any error that remains being corrected, the gun is fit to be mounted on its carriage for ſervice. It is to be obſerved, that this ſector will fit any gun, if the cocks and rectangular ends, &c. of the parallel bar be of the above dimenſions, and will be equally applicable to all ſuch pieces whoſe cocks have been adjuſted, as if it had been adjuſted ſeparately with each of them. And if the ſector be ſet at any degree of elevation, and the gun moved ſo as to bring the interſection of the croſs-hairs on the object to be fired at (the limb of the ſector being vertical), the bore of the gun will have the ſame elevation above it, in the true direction of the ſhot, whatever poſition the carriage of the gun is ſtanding in. A teleſcope with croſs hairs, fixed to a common rifled muſket, and adjuſted to the direction of the ſhot, will make any perſon, with a very little practice, hit an object with more preciſion than the moſt experienced markſman. Practice.

For garriſon ſervice, or for batteries, the ſhip or garriſon carriage, with two iron ſtaples on each ſide to put through a couple of poles to carry theſe guns from place to place with more diſpatch, are as proper as any. But, for the field, a carriage like that at fig. 16. where the ſhafts puſh in upon taking out the iron pins *a b*, and moving the croſs bar A, upon which the breech of the gun reſts, as far down as the ſhafts were puſhed in, is the propereſt, ſince the whole can then be carried like a hand-barrow, over ditches, walls, or rough ground, all which may be eaſily underſtood from the figure. 49 Their carriages.

The principal advantage that will accrue from the uſe of rifled ordnance, is the great certainty with which any object may be hit when fired at with them, ſince the ſhot deviates but little from its intended line of direction, and the gun is capable of being brought to bear upon the object, with great exactneſs, by means of the teleſcope and croſs-hairs.

The other pieces of artillery commonly made uſe of are mortars, howitzers, and royals. The mortars are a kind of ſhort cannon of a large bore, with chambers for the powder, and are made of braſs or iron. Their uſe is to throw hollow ſhells filled with powder, which falling on any building, or into the works of a fortification, burſt, and with their fragments deſtroy every thing near them. Carcaſes are alſo thrown out of them; which are a ſort of ſhells with five holes, filled with pitch and other materials, in order to ſet buildings on fire; and ſometimes baſkets full of ſtones, of the ſize of a man's fiſt, are thrown out of them upon an enemy placed in the covert-way in the time of a ſiege. The ingenious General Deſaguliers contrived to throw bags filled with grapeſhot, containing in each bag from 400 to 600 ſhot of different dimenſions, out of mortars. The effect of theſe is tremendous to troops forming the line of battle, paſſing a defile, or landing, &c. the ſhot pouring down like a ſhower of hail on a circumference of above 300 feet. 50 Mortars deſcribed.

Mortars are chiefly diſtinguiſhed by the dimenſions of their bore; for example, a 13-inch mortar is one the diameter of whoſe bore is 13 inches, &c.—The land-mortars are thoſe uſed in ſieges, and in battles. They are mounted on beds, and both mortar and bed are tranſported on block carriages. There is likewiſe a kind of land-mortars mounted on travelling carriages, invented by Count Buckeburgh, which may be elevated to any degree; whereas all the Engliſh mortars are fixed to an angle of 45°. This cuſtom, however, does not appear to have any foundation in reaſon. In a ſiege, ſhells ſhould never be thrown with an angle of 45 degrees, excepting one caſe only; that is, when the battery is ſo far off, that they cannot otherwiſe reach the works: for when ſhells are thrown out of the trenches into the works of a fortification, or from the town into the trenches, they ſhould have as little elevation as poſſible, in order not to bury themſelves, but to roll along the ground, whereby they do much more damage, and occaſion a much greater conſternation

Practice. ſternation among the troops, than if they ſunk into the ground. On the contrary, when ſhells are thrown upon magazines, or any other buildings, the mortars ſhould be elevated as high as poſſible, that the ſhells may acquire a greater force in their fall, and conſequently do more execution.

There are other kinds of mortars, called *partridge-mortars*, *hand-mortars*, and *firelock-mortars*; which laſt are alſo called *bombards*. The partridge-mortar is a common one, ſurrounded with 13 other little mortars bored round its circumference, in the body of the metal; the middle one is loaded with a ſhell, and the others with grenades. The vent of the large mortar being fired, communicates its fire to the reſt; ſo that both the ſhell and grenades go off at once. Hand-mortars were frequently uſed before the invention of cohorns. They were fixed at the end of a ſtaff four feet and a half long, the other end being ſhod with iron to ſtick in the ground; and while the bombardier with one hand elevated it at pleaſure, he fired it with the other. The firelock-mortars, or bombards, are ſmall mortars fixed to the end of a firelock. They are loaded as all common firelocks are; and the grenade, placed in the mortar at the end of the barrel, is diſcharged by a flint-lock. To prevent the recoil hurting the bombardier, the bombard reſts on a kind of halberd made for that purpoſe.

The chamber in mortars is the place where the powder is lodged. They are of different forms, and made variouſly by different nations; but the cylindric ſeems to be preferable to any other form.

51 Howitzers and royals. The howitzer is a kind of mortar mounted on a field-carriage like a gun: it differs from the common mortars in having the trunnions in the middle, whereas thoſe of the mortar are at the end. The conſtruction of howitzers is as various and uncertain as that of mortars, excepting that the chambers are all cylindric. They are diſtinguiſhed by the diameter of their bore; for inſtance, a 10-inch howitzer is that which has a bore of 10 inches diameter, and ſo of others. Thcy were much more lately invented than mortars, and indeed are plainly derived from them.

Royals are a kind of ſmall mortars, which carry a ſhell whoſe diameter is 5.5 inches. They are mounted on beds in the ſame way as other mortars.

52 Parts of a mortar. Fig. 17. repreſents a mortar; and the names of its parts are as follow.

AB, the whole length of the mortar.
AC, the muzzle.
CD, chaſe.
DE, reinforce.
EF, breech.
GH, trunnions.
a, vent.
b, dolphin.
c d, vent-aſtragal and fillets.
d e, breech-ring and ogee.
f g, reinforce-ring and ogee.
g h, reinforce-aſtragal and fillets.
i k, muzzle-aſtragal and fillets.
k l, muzzle-ring and ogee.
l m, muzzle-mouldings.
n, ſhoulders.

Interior parts.

o, chamber.
p, bore.
q, mouth.
r, vent.

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The mortar-beds are formed of very ſolid timber, and placed upon very ſtrong wooden frames, fixed in ſuch a manner that the bed may turn round. The fore part of thoſe beds is an arc of a circle deſcribed from the centre on which the whole turns.

53 Inſtruments uſed in loading cannon. There are ſeveral inſtruments employed in the loading of cannon. The names of theſe are as follow:

1. The lantern or ladle, which ſerves to carry the powder into the piece, and which conſiſts of two parts, viz. of a wooden box, appropriated to the caliber of the piece for which it is intended, and of a caliber and a half in length with its vent; and of a piece of copper nailed to the box, at the height of a half caliber.—This lantern muſt have three calibers and a half in length, and two calibers in breadth, being rounded at the end to load the ordinary pieces.

2. The rammer is a round piece of wood, commonly called a *box*, faſtened to a ſtick 12 feet long, for the pieces from 12 to 33 pounders; and 10 for the 8 and 4 pounders; which ſerve to drive home the powder and ball to the breech.

3. The ſponge is a long ſtaff or rammer, with a piece of ſheep or lamb-ſkin wound about its end, to ſerve for ſcouring the cannon when diſcharged, before it be charged with freſh powder; to prevent any ſpark of fire from remaining in her, which would endanger the life of him who ſhould load her again.

4. Wad-ſcrew conſiſts of two points of iron turned ſerpent-wiſe, to extract the wad out of the pieces when one wants to unload them, or the dirt which had chanced to enter into it.

5. The botefeux are ſticks two or three feet long, and an inch thick, ſplit at one end, to hold an end of the match twiſted round it, to fire the cannon.

6. The priming iron is a pointed iron rod, to clear the touch-hole of the pieces of powder or dirt; and alſo to pierce the cartridge, that it may ſooner take fire.

7. The primer, which muſt contain a pound of powder at leaſt, to prime the pieces.

8. The quoin of mire, which are pieces of wood with a notch on the ſide to put the fingers on, to draw them back or puſh them forward when the gunner points his piece. They are placed on the ſole of the carriage.

9. Leaden plates, which are uſed to cover the touch-hole, when the piece is charged, leſt ſome dirt ſhould enter it and ſtop it.

54 Method of managing them. Before charging the piece, it is well ſponged, to clean it of all filth and dirt within-ſide; then the proper weight of gunpowder is put in and rammed down; care being taken that the powder be not bruiſed in ramming, which weakens its effect; it is then run over by a little quantity of paper, hay, or the like; and laſtly, the ball is thrown in.

To point, level, or direct the piece, ſo as to play againſt any certain point, is done by the help of a quadrant

Practice. drant with a plummet: which quadrant conſiſts of two branches made of braſs or wood; one about a foot long, eight lines broad, and one line in thickneſs; the other four inches long, and the ſame thickneſs and breadth as the former. Between theſe branches is a quadrant, divided into 90 degrees, beginning from the ſhorter branch, and furniſhed with thread and plummet.

The longeſt branch of this inſtrument is placed in the cannon's mouth, and elevated or lowered till the thread cuts the degree neceſſary to hit the propoſed object. Which done, the cannon is primed, and then ſet fire to. The method by the ſector, however, propoſed by Dr Lind, is certainly in all caſes to be preferred.

A 24 pounder may very well fire 90 or 100 ſhots every day in ſummer, and 60 or 75 in winter. In caſe of neceſſity it may fire more; and ſome French officers of artillery aſſure us, that they have cauſed ſuch a piece to fire every day 150 ſhots in a ſiege.—A 16 and a 12 pounder fire a little more, becauſe they are eaſier ſerved. There have even been ſome occaſions where 200 ſhots have been fired from theſe pieces in the ſpace of nine hours, and 138 in the ſpace of firing. In quick firing, tubes are made uſe of. They are made of tin; and their diameter is two-tenths of an inch, being juſt ſufficient to enter into the vent of the piece. They are about ſix inches long, with a cap above, and cut ſlanting below, in the form of a pen; the point is ſtrengthened with ſome ſolder, that it may pierce the cartridge without bending. Through this tube is drawn a quick-match, the cap being fitted with mealed powder moiſtened with ſpirits of wine. To prevent the mealed powder from falling out by carriage, a cap of paper or flannel ſteeped in ſpirits of wine is tied over it. To range pieces in a battery, care muſt be taken to reconnoitre well the ground where it is to be placed, and the avenues to it. The pieces muſt be armed each with two lanterns or ladles, a rammer, a ſpunge, and two priming-irons. The battery muſt alſo be provided with carriages, and other implements, neceſſary to remount the pieces which the enemy ſhould chance to diſmount.

To ſerve expeditiouſly and ſafely a piece in a battery, it is neceſſary to have to each a ſack of leather, large enough to contain about 20 pounds of powder to charge the lanterns or ladles, without carrying them to the magazine; and to avoid thereby making thoſe trains of powder in bringing back the lantern from the magazine, and the accidents which frequently happen thereby.

A battery of three pieces muſt have 30 gabions, becauſe ſix are employed on each of the two ſides or epaulments, which make 12, and nine for each of the two merlons.

There ought to be two gunners and ſix ſoldiers to each piece, and an officer of artillery.

The gunner poſted on the right of the piece muſt take care to have always a pouch full of powder and two priming irons: his office is to prime the piece, and load it with powder. The gunner on the left fetches the powder from the little magazine, and fills the lantern or ladle which his comrade holds; after which, he takes care that the match be very well lighted, and ready to ſet fire to the piece at the firſt command of the officer. Practice.

There are three ſoldiers on the right and three on the left of the piece. The two firſt take care to ram and ſpunge the piece, each on his ſide. The rammer and ſpunge are placed on the left, and the lantern or ladle on the right. After having rammed well the wad put over the powder and that put over the bullet, they then take each a handſpike, which they paſs between the foremoſt ſpokes of the wheel, the ends whereof will paſs under the head of the carriage, to make the wheel turn round, leaning on the other end of the handſpike, towards the embraſure.

It is the office of the ſecond ſoldier on the right to provide wad, and to put it into the piece, as well over the powder as over the bullet; and that of his comrade on the left to provide 50 bullets, and every time the piece is to be charged to fetch one of them and put it into the piece after the powder has been rammed. Then they both take each an handſpike, which they paſs under the hind part of the wheel, to puſh it in battery.

The officer of artillery muſt take care to have the piece diligently ſerved.

In the night he muſt employ the gunners and ſoldiers, who ſhall relieve thoſe who have ſerved 24 hours, to repair the embraſures.

If there be no water near the battery, care muſt be taken to have a caſk filled with it, in which to dip the ſpunges and cool the pieces every 10 or 12 rounds.

The carriage for a mortar of 12 inches diameter muſt be 6 feet long, the flaſks 12 inches long and 10 thick. The trunnions are placed in the middle of the carriage.

The carriage of an 18 inch mortar muſt be 4 feet long, and the flaſks 11 inches high and 6 thick.

To mount the mortars of new invention, they uſe carriages of caſt iron.

55 Method of managing mortars.

In Germany, to mount mortars from 8 to 9 inches, and carry them into the field, and execute them horizontally as a piece of cannon, they make uſe of a piece of wood 8 feet 2 inches long, with a hole in the middle to lodge the body of the mortar and its trunnions as far as their half diameter, and mounted on two wheels four feet high, to which they join a vantrain proportioned to it, and made like thoſe which ſerve to the carriages of cannons.

Having mounted the mortar on its carriage, the next thing is to caliber the bomb by means of a great caliber, the two branches whereof embrace the whole circumference of the bomb: theſe two branches are brought on a rule where the different calibers are marked, among which that of the bomb is found.

If no defect be found in the bomb, its cavity is filled, by means of a funnel, with whole gunpowder; a little ſpace or liberty is left, that when a fuſee or wooden tube, of the figure of a truncated cone, is driven through the aperture (with a wooden mallet, not an iron one for fear of accident), and faſtened with a cement made of quicklime, aſhes, brick-duſt, and ſteel-filings, worked together in a glutinous water, or of four parts of pitch, two of colophony, one of turpentine, and one of wax, the powder may not be bruiſed. This tube is filled with a combuſtible matter made of two

Practice. ounces of nitre, one of ſulphur, and three or more of gunpowder duſt well rammed. See FUZEE.

This fuſee ſet on fire burns ſlowly till it reaches the gunpowder, which goes off at once, burſting the ſhell to pieces with incredible violence. Special care, however, muſt be taken that the fuſee be ſo proportioned as that the gunpowder do not take fire ere the ſhell arrives at the deſtined place; to prevent which, the fuſee is frequently wound round with a wet clammy thread.

Batteries conſiſt,—1. Of an epaulment to ſhelter the mortars from the fire of the enemy. 2. Of platforms on which the mortars are placed. 3. Of ſmall magazines of powder. 4. Of a boyau, which leads to the great magazine. 5. Of ways which lead from the battery to the magazine of bombs. 6. Of a great ditch before the epaulment. 7. Of a berm or retraite.

The platforms for mortars of 12 inches muſt have 9 feet in length and 6 in breadth.—The lambourds for common mortars muſt be four inches thick; thoſe of a concave chamber of 8lb. of powder, 5 inches; thoſe of 12lb. 6 inches; thoſe of 18lb. 7 inches or thereabouts. Their length is at diſcretion, provided there be enough to make the platforms 9 feet long.—The fore part of the platform will be ſituated at two feet diſtance from the epaulment of the battery.—The bombardiers, to ſhelter themſelves in their battery, and not be ſeen from the town beſieged, raiſe an epaulment of 7 feet or more high, which epaulment has no embraſures.

To ſerve expeditiouſly a mortar in battery, there are required,—five ſtrong handſpikes; a dame or rammer, of the caliber of the conic chamber, to ram the wad and the earth; a wooden knife a foot long, to place the earth round the bomb; an iron ſcraper two feet long, one end whereof muſt be four inches broad and roundwiſe, to clean the bore and the chamber of the mortar, and the other end made in form of a ſpoon to clean the little chamber; a kind of brancard to carry the bomb, a ſhovel, and pick-axe.

The officer who is to mind the ſervice of the mortar muſt have a quadrant to give the degrees of elevation.

Five bombardiers, or others, are employed in that ſervice; the firſt muſt take care to fetch the powder to charge the chamber of the mortar, putting his priming-iron in the touch-hole before he charges the chamber; and never going to fetch the powder before he has aſked his officer at what quantity of powder he deſigns to charge, becauſe more or leſs powder is wanted according to the diſtance where it is fired; the ſame will take care to ram the wad and earth, which another ſoldier puts in the chamber.

The ſoldier on the right will put again two ſhovelful of earth in the bottom of the bore, which ſhould be likewiſe very well rammed down.

This done, the rammer or dame is returned into its place againſt the epaulment on the right of the mortar: he takes an handſpike in the ſame place to poſt himſelf behind the carriage of the mortar, in order to help to puſh it into battery: having laid down his handſpike, he takes out his priming-iron, and primes the touch-hole with fine powder.

The ſecond ſoldier on the right and left will have by that time brought the bomb ready loaded, which muſt be received into the mortar by the firſt ſoldier, and placed very ſtrait in the bore or chaſe of the mortar. Practice.

The firſt on the right will furniſh him with earth to put round the bomb, which he muſt take care to ram cloſe with the knife given him by the ſecond on the left.

This done, each ſhall take a handſpike, which the two firſt on the right and left ſhall put under the pegs of retreat of the fore part, and the two behind under thoſe of the hind part, and they together puſh the mortar in battery.

Afterwards the officer points or directs the mortar.

During that time the firſt ſoldier takes care to prime the touch-hole of the mortar, without ramming the powder; and the laſt on the right muſt have the match ready to ſet fire to the fuſee of the bomb on the right, while the firſt is ready with his on the left to ſet fire to the touch-hole of the mortar, which he ought not to do till he ſees the fuſee well lighted.

The foremoſt ſoldiers will have their handſpikes ready to raiſe the mortar upright as ſoon as it has diſcharged, while the hindmoſt on the left ſhall with the ſcraper clean the bore and chamber of the mortar.

The magazine of powder for the ſervice of the battery muſt be ſituated 15 or 20 paces behind, and covered with boards and earth over it.—The loaded bombs are on the ſide of the ſaid magazine, at five or ſix paces diſtance.

The officer who commands the ſervice of the mortar muſt take care to diſcover as much as poſſible with the eye the diſtance of the place where he intends to throw his bomb, giving the mortar the degree of elevation according to the judgment he has formed of the diſtance. Having thrown the firſt bomb, he muſt diminiſh or increaſe the degrees of elevation according to the place upon which it ſhall fall. Several make uſe of tables to diſcover the different diſtances according to the differences of the elevations of the mortar, eſpecially the degrees of the quadrant from 1 to 45: but theſe, from the principles already laid down, muſt be fallacious.

56

Of the petard. The petard is the next piece of artillery which deſerves our attention; and is a kind of engine of metal, ſomewhat in ſhape of a high-crowned hat, ſerving to break down gates, barricades, draw-bridges, or the like works, which are intended to be ſurpriſed. It is very ſhort, narrow at the breech and wide at the muzzle, made of copper mixed with a little braſs, or of lead with tin.

The petards are not always of the ſame height and bigneſs: they are commonly 10 inches high, 7 inches of diameter a-top, and 10 inches at bottom. They weigh commonly 40, 45, and 50 pounds.

The madrier, on which the petard is placed, and where it is tied with iron circles, is of two feet for its greateſt width, and of 18 inches on the ſides, and no thicker than a common madrier. Under the madrier are two iron bars paſſed croſswiſe, with a hook, which ſerves to fix the petard.

To charge a petard 15 inches high, and 6 or 7 inches of caliber or diameter at the bore, the inſide muſt be firſt very well cleaned and heated, ſo that the hand may bear the heat; then take the beſt powder that may be found, throw over it ſome ſpirit of wine, and

Fig. 1.

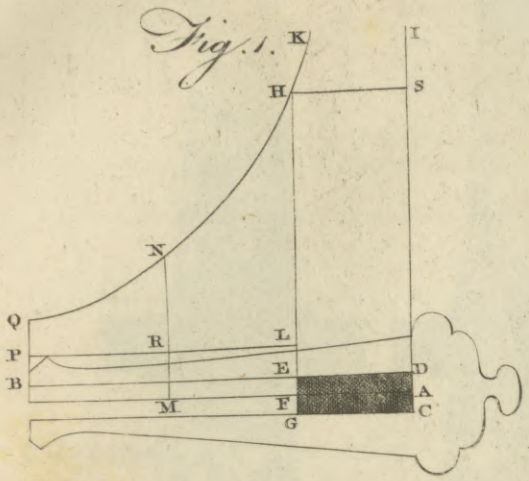


Fig. 2.

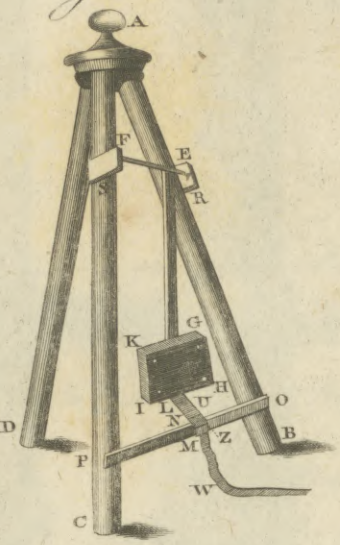
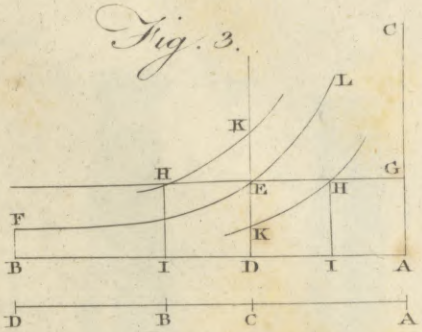


Fig. 3.



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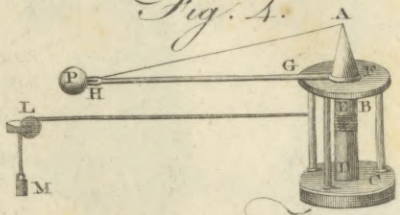

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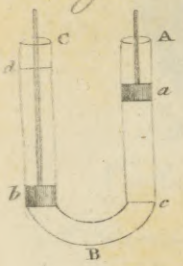

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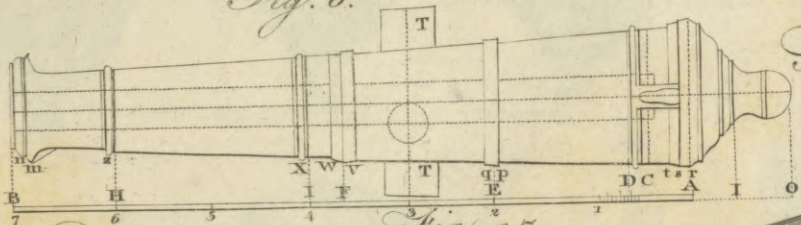


Fig. 12.

Fig. 11.

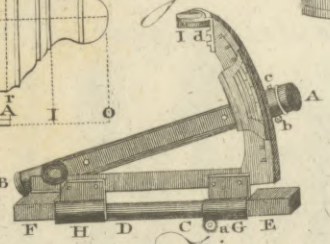
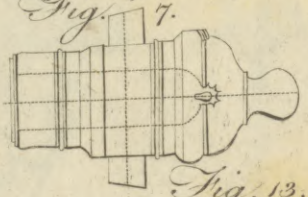


Fig. 7.



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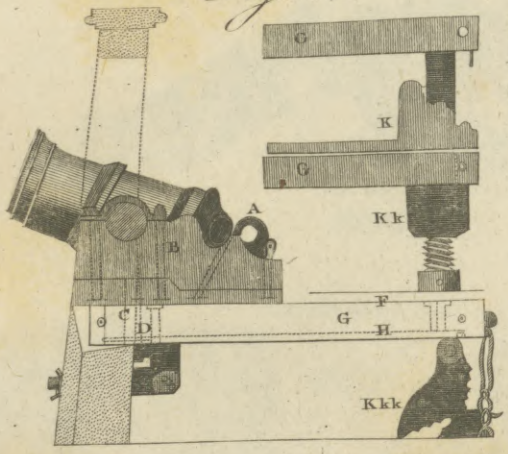

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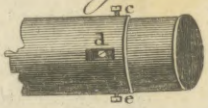


Fig. 17.

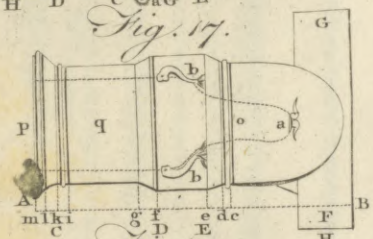


Fig. 15.

Fig. 16.

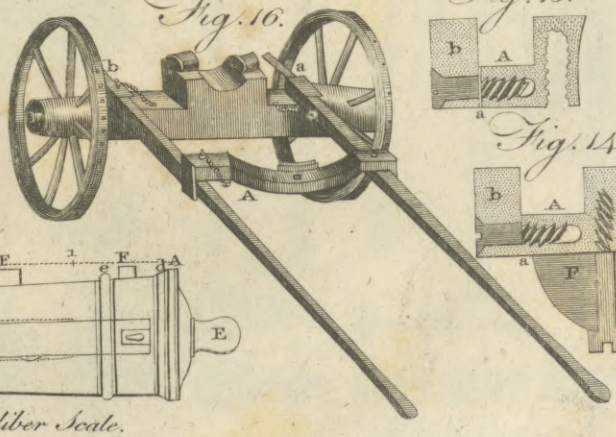


Fig. 14.

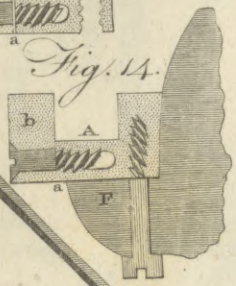


Fig. 9.

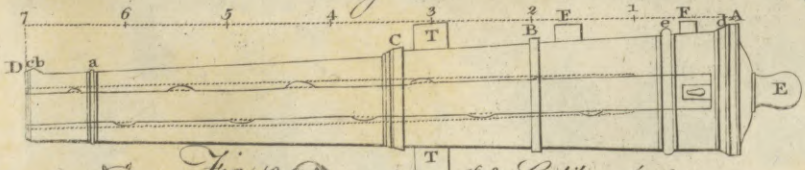
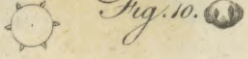
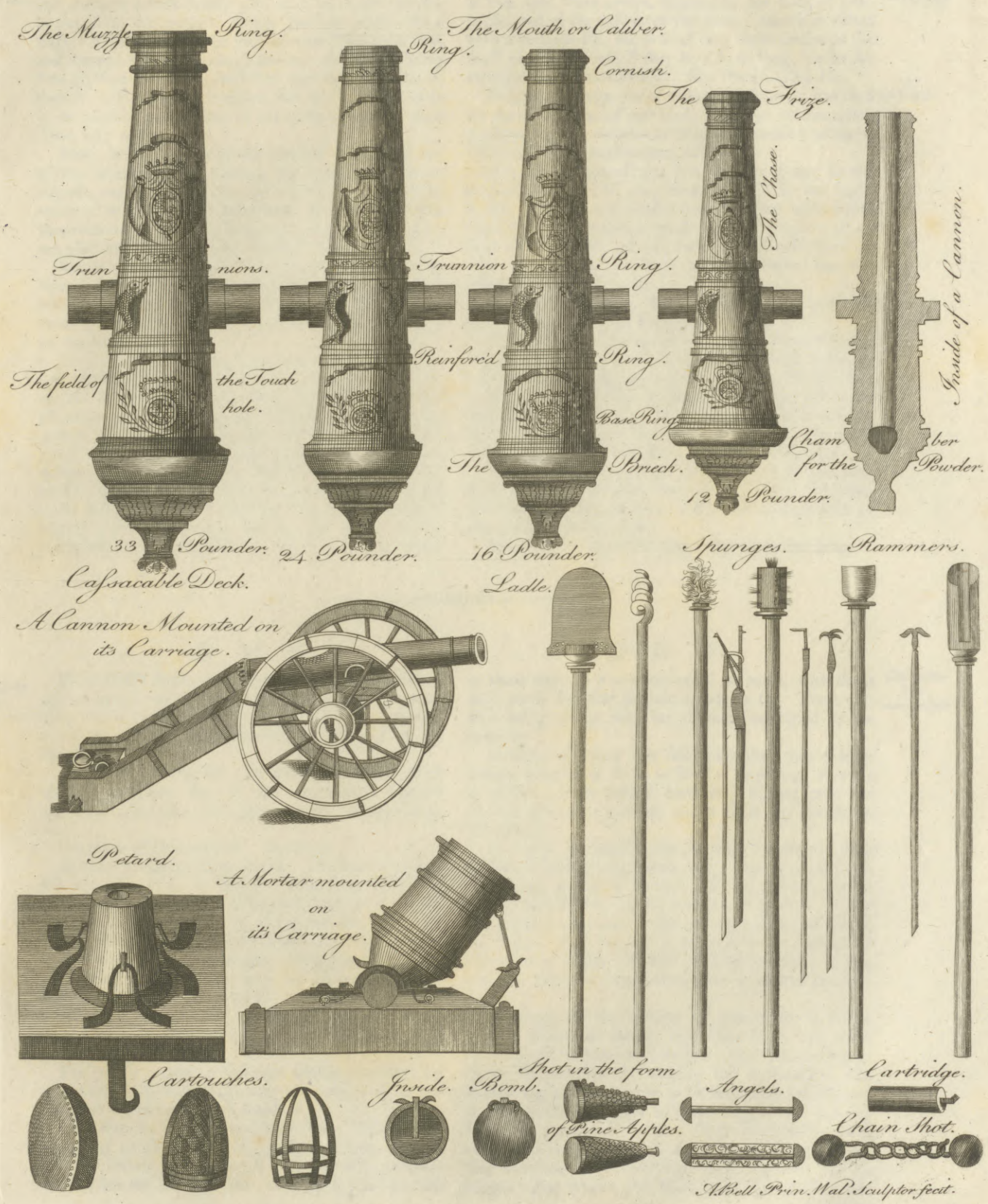


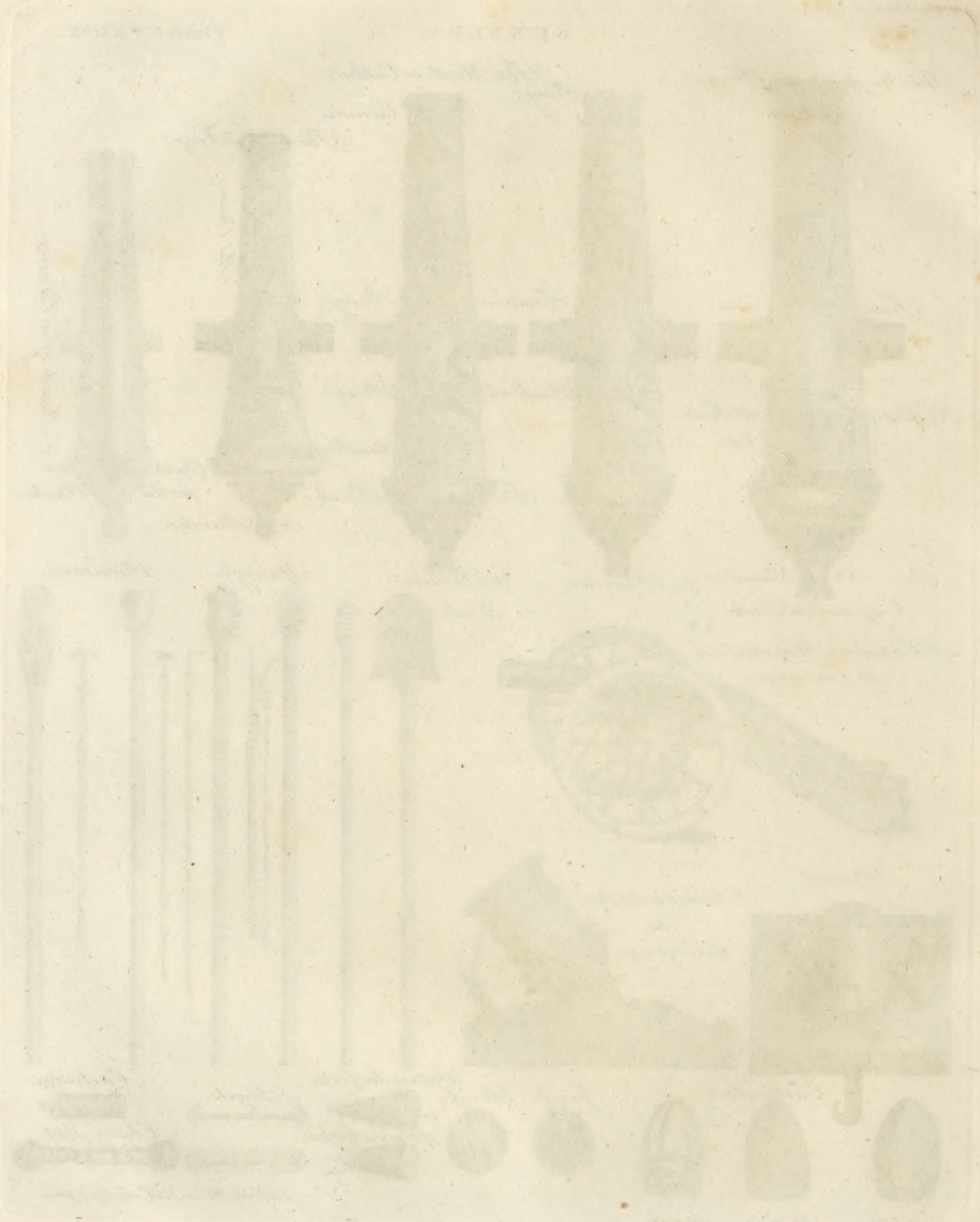
Fig. 10.



16 8 Caliber Scale.

Abbott Prin. Mall. Sculptor fecit.


The Muzzle Ring.
The Mouth or Caliber.
Ring.
Cornish.
The Frize.
The Chase.
Trun nions.
Triunnion
Ring.
Inside of a Cannon.
The field of the Touch hole.
Reinforc'd Ring.
Base Ring
Cham ber for the Powder.
The Boriech.
12 Pounder.
33 Pounder.
24 Pounder.
16 Pounder.
Caſsacable Deck.
Spunges.
Rammers.
Ladle.
A Cannon Mounted on its Carriage.
Petard.
A Mortar mounted on its Carriage.
Cartouches.
Inside.
Bomb.
Shot in the form of Pine Apples.
Angels.
Cartridge.
Chain Shot.
A. Bell Prin. Mal. Sculptor fecit.



Practice. and expoſe it to the ſun, or put it in a frying-pan; and when it is well dried, 5 lb. or 6 lb. of this powder is put into the petard, which reaches within three fingers of the mouth: the vacancies are filled with tow, and ſtopped with a wooden tompion; the mouth being ſtrongly bound up with cloth tied very tight with ropes; then it is fixed on the madrier, that has a cavity cut in it to receive the mouth of the petard, and faſtened down with ropes.

Some, inſtead of gunpowder for the charge, uſe one of the following compoſitions, viz. gunpowder ſeven pounds, mercury ſublimate one ounce, camphor eight ounces; or gunpowder ſix pounds, mercury ſublimate three ounces, and ſulphur three; or gunpowder ſix, beaten glaſs half an ounce, and camphor three quarters.

Before any of theſe pieces are appropriated for ſervice, it is neceſſary to have each undergo a particular trial of its ſoundneſs, which is called a *proof*, to be made by or before one authoriſed for the purpoſe, called the *proof-maſter*.

To make a proof of the piece, a proper place is choſen, which is to be terminated by a mount of earth very thick to receive the bullets fired againſt it, that none of them may run through it. The piece is laid on the ground, ſupported only in the middle by a block of wood. It is fired three times; the firſt with powder of the weight of the bullet, and the two others with $\frac{1}{4}$ of the weight; after which a little more powder is put in to ſinge the piece; and after this, water, which is impreſſed with a ſponge, putting the finger on the touch-hole to diſcover if there be any cracks; which done, they are examined with the cat, which is a piece Practice. of iron with three graſps, diſpoſed in the form of a triangle, and of the caliber of the piece; then it is viſited with a wax-candle, but it is of very little ſervice in the ſmall pieces, becauſe if they be a little long, the ſmoke extinguiſhes it immediately. See Plate CCXLIX.

57 Beſides the large pieces already mentioned, invented Of ſmall for the deſtruction of mankind, there are others called arms. *ſmall guns*; viz. muſkets of ramparts, common muſkets, fuſils, carabines, muſketoons, and piſtols.

A muſket, or muſquet, is a fire-arm borne on the ſhoulder, and uſed in war, formerly fired by the application of a lighted match, but at preſent with a flint and lock. The common muſket is of the caliber of 20 leaden balls to the pound, and receives balls from 22 to 24: its length is fixed to 3 feet 8 inches from the muzzle to the touch-pan.

A fuſil, or fire-lock, has the ſame length and caliber, and ſerves at preſent inſtead of a muſket.

A carabine is a ſmall ſort of fire-arm, ſhorter than a fuſil, and carrying a ball of 24 in the pound, borne by the light-horſe, hanging at a belt over the left ſhoulder. This piece is a kind of medium between the piſtol and the muſket; and bears a near affinity to the arquebuſs, only that its bore is ſmaller. It was formerly made with a match-lock, but afterwards with a flint-lock.

The muſquetoon is of the ſame length of the carabine, the barrel poliſhed, and clean within. It carries five ounces of iron, or ſeven and a half of lead, with an equal quantity of powder.

The barrel of a piſtol is generally 14 inches long.

GUN

GUN

Gunpowder. GUNPOWDER, a compoſition of nitre, ſulphur, and charcoal, mixed together, and uſually granulated; which eaſily takes fire, and, when fired, rarefies or expands with great vehemence, by means of its elaſtic force.

It is to this powder we owe all the action and effect of guns, ordnance, &c. ſo that the modern military art, fortification, &c. in a great meaſure depend thereon.

Invention of GUNPOWDER. See GUN.

Method of making GUNPOWDER. Dr Shaw's receipt for this purpoſe is as follows: Take four ounces of refined nitre, an ounce of ſulphur, and ſix drams of ſmall-coal: reduce theſe to a fine powder, and continue beating them for ſome time in a ſtone mortar with a wooden peſtle, wetting the mixture between whiles with water, ſo as to form the whole into an uniform paſte, which is reduced to grains, by paſſing it through a wire-ſieve fit for the purpoſe; and in this form being carefully dried, it becomes the common gunpowder.

For greater quantities mills are uſually provided, by means of which more work may be performed in one day than a man can do in a hundred.

The nitre or ſaltpetre is refined thus: Diſſolve four pounds of rough nitre as it comes to us from the Indies, by boiling it in as much water as will commodiouſly ſuffice for that purpoſe: then let it ſhoot for two or three days in a covered veſſel of earth, with ſticks Gunpowder. laid acroſs for the cryſtals to adhere to. Theſe cryſtals being taken out, are drained and dried in the open air.

In order to reduce this ſalt to powder, they diſſolve a large quantity of it in as ſmall a proportion of water as poſſible; then keep it conſtantly ſtirring over the fire till the water exhales, and a white dry powder is left behind.

In order to purify the ſulphur employed, they diſſolve it with a very gentle heat; then ſcum and paſs it through a double ſtrainer. If the ſulphur ſhould happen to take fire in the melting, they have an iron cover that fits on cloſe to the melting-veſſel, and damps the flame. The ſulphur is judged to be ſufficiently refined if it melts, without yielding any fetid odour, between two hot iron plates, into a kind of red ſubſtance.

The coal for the making of gunpowder is either that of willow or hazel, well charred in the uſual manner, and reduced to powder. And thus the ingredients are prepared for making this commodity: but as theſe ingredients require to be intimately mixed, and as there would be danger of their firing if beat in a dry form, the method is to keep them continually moiſt, either with water, urine, or a ſolution of ſal ammoniac: they continue thus ſtamping them together for 24 hours; after which the maſs is fit for corning and drying.

Gunpowder. drying in the ſun, or otherwiſe, ſo as ſedulouſly to prevent its firing.

Different kinds of GUNPOWDER. The three ingredients of gunpowder are mixed in various proportions according as the powder is intended for muſkets, great guns, or mortars, though theſe proportions ſeem not to be perfectly adjuſted or ſettled by competent experience.

Semienowitz, for mortars, directs a hundred pounds of ſaltpetre, twenty-five of ſulphur, and as many of charcoal; for great guns, a hundred pounds of ſaltpetre, fifteen pounds of ſulphur, and eighteen pounds of charcoal; for muſkets and piſtols, a hundred pounds of ſaltpetre, eight pounds of ſulphur, and ten pounds of charcoal. Miethius extols the proportion of one pound of ſaltpetre to three ounces of charcoal, and two or two and a quarter of ſulphur; than which, he affirms, no gunpowder can poſſibly be ſtronger. He adds, that the uſual practice of making the gunpowder weaker for mortars than guns, is without any foundation, and renders the expence needleſsly much greater: for whereas to load a large mortar twenty-four pounds of common powder is required, and conſequently, to load it ten times, two hundred and forty pounds, he ſhows, by calculation, that the ſame effect would be produced by one hundred and fifty pounds of the ſtrong powder.

* *Phil. Tranſ.* vol. lxxi.

On this ſubject Count Rumford * obſerves, that almoſt all thoſe who have written upon gunpowder, particularly thoſe of the laſt century, have given different receipts for its compoſition; and he propoſes it as a query, Whether theſe differences have not ariſen from obſerving that ſome kinds of powder were better adapted to particular purpoſes than others, or from experiments made on purpoſe to aſcertain the fact? "There is one circumſtance (he ſays) that would lead us to ſuppoſe that this was the caſe. That kind of powder deſigned for mortars and great guns was weaker than that intended for ſmall arms: for if there is any foundation for theſe conjectures, it is certain, that the weakeſt powder, or the heavieſt in proportion to its elaſtic force, ought to be uſed to impel the heavieſt bullets; and particularly in guns that are imperfectly formed, where the vent is large, and the windage very great. I am perfectly aware (adds he), that an objection may here be made, viz. that the elaſtic fluid generated from gunpowder muſt be ſuppoſed to have the ſame properties very nearly, whatever may be the proportion of its ſeveral ingredients; and that therefore the only difference there can be in powder is, that one kind may generate more of this fluid, and another leſs; and that when it is generated it acts in the ſame manner, and will alike eſcape, and with the ſame velocity, by any paſſage it can find. But to this I anſwer, that though the fluid may be the ſame, as it undoubtedly is, and though its denſity and elaſticity may be the ſame in all caſes at the inſtant of its generation; yet in the exploſion, the elaſtic and unelaſtic parts are ſo mixed together, that I imagine the fluid cannot expand without taking the groſs matter along with it; and the velocity with which the flame iſſues at the vent is to be computed from the elaſticity of the fluid, and the denſity or weight of the fluid and groſs matter taken together, and not ſimply from the denſity and elaſticity of the fluid."

To increaſe the ſtrength of powder, Dr Shaw thinks it proper to make the grains conſiderably large, and to have it well ſifted from the ſmall duſt. We ſee that gunpowder, reduced to duſt, has little exploſive force; but when the grains are large, the flame of one grain has a ready paſſage to another, ſo that the whole parcel may thus take fire nearly at the ſame time, otherwiſe much force may be loſt, or many of the grains go away as ſhot unfired. Gunpowder.

In the 71ſt volume of the Phil. Tranſ. Count Rumford gives an account of ſeveral attempts to augment the force of gunpowder by the addition of different ingredients. The power of ſteam has by many been overrated to ſuch a degree, as to be ſuppoſed capable of anſwering the purpoſes of gunpowder; but no attempts to accompliſh this have ever ſucceeded in any degree. Count Rumford attempted to combine the forces of ſteam and gunpowder together in the following manner. Having procured a number of air bladders of very ſmall ſiſhes, he put different quantities of water into them, from the ſize of a ſmall pea to that of a piſtol bullet, and tying them up with ſome very fine thread, hung them up to dry on the outſide. He then provided a number of cartridges made of fine paper, and filled them with a quantity of gunpowder equal to the uſual charge for a common horſeman's piſtol. He then loaded the piſtol with a bullet, fired it againſt an oaken plank about ſix feet from the muzzle, and obſerved the recoil and penetration of the bullet. He next tried the effect of one of theſe ſmall bladders of water when put among the gunpowder, but always found the force of the powder very much diminiſhed, and the larger the quantity of water the greater was the diminution; the report of the exploſion was alſo diminiſhed in a ſtill greater proportion than the force of the bullet or recoil. It being ſuppoſed that the bladder had burſt, and thus by wetting the gunpowder prevented it from taking fire, the experiment was repeated with highly rectified ſpirit of wine, but the diminution of the force was very little inferior to what it had been with water. Etherial oil of turpentine and ſmall quantities of quickſilver were alſo tried, but with no better ſucceſs than before. Thinking, however, that the failure of the quickſilver might be owing to its having been too much in a body, the experiment was repeated with the metal diſperſed in ſmall particles through the powder. To accompliſh this diſperſion the more completely, 20 grains of ethiops mineral were mixed very intimately with 145 grains of powder; but ſtill the force of the bullet was much leſs than if the powder had been uſed without any addition. As the exploſion of pulvis fulminans appears vaſtly ſuperior to that of gunpowder, ſome ſalt of tartar, in its pureſt ſtate, was mixed in the proportion of 20 grains to 145 of powder; but on firing the piece, it was ſtill found that the force of the exploſion was leſſened. Sal ammoniac was next tried, which, under certain circumſtances, is found to produce a great quantity of air or elaſtic vapour; but on mixing 20 grains of it with 145 of gunpowder, the force of the exploſion was ſtill found to be diminiſhed. As moſt of the metals, when diſſolved in acids, particularly braſs in ſpirit of nitre, are found to produce much elaſtic vapour, it was thought worth while to try whether the force of powder could be augmented by this means. Twenty grains

Gunpowder.

grains of braſs duſt were therefore mixed with 145 grains of powder; but ſtill the force of the exploſion was not augmented. In our author's opinion, however, neither braſs duſt nor ethiops mineral diminiſh the force of the exploſion otherwiſe than by filling up the interſtices between the grains, obſtructing the paſſage of the flame, and thus impeding the progreſs of the inflammation. Thus it appears, that little hope remains of augmenting the force of gunpowder by any addition either of liquid or inflammable ſolids: the reaſon is obvious; viz. becauſe all of them, the liquids eſpecially, abſorb great quantities of heat before they can be converted into vapour; and this vapour, after it is formed, requires more heat to make it expand more forcibly than air: hence, as the effects of gunpowder depend entirely upon the emiſſion of a quantity of air, and its rarefaction by vehement heat, the power muſt be greatly diminiſhed by the abſorption of this heat, which ought to be ſpent in rarefying the air. Even ſolid bodies cannot be ſet on fire without a previous abſorption of heat to convert them into vapour; but liquids have this property ſtill more than ſolids, and muſt therefore diminiſh the exploſive force ſtill more. Lime added to gunpowder, however, is ſaid to augment the power of the exploſion by one-third.

In his experiments on gunpowder, Count Rumford had the curioſity to compare the ſtrength of aurum fulminans, when incloſed in a gun-barrel, with that of common gunpowder; but his experiment only verified what has been found by others, viz. that this powder which in the open air makes ſuch a very violent report, has in cloſe veſſels ſcarce any power, comparatively ſpeaking, either of exploſion or projecting a bullet. Count Rumford, however, taking it for granted that the power of aurum fulminans would be found much greater than that of gunpowder, took care to have a barrel of uncommon ſtrength prepared for the experiment. The weight of it was 7 lb. 5 oz.; the length 13.25 inches, and the width of the bore 0.55 inches. This barrel, being charged with 27.44 grains of aurum fulminans and two leaden bullets, which, together with the leather put about them to make them fit the bore without windage, weighed 427 grains: it was laid upon a chafingdiſh of live coals at the diſtance of about ten feet from the pendulum, and the piece was directed againſt the centre of the pendulum. Some minutes elaſped before the powder exploded; but when it did ſo, the exploſion did not much exceed the report of a well-charged air-gun; and it was not until he ſaw the pendulum in motion, that Count Rumford could be perſuaded that the bullets had been diſcharged. On examination, however, it was found that nothing had been left in the barrel, and that the powder had probably been all exploded, as a great many particles of the revived metal were thrown about. From a calculation of the motion communicated to the pendulum, it was found that the velocity of the bullets had been about 428 feet in a ſecond; whence it appears that the power of aurum fulminans, compared with that of gunpowder, is only as 4 to 13 very nearly.

Method of Trying and Examining GUNPOWDER. There are two general methods of examining gunpowder; one with regard to its purity, the other with regard to its ſtrength. Its purity is known by laying two or three little heaps near each other upon white paper, and firing one of them. For if this takes fire readily, and the ſmoke riſes upright, without leaving any droſs or feculent matter behind, and without burning the paper, or firing the other heaps, it is eſteemed a ſign that the ſulphur and nitre were well purified, that the coal was good, and that the three ingredients were thoroughly incorporated together: but if the other heaps alſo take fire at the ſame time, it is preſumed, that either common ſalt was mixed with the nitre, or that the coal was not well ground, or the whole maſs not well beat and mixed together; and if either the nitre or ſulphur be not well purified, the paper will be black or ſpotted.

Several inſtruments have been invented to try the ſtrength of gunpowder; but they have generally been complained of as inaccurate. Mr Thomſon, (now Count Rumford), in the 71ſt volume of the Philoſophical Tranſactions, gives an account of an exact method of proving the ſtrength of it. "As the force of powder (ſays he) ariſes from the action of an elaſtic fluid that is generated from it in its inflammation, the quicker the charge takes fire, the more of this fluid will be generated in any given ſhort ſpace of time, and the greater of courſe will its effect be upon the bullet. But in the common method of proving gunpowder, the weight by which the powder is confined is ſo great in proportion to the quantity of the charge, that there is time quite ſufficient for the charge to be all inflamed, even when the powder is of the ſloweſt compoſition, before the body to be put in motion can be ſenſibly removed from its place. The experiment therefore may ſhow which of the two kinds of powder is the ſtrongeſt, when equal quantities of both are confined in equal ſpaces, and both completely inflamed; but the degree of the inflammability, which is a property eſſential to the goodneſs of the powder, cannot by theſe means be aſcertained. Hence it appears how powder may anſwer to the proof, ſuch as is commonly required, and may nevertheleſs turn out very indifferent when it comes to be uſed in ſervice. But though the common powder-triers may ſhow powder to be better than it really is, they can never make it appear to be worſe than it is; it will therefore always be the intereſt of thoſe who manufacture the commodity to adhere to the old method of proof, but the purchaſer will find his account in having it examined in a method by which its goodneſs may be aſcertained with greater preciſion.

From ſeveral experiments it appears, that the effect of the charge is conſiderably augmented or diminiſhed, according to the greater or leſs force employed in ramming it down. To prevent this inconvenience, Count Rumford adviſes the uſe of a cylindric ramrod of wood, fitted with a metal ring about an inch or an inch and a half in diameter; which being placed at a proper diſtance from the end which goes up into the bore, will prevent the powder from being too much compreſſed. In making experiments of this kind, however, it is neceſſary to pay attention to the heat of the barrel as well as to the temperature of the atmoſphere; for heat and cold, dryneſs and moiſture, have a very ſenſible effect upon gunpowder to augment or diminiſh its force. When a very great degree of accuracy therefore

Gunpowder. therefore happens to be requiſite, it will be proper to begin by firing the piece two or three times, merely to warm it; after which three or four experiments may be made with ſtandard powder, to determine the proof mark a ſecond time, for the ſtrength of powder is different at different times, in conſequence of the ſtate of the atmoſphere. After this the experiments may be made with the powder that is to be proved, taking care to preſerve the ſame interval of time between the diſcharges, that the heat of the piece may be the ſame in each trial.

Having determined the comparative degrees of ſtrength of two different kinds of powder, their comparative value may be aſcertained by augmenting the quantity of the weaker powder till the velocity of the bullets in both caſes becomes the ſame. The ſtrong powder is therefore preciſely as much more valuable than the weak, as it produces the ſame effect with a ſmaller quantity. Thus if a quarter of an ounce of one kind of powder diſcharges a bullet with the ſame velocity that half an ounce of another kind does, it is plain that the former is twice as valuable as the latter, and ought to be ſold at double the price.—By compariſons of this kind, Count Rumford found that the beſt battle powder (ſo called from its being made at the village of *Battle* in Kent) is ſtronger than government powder, in the proportion of 4 to 3; but from a compariſon of the prices, it appears that the former is no leſs than 41⅔ per cent. dearer than it ought to be; and conſequently, that whoever uſes it in preference to government powder, does it at a certain loſs of 41⅔ per cent. of the money it coſts him.

It is ſuppoſed by Count Rumford, that very little of the heat acquired in firing a piece of ordnance comes from the powder; for the time that it continues in the piece, perhaps not exceeding the 200th part of a ſecond, is ſo ſmall, that were the flame *four hundred* times, inſtead of *four* times, as Mr Robins ſuppoſes, hotter than red hot iron, it is by far too ſhort to communicate a ſenſible degree of heat to one of our large pieces of cannon. Beſides, if the heat of the flame was ſufficient to communicate ſuch a degree of heat to the gun, it muſt undoubtedly be capable of burning up all combuſtible bodies that come in its way, and of melting lead-ſhot when ſuch were uſed; but inſtead of this, we frequently ſee the fineſt paper diſcharged from the mouth of a gun without being inflamed, after it has ſuſtained the action of the fire through the whole length of the bore; and the ſmalleſt lead-ſhot is diſcharged without being melted. The objection drawn from the heat of bullets taken up immediately after being diſcharged from fire arms does not hold; for bullets diſcharged from air-guns and even croſs-bows are likewiſe found hot, eſpecially when they happen to ſtrike any hard body, and are much flattened. If a muſket ball be diſcharged into water, or againſt any very ſoft body, it will not be ſenſibly heated; but if it hits a plate of iron or any other body which it cannot penetrate, it will be broken in pieces by the blow, and the diſperſed parts will be found in a ſtate little ſhort of actual fuſion. Hence our author concludes, that bullets are not heated by the flame, but by percuſſion. Another objection is, that the vents of braſs guns are frequently enlarged to ſuch a degree by repeatedly firing them, that the piece becomes uſeleſs. But this proves only that braſs is eaſily corroded by the flame of gunpowder; which indeed is the caſe with iron alſo. We cannot ſuppoſe that in either caſe any real ſolution takes place; on the contrary, it is very evident that it does not: for when the vents of fire-arms are lined with gold, they will remain without enlargement for any length of time, though it is well known that gold is much more eaſily melted than iron. As the heat communicated to bullets, therefore, is not to be aſcribed to the flame but to percuſſion, ſo the heat acquired by guns is to be attributed, in our author's opinion, to the motion and friction of the internal parts of the metal among themſelves by the violent action of the flame upon the inſide of the bore. To generate heat, the action of the powder muſt be not only ſufficient to ſtrain the metal, and produce a motion in its parts, but this effect muſt be extremely rapid; and the effect will be much augmented if the exertion of the force and the duration of its action are momentaneous: for in that caſe the fibres of the metal that are violently ſtretched will return with their full force and velocity, and the ſwift vibratory motion and attrition above-mentioned will be produced. Now the effort of any given charge of powder upon the gun is very nearly the ſame whether it be fired with a bullet or without; but the velocity with which the generated elaſtic fluid makes its eſcape, is much greater when the powder is fired alone than when it is made to impel one or more bullets; the heat ought therefore to be much greater in the former than in the latter caſe, as has been found by experiment. "But to make this matter ſtill plainer, (ſays our author), we will ſuppoſe any given quantity of powder to be confined in a ſpace that is juſt capable of containing it, and that in this ſituation it is ſet on fire. Let us ſuppoſe this ſpace to be the chamber of a piece of ordnance, and that a bullet or any other ſolid body is ſo firmly fixed in the bore, immediately upon the charge, that the whole effort of the powder ſhall not be able to remove it: as the powder goes on to be inflamed, and the elaſtic fluid to be generated, the preſſure upon the inſide of the chamber will be increaſed, till at length all the powder being burnt, the ſtrain upon the metal will be at its greateſt height, and in this ſituation things will remain; the coheſion or elaſticity of the particles of metal counterbalancing the preſſure of the fluid.—Under theſe circumſtances very little heat would be generated; for the continued effort of the elaſtic fluid would approach to the nature of the preſſure of a weight; and that concuſſion, vibration, and friction among the particles of the metal, which in the colliſion of elaſtic bodies is the cauſe of the heat produced, would ſcarcely take effect. But inſtead of being firmly fixed in its place, let the bullet now be moveable, but let it give way with great difficulty, and by ſlow degrees. In this caſe the elaſtic fluid will be generated as before, and will exert its whole force upon the chamber of the piece; but as the bullet gives way to the preſſure, and moves on in the bore, the fluid will expand itſelf and grow weaker, and the particles of the metal will gradually return to their former ſituations; but the velocity with which the metal reſtores itſelf being but ſmall, the vibration that remains in the metal after the elaſtic fluid has made its eſcape will be very languid, as will the heat be which

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is generated by it. But if, inſtead of giving way with ſo much difficulty, the bullet is made lighter, ſo as to afford but little reſiſtance to the elaſtic fluid in making its eſcape, or if it is fired without any bullet at all; then, there being little or nothing to oppoſe the paſſage of the flame through the bore, it will expand itſelf with amazing velocity, and its action upon the gun will ceaſe almoſt in an inſtant; the ſtrained metal will reſtore itſelf with a very rapid motion, and a ſharp vibration will enſue, by which the piece will be much heated."

The Count, however, after more mature reflection, a greater number and diverſity of experiments, and the increaſed knowledge which muſt always accompany ſuch intellectual exertions as have diſtinguiſhed him through life, has been enabled to evince, that the amazing force of the elaſtic fluid generated in the combuſtion of gunpowder, may be fully accounted for on the hypotheſis, that it entirely depends on the elaſticity of watery vapour, or ſteam, which is doubled by every increaſe of temperature equal to 30° of Fahrenheit's thermometer. If then the mean preſſure of the atmoſphere at the temperature of 212°, equals the elaſtic force of ſteam, this force at the temperature of 242° muſt be equal to the preſſure of two atmoſpheres, ſince 212+30=242, and ſo on in the ſame ratio. The Count alſo found that the elaſtic force of gunpowder is equal to the preſſure of 131,072 atmoſpheres at the temperature of 722°. By the flame of gunpowder, braſs has been known to be melted, which requires a temperature equal to 3807° of Fahrenheit, or 21° of Wedgwood, to bring it to a ſtate of fuſion. He alſo proved in a ſatisfactory manner, that gunpowder contains a ſufficient quantity of water for ſupplying the requiſite proportion of ſteam; but for a full account of his very ingenious and detailed experiments on this curious ſubject, we muſt refer our readers to Nicholſon's Journal, vol. i. 4to. p. 459.

It has been propoſed to ſubſtitute hyperoxymuriate of potaſh in place of nitre; but the uſe of this ſubſtance is attended with many inconveniences, ſome of which preclude its being employed in the compoſition of gunpowder. See CHEMISTRY, N° 959 to N° 967.

To recover damaged GUNPOWDER. The method of the powder-merchants is, to put part of the powder on a ſail-cloth, to which they add an equal weight of what is really good; and with a ſhovel mingle it well together, dry it in the ſun, and barrel it up, keeping it in a dry and proper place. Others again, if it be very bad, reſtore it by moiſtening it with vinegar, water, urine, or brandy; then they beat it fine, ſearce it, and to every pound of powder add an ounce, an ounce and an half, or two ounces, according as it is decayed, of melted ſaltpetre. Afterwards, theſe ingredients are to be moiſtened and mixed well, ſo that nothing can be diſcerned in the compoſition, which may be known by cutting the maſs; and then they granulate it as before. In caſe the powder be in a manner quite ſpoiled, the only way is to extract the ſaltpetre with water according to the uſual manner, by boiling, filtrating, evaporating, and cryſtallizing; and then with freſh ſulphur and charcoal to make it up anew again.

In regard to the medical virtues of gunpowder, Boerhaave informs us, that the flame of it affords a very healthy fume in the height of the plague, becauſe the exploſive acid vapour of nitre and ſulphur corrects the air; and that the ſame vapour, if received in a ſmall cloſe pent-up place, kills inſects.

Gun-ſhot wounds || Gun-Smithery.

It is enacted by 5 and 11 of Geo. I. and 5 Geo. II. c. 20. that gunpowder be carried to any place in a covered carriage; the barrels being cloſe-jointed; or in caſes and bags of leather, &c. And perſons keeping more than 200 pounds weight of gunpowder at one time, within the cities of London and Weſtminſter, or the ſuburbs, &c. are liable to forfeitures if it be not removed; and juſtices of the peace may iſſue warrants to ſearch for, ſeize, and remove the ſame.

Gun-Shot Wounds. See SURGERY.

Gun-Smith, a maker of ſmall fire-arms, as muſkets, fowling-pieces, piſtols, &c.

Gun-Smithery, the buſineſs of a gun-ſmith, or the art of making fire-arms of the ſmaller ſort, as muſkets, fowling-pieces, piſtols, &c.

The principal part of theſe inſtruments is the barrel, which ought to have the following properties. 1. Lightneſs, that it may incommode the perſon who carries it as little as poſſible. 2. Sufficient ſtrength and other properties requiſite to prevent its burſting by a diſcharge. 3. It ought to be conſtructed in ſuch a manner as not to recoil with violence. And, 4. It ought to be of ſufficient length to carry the ſhot to as great a diſtance as the force of the powder employed is capable of doing.

The manufacture of fire-arms is now carried to ſuch a degree of perfection by different European nations, that it may perhaps be juſtly doubted whether any farther improvement in the requiſites juſt mentioned can be made. For the materials, the ſofteſt iron that can be procured is to be made uſe of. The beſt in this country are formed of *ſtubs*, as they are called, or old horſe-ſhoe nails; which are procured by the gun-ſmiths from farriers, and from poor people who ſubſiſt by picking them up on the great roads leading to London. Theſe are ſold at about 10s. per cwt. and 28 pounds are requiſite to form a ſingle muſket barrel. The method of manufacturing them from this material is as follows: A hoop of about an inch broad, and ſix or ſeven inches diameter, is placed in a perpendicular ſituation, and the ſtubs, previouſly well cleaned, piled up in it with their heads outermoſt on each ſide, till the hoop is quite filled and wedged tight with them. The whole then reſembles a rough circular cake of iron, which being heated to a white heat, and then ſtrongly hammered, coaleſces into one ſolid lump. The hoop is now removed, and the heatings and hammerings repeated till the iron is rendered very tough and cloſe in the grain; when it is drawn out into pieces of about 24 inches in length, half an inch or more in breadth, and half an inch in thickneſs.

Four of theſe pieces are employed for one barrel; but in the ordinary way a ſingle bar of the beſt ſoft iron is employed. The workmen begin with hammering out this into the form of a flat ruler, having its length and breadth proportioned to the dimenſions of the intended barrel. By repeated heating and hammering this plate is turned round a tempered iron rod called a *mandril*, the diameter of which is conſiderably ſmaller than the intended bore of the barrel. One of the edges of the plate being laid over the other about

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half an inch, the whole is heated and welded by two or three inches at a time, hammering it briſkly, but with moderate ſtrokes, upon an anvil which has a number of ſemicircular furrows in it, adapted to barrels of different ſizes. Every time the barrel is withdrawn from the fire, the workman ſtrikes it gently againſt the anvil once or twice in an horizontal direction. By this operation the particles of the metal are more perfectly conſolidated, and every appearance of a ſeam in the barrel is obliterated. The mandril being then again introduced into the cavity of the barrel, the latter is very ſtrongly hammered upon it in one of the ſemicircular hollows of the anvil, by ſmall portions at a time; the heatings and hammerings being repeated until the whole barrel has undergone the operation, and its parts rendered as perfectly continuous as if they had been formed out of a ſolid piece. To effect this completely, three welding heats are neceſſary when the very beſt iron is made uſe of, and a greater number for the coarſer kinds. The French workmen imagine, that by giving the barrel, while in the fire, ſlight horizontal ſtrokes with the hammer, ſo as to communicate a vibratory motion to the iron, thoſe particles are thrown off which are in a ſtate of fuſion and cannot eaſily be converted into malleable iron: but conſidering the great number of operations already deſcribed which the metal has undergone, we can ſcarce ſuppoſe this to be of much conſequence.

The next operation in forming the barrels is the boring of them, which is done in the following manner: Two beams of oak, each about ſix inches in diameter, and ſix or ſeven feet long, are placed horizontally and parallel to one another; having each of their extremities mortiſed upon a ſtrong upright piece about three feet high, and firmly fixed. A ſpace of three or four inches is left between the horizontal pieces, in which a piece of wood is made to ſlide by having at either end a tenon let into a groove which runs on the inſide of each beam throughout its whole length. Through this ſliding piece a ſtrong pin or bolt of iron is driven or ſcrewed in a perpendicular direction, having at its upper end a round hole large enough to admit the breech of the barrel, which is ſecured in it by means of a piece of iron that ſerves as a wedge, and a vertical ſcrew paſſing through the upper part of the hole. A chain is faſtened to a ſtaple in one ſide of the ſliding piece which runs between the two horizontal beams; and paſſing over a pully at one end of the machine, has a weight hooked on to it. An upright piece of timber is fixed above this pully and between the ends of the beams, having its upper end perforated by the axis of an iron crank furniſhed with a ſquare ſocket; the other axis being ſupported by the wall, or by a ſtrong poſt, and loaded with a heavy wheel of caſt iron to give it force. The axes of this crank are in a line with the hole in the bolt already mentioned.—The borer being then fixed into the ſocket of the crank, has its other end, previouſly well oiled, introduced into the barrel, whoſe breech part is made faſt in the hole of the bolt: the chain is then carried over the pully, and the weight hooked on; the crank being then turned with the hand, the barrel advances as the borer cuts its way, till it has paſſed through the whole length.—The boring bit conſiſts of an iron rod ſomewhat longer than the barrel, one end of which fits the ſocket of the crank; the other is adapted to a cylindrical piece of tempered ſteel about an inch and a half in length, having its ſurface cut after the manner of a perpetual ſcrew, with five or ſix threads, the obliquity of which is very ſmall. The breadth of the furrows is the ſame with that of the threads, and their depth ſufficient to let the metal cut by the threads paſs through them eaſily. Thus the bit gets a very ſtrong hold of the metal; and the threads, being ſharp at the edges, ſcoop out and remove all the inequalities and roughneſs from the inſide of the barrel, and render the cavity ſmooth and equal throughout. A number of bits, each a little larger than the former, are afterwards ſucceſſively paſſed through the barrel in the ſame way, until the bore has acquired the magnitude intended. By this operation the barrel is very much heated eſpecially the firſt time the borer is paſſed through it, by which means it is apt to warp. To prevent this in ſome meaſure, the barrel is covered with a cloth kept conſtantly wetted, which not only preſerves the barrel from an exceſs of heat, but likewiſe preſerves the temper of the bit from being deſtroyed. The borer itſelf muſt alſo be withdrawn from time to time; both to clean it from the ſhavings of the metal and to oil it, or repair any damages it may have ſuſtained. Every time a freſh bit has been paſſed through the barrel, the latter muſt be carefully examined, to ſee if it has warped; and likewiſe if there are any ſpots, by the workmen called *blacks*, on its inſide. When warped, it muſt be ſtraightened on the anvil; for which a few ſlight ſtrokes on the convex parts will be ſufficient; and this is termed *ſetting up* the barrel. When black ſpots are perceived, the correſponding part on the outſide muſt be marked, and driven in by gentle ſtrokes with the hammer, when they will be completely removed by paſſing the borer another time through the piece.

The equality of the bore is of the utmoſt conſequence to the perfection of a barrel; inſomuch that the greateſt poſſible accuracy in every other reſpect will not make amends for any deficiency in this. The method uſed by gunſmiths to aſcertain this is by a cylindrical plug of tempered ſteel highly poliſhed, about an inch in length, and fitting the bore exactly. This is ſcrewed upon the end of an iron rod, and introduced into the cavity of the barrel, where it is moved backwards and forwards; and the places where it paſſes with difficulty being marked, the boring bit is repeatedly paſſed until it moves with equal eaſe through every part. Any perſon who wiſhes to know the merit of his piece in this reſpect, may do it with tolerable accuracy by means of a plug of lead caſt on a rod of iron; or even by a muſket ball filed exactly to the bore, and puſhed through the barrel by a ramrod; taking care, however, not to uſe much force leſt the ball be flattened, and its paſſage thus rendered difficult.

The laſt ſtep towards the perfection of the inſide of the barrel is termed *fine boring;* by which is meant the ſmoothing it in ſuch a manner as to remove all marks and inequalities left by the borer. The fine borer reſembles the other in its general conſtruction; but inſtead of the piece of ſteel cut in form of a ſcrew which belongs to that, it is furniſhed with a ſquare broach 10 or 12 inches long, highly poliſhed, and very ſharp, by which means it cuts the metal very ſmoothly. It is found to anſwer the purpoſe beſt when only two of its

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its edges are allowed to work; the other two are covered with ſlips of oiled paper, one or more additional ſlips being put on each time that the inſtrument is paſſed through the barrel. The fine-borer is frequently paſſed through, from the muzzle to the breech, and from the breech to the muzzle, until the whole inſide preſents a perfectly equal and poliſhed ſurface; the barrel being likewiſe examined and ſet up, if requiſite, after each time. It is abſolutely neceſſary that this inſtrument ſhould be perfectly true, and not in the leaſt caſt or warped in the tempering.

Beſides the operations above deſcribed, another, called *poliſhing*, is uſually performed on gun-barrels, though it is doubtful whether this laſt be attended with any good effect or not. It is performed by a cylinder of lead, five or ſix inches long, caſt upon a rod of iron, and filed exactly to the bore. The lead being then covered with very fine emery and oil, is wrought backwards and forwards through the whole length of the barrel until the inſide has acquired the requiſite degree of poliſh. The diſadvantages of this operation are, that it is ſcarce poſſible to perform it without preſſing more upon one part than another, and thus producing ſome degree of inequality on the inſide, which is of the very worſt conſequence to fire-arms. The poliſh thus given is likewiſe very periſhable; ſo that the fine-boring may juſtly be conſidered as the laſt operation neceſſary for the inſide of a barrel; and it is then proper to give the external form and proportions by means of a file. For this purpoſe, four faces are firſt formed upon it, then eight, then 16; and ſo on till it be quite round, excepting the part next the breech, called the *reinforced part*, which is always left of an octagonal form. It being abſolutely neceſſary that the barrel ſhould be equally thick on every ſide, gunſmiths employ, for accomplithing this purpoſe, a particular tool named a *compaſs*. This conſiſts of an iron rod bent in ſuch a manner as to form two parallel branches about an inch diſtant from each other. One of theſe branches is introduced into the barrel, and kept cloſely applied to the ſide, by means of one or more ſprings with which it is furniſhed: the other deſcends parallel to this on the outſide, and has ſeveral ſcrews paſſing through it with their points directed to the barrel. By ſcrewing theſe until their points touch the ſurface of the barrel, and then turning the inſtrument round within the bore, we perceive where the metal is too thick, and how much it muſt be reduced, in order to render every part perfectly equal throughout its circumference. It may be made long enough to reach the whole length of the barrel, though it will be more convenient to have it only half as much, and to introduce it firſt at one end and then at the other. Inſtead of rounding the barrel by means of a file and compaſs, however, ſome people do ſo by turning it in a lathe; which is no doubt more expeditious, though neither ſo certain nor exact. A ſpindle as long as a gun-barrel cannot, without great difficulty, be prevented from ſpringing conſiderably under the tool employed to reduce or ſmooth it in turning; whence it is found, that by this operation barrels are more frequently warped than by all the borings they undergo; and there is now this farther inconvenience, that they cannot be ſet up as formerly, without danger of deſtroying them entirely.

The barrels being thus bored and formed externally, it is cuſtomary with the gunſmiths in France to ſolder on the loops and aim before they breech the barrel. The Engliſh, however, do not reſtrict themſelves in this manner: for as ſoft ſolder is ſufficient for faſtening on theſe, they never uſe any other; while the French, who uſe hard ſolder, muſt of conſequence employ a great heat. Thus the inſide is roughened ſometimes ſo conſiderably, that it is neceſſary to repeat the fine boring; which could not be done without injuring the threads of the ſcrew formed for the breech, if the barrel were prepared for the latter without ſoldering on the former.

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The firſt tool employed in forming the breech-ſcrew is a plug of tempered ſteel, ſomewhat conical, with the threads of a male ſcrew upon its ſurface, and by the workman termed a *ſcrew tap*. This being introduced into the barrel, and worked from left to right and back again, until it has marked out the four firſt threads of the ſcrew, another leſs conical tap is introduced; and when this has carried the impreſſion of the ſcrew as far as it is intended to go, a third one, nearly cylindrical, is made uſe of, ſcarcely differing from the plug of the breech intended to fill the ſcrew thus formed in the barrel. The plug itſelf has its ſcrew formed by means of a ſcrew-plate of tempered ſteel, with ſeveral female ſcrews, correſponding with the taps employed for forming that in the barrel. Seven or eight threads are a ſufficient length for a plug: they ought to be neat and ſharp, ſo as completely to fill the turns made in the barrel by the tap. The breech plug is then to be caſe-hardened, or to have its ſurface converted into ſteel, by covering it with ſhavings of horn, or the parings of the hoofs of horſes, and keeping it for ſome time red hot; after which it is plunged in cold water.

The only thing now requiſite for completing the barrels is to give them a proper colour; as a preparation for which their outſide is firſt to be neatly poliſhed with oil and emery. This being done, it was formerly the cuſtom to give ſuch a degree of heat as would make them blue throughout; but as this cannot be effected without a partial calcination of the ſurface, which of conſequence affects the inſide alſo, the blue colour has been for ſome time diſuſed, and a brown one ſubſtituted in its place. To give this colour, the pieces are firſt rubbed over with aquafortis or ſpirit of ſalt diluted with water; after which they are laid by till a complete coat of ruſt is formed upon them: a little oil is then applied; and the ſurface being rubbed dry, is poliſhed by means of a hard bruſh and bees-wax.

Thus the common muſket barrels for the purpoſes eſpecially of ſportmanſhip are made; but there are ſome other methods of manufacture, by which the barrels are made to differ in ſome reſpects from thoſe juſt deſcribed, and are thought to be conſiderably improved. One kind of theſe are called *twiſted* barrels; and by the Engliſh workmen are formed out of the plates made of *ſtubs* formerly deſcribed. Four of theſe, of the ſize already mentioned, are requiſite to make one barrel. One of them heated red hot for five or ſix inches is turned like a cork-ſcrew by means of the hammer and anvil; the remaining parts being treated ſucceſſively in the ſame manner until the whole is turned into a ſpiral, forming a tube, the diameter of which correſponds with the bore of the intended barrel. Four are generally ſufficient to form a barrel of the ordinary length, i. e.

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from 32 to 38 inches; and the two which form the breech or ſtrongeſt part, called the *reinforced part*, are conſiderably thicker than thoſe which form the muzzle or fore part of the barrel. One of theſe tubes is then welded to a part of an old barrel to ſerve as a handle; after which the turns of the ſpiral are united by heating the tube two or three inches at a time to a bright white heat, and ſtriking the end of it ſeveral times againſt the anvil in a horizontal direction with conſiderable ſtrength, which is called *jumping the barrel*; and the heats given for this purpoſe are called *jumping heats*. The next ſtep is to introduce a mandril into the cavity, and to hammer the heated portion lightly in order to flatten the ridges or burs raiſed by the jumping at the place where the ſpirals are joined. As ſoon as one piece is jumped throughout its whole length, another is welded to it, and treated in the ſame manner, until the four pieces are united, when the part of the old barrel is cut off, as being no longer of any uſe. The welding is repeated three times at leaſt, and is performed exactly in the ſame manner as directed for plain barrels; and the piece may afterwards be finiſhed according to the directions already given.

The operation for the French twiſted barrels is very different from that juſt mentioned, and much more exceptionable. It conſiſts in heating the barrel by a few inches at a time to a ſtrong red heat; one end is then ſcrewed into a vice, and a ſquare piece of iron with an handle like an augre is introduced into the other. By means of theſe the fibres of the heated portion are twiſted into a ſpiral direction, which is ſuppoſed to reſiſt the effort of the inflamed powder better than the other. To render this operation complete, however, it muſt be obſerved, that when once the ſeveral portions of the barrel have been twiſted, the ſubſequent heats ought not to be very great, or the grain of the metal will regain its former ſtate, and the barrel be no better for the twiſting than before. To twiſt a barrel in this manner, alſo, it will be neceſſary to forge it at leaſt half a foot longer than it is intended to be, that a ſufficient length may be kept cold at each end to give a ſufficient purchaſe to the vice and twiſting inſtrument; and theſe portions muſt afterwards be cut off before the barrel is bored, or two pieces of an old barrel may be welded to the muzzle and breech of that which is to be twiſted, and cut off when the operation is over. Theſe pieces may alſo be made ſtronger than uſual to reſiſt the force of the vice and twiſting inſtrument; and in order to give the latter a firmer hold, the cavity of the muzzle may be made of a ſquare form. The Engliſh workmen are unanimouſly of opinion that this method of twiſting is really injurious to the barrel, by ſtraining the fibres of the metal. At any rate, from the injudicious methods followed by the French artiſts, the greateſt part of their barrels, ſaid to be twiſted, are not ſo in reality; there being at leaſt ſix or ſeven inches at the muzzle, and ſeven or eight at the breech, which are not affected by the operation.

The French *ribbon barrels* have a great reſemblance to the Engliſh twiſted ones: but the proceſs for making them is much more operoſe, though it ſeems not to poſſeſs any real advantage over that uſed by the Engliſh artiſts. A plate of iron, about the twelfth part of an inch in thickneſs, is turned round a mandril, and welded its whole length in the ſame manner as a plain barrel. Upon this ſlight barrel, which is called the *lining*, a plate of iron about an inch in breadth, and bevelled off at the edges, is by means of ſucceſſive heats rolled in a ſpiral direction; after which it is termed the *ribbon*, and muſt have a thickneſs correſponding with that part of the barrel which it is to form. As it would, however, be difficult to form a ribbon of ſufficient length for the whole barrel, it is made in ſeveral pieces; and when one piece is rolled on, another is welded to its end, and the operation continued until the lining be entirely covered. The edges are ſo much bevelled, that the one folds over the other about a quarter of an inch. After the ribbon is all rolled on, the barrel muſt be heated by two or three inches at a time, and the turns of the ſpiral united to each other and to the lining by being welded in the ſame manner as the twiſted barrel; though, from what has been ſaid of the conſtruction of theſe barrels, it is plain that the operation of *jumping* cannot be admitted in them. The barrel is afterwards bored in ſuch a manner that almoſt the whole of the lining is cut out, and ſcarce any thing left but the ribbon with which the lining was covered.

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The ſuperiority of twiſted and ribbon barrels over the plain kind gave occaſion to a third ſort named *wired barrels*. Theſe were invented by an ingenious workman at Paris named *Barrois*; whoſe method was as follows: Upon a thin barrel, filed and dreſſed as uſual, he rolled, as cloſe as poſſible, and in a ſpiral direction, a tempered iron wire about the thickneſs of a crow-quill, the firſt layer covering only the reinforced part. The turns of the wire were ſoldered to each other and to the barrel with a compoſition which he kept a ſecret. The wired part was then filed ſmooth and bright, but not ſo much as to weaken it; a ſecond layer of wire was applied over the firſt, extending two-thirds of the length of the barrel; and this being ſmoothed and brightened like the firſt, a third layer was applied, which covered the two former and reached quite to the muzzle.

The barrels made after this manner are ſuppoſed to be much ſuperior to others, though the ſuppoſition ſeems not to be well founded. It is certain that wire is not preferable to other iron as a material for gun-barrels: and the ſolder uſed by M. Barrois in a quantity nearly equal to the wire itſelf, muſt be accounted a defect as far as it was uſed; for no metal has yet been found equal to iron for the purpoſes of gun-ſmiths: ſo that by the uſe of ſo much of this ſolder in the compoſition of the barrel, it muſt be undoubtedly weaker than if it had been all made of iron. We are not to ſuppoſe the wire abſolutely free from flaws; and even though it were, there will always be ſmall cavities between its turns, which the ſolder cannot fill completely. Beſides, as the operation of wiring was performed by M. Barrois upon a barrel that had been previouſly bored and dreſſed within, the repeated heats to which it was afterwards ſubjected in ſoldering, if they did not cauſe it warp, at leaſt rendered it ſo rough that it was neceſſary to fine-bore it afterwards. The only advantage therefore which theſe barrels were found to poſſeſs was their beautiful appearance; which was greatly overbalanced by the circumſtances juſt mentioned, as well as by the extravagant prices at which they were ſold; a ſingle barrel being ſold at 5l. and a double one at twice that ſum; whence the ſale of them

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them never anſwered the expectation of the inventor, and after his death nobody thought of making them.

The Spaniſh barrels have long been held in great eſtimation, both on account of their being formed of better iron than thoſe of other countries, and likewiſe from an opinion of their being more perfectly forged and bored. Thoſe made at Madrid are the beſt, and even of theſe ſuch as have been made by former gunſmiths are in the greateſt eſtimation. The moſt celebrated Spaniſh gunſmiths were Nicolas Biz, who lived in the beginning of the preſent century, and died in 1724; and the barrels fabricated by him in the former part of his life are held in greateſt eſtimation. Thoſe of his cotemporaries, Juan Belan and Juan Fernandez, are no leſs valued; all of their barrels ſelling in France at 1000 livres, or 45l. 15s. ſterling. The ſucceſſors of theſe great artiſts were Diego Eſquibal, Alonzo Martinez, Agoſtin Ortiz, Matthias Vaera, Luis Santos, Juan Santos, Franciſco Garcia, Franciſco Targarone, Joſeph Cano, and N. Zelaya. The moſt celebrated after theſe were Franciſco Loper, Salvador Cenarro, Miguel Zeguarra, Iſidoro Soler, and Juan de Soto. The three firſt are gunſmiths to the king; and the barrels made by all of them ſold for 13l. ſterling. Almoſt all the Madrid barrels are compoſed of the old ſhoes of horſes and mules, which are all collected for the purpoſe. They are manufactured firſt by welding longitudinally, and then being joined together in four or five pieces like the Engliſh barrels made from ſtubs, as already mentioned. In this, and indeed all other operations for making gun-barrels, an immenſe waſte of the iron takes place; but that of the Spaniſh iron is by far the greateſt, a maſs of 40 or 45 pounds being required to make one barrel, which when rough from the forge weighs only ſix or ſeven pounds; ſo that from 30 to 38 pounds are loſt in the hammerings. It may perhaps, however, be doubted, whether the iron be really *purified* by this waſte; for it is certain, that by long continued working in the fire it may be rendered totally uſeleſs and deſtroyed; neither can we be aſſured that the other advantages pretended to reſult from their method of manufacture are of any conſequence. The Spaniſh artiſts likewiſe value themſelves on giving the inſide of their barrels a very high poliſh; but the advantage of this, as has already been obſerved, is extremely dubious. The only thing requiſite in a gun-barrel is that it do not *lead;* that is, that the mark of the bullet be not perceived on the inſide after it has been diſcharged, by ſome of the lead rubbed off as it paſſes through. In the opinion of very good judges, therefore, it is better to take a barrel immediately after it has undergone the operation of fine-boring than to give it any higher poliſh; and in ſupport of this opinion, M. de Marolles, an author of great reputation, informs us, that he has ſeen a barrel rough from the borer throw a charge of ſhot deeper into a quire of paper than one which was highly poliſhed within, though the length, bore, and charge, were the ſame in both.

As the Spaniſh iron is univerſally allowed to be excellent, it has not been unreaſonably ſuppoſed that the ſuperiority of the barrels manufactured in that kingdom is owing more to the goodneſs of the materials than to the ſkill of the workmen. It muſt be obſerved, however, that inſtead of making the plates overlap *a little* in the place where they join, they give one of them a complete turn; ſo that every Spaniſh barrel may be ſaid to be double throughout its whole length. The different portions of the iron are alſo forged in ſuch a manner, that the grain of the iron is diſpoſed in a ſpiral manner; whence it has the ſame effect with a ribbon or twiſted barrel. The outſide is finiſhed by turning them in a lathe; whence probably they are always leſs elegantly wrought than the French and Engliſh pieces. The great value put upon them is alſo thought to be more owing to fancy than to any real good qualities they poſſeſs. Formerly they were made from three to three feet and a half long; their bore being ſuch as to admit a bullet from 22 to 24 in the pound; and their weight from three to three pounds and a half. The reinforced part extends two-fifths of the length; and at 10 or 12 inches from the breech is placed a *ſight*, ſuch as is uſually put upon rifle-barrels or thoſe intended only for ball. According to Eſpinas, arquebuſs-bearer to Philip IV. the weight of a Spaniſh barrel ought to be four pounds and a half when their length is 42 inches; but both weight and length are now much reduced, they ſeldom exceeding the dimenſion already mentioned. Next to the barrels made at Madrid, the moſt eſteemed are thoſe of Buſtindui and St Olabe at Placentia in Biſcay; and of Jeun and Clement Padweſteva, Eudal Pous, and Martin Marechal, at Barcelona; the uſual price of them being about 3l. 10s. ſterling.

Having now deſcribed the method of forging barrels, we ſhall next proceed to give an account of thoſe imperfections to which they are ſometimes liable, and which render them apt to burſt or recoil with violence. The principal of theſe are the *chink*, *crack*, and *flaw*. The firſt is a ſmall rent in the direction of the length of the barrel; the ſecond acroſs it; and the third is a kind of ſcale or ſmall plate adhering to the barrel by a narrow baſe, from which it ſpreads out like the head of a nail from its ſhank, and when ſeparated leaves a pit or hollow in the metal. The chink or flaw is of much worſe conſequence than the crack in fire-arms, the force of the powder being exerted more upon the circumference than the length of the barrel. The flaw is much more frequent than the chink, the latter ſcarce ever occurring but in plain barrels formed out of a ſingle plate of iron, and then only when the metal is deficient in quality. When flaws happen on the outſide, they are of no great conſequence; but in the inſide they are apt to lodge moiſture and foulneſs which corrode the iron, and thus the cavity enlarges continually till the piece burſts. This accident, however, may ariſe from many other cauſes beſides the defect of the barrel itſelf. The beſt pieces will burſt when the ball is not ſufficiently rammed home, ſo that a ſpace is left between it and the powder. A very ſmall windage or paſſage for the inflamed powder between the ſides of the barrel and ball will be ſufficient to prevent the accident; but if the ball has been forcibly driven down with an iron ramrod, ſo as to fill up the cavity of the barrel very exactly, the piece will almoſt certainly burſt, if only a very ſmall ſpace be left between it and the powder; and the greater the ſpace is, the more certainly does the event take place. Of this Mr Robins gives a remarkable inſtance, accounting at the ſame time for the phenomenon. "A moderate charge of powder (ſays he), when

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it has expanded itſelf through the vacant ſpace and reaches the ball, will, by the velocity each part has acquired, accumulate itſelf behind the ball, and will thereby be condenſed prodigiouſly: whence, if the barrel be not of an extraordinary ſtrength in that part, it muſt infallibly burſt. The truth of this I have experienced in a very good Tower muſket forged of very tough iron: for charging it with 12 pennyweights of powder, and placing the ball looſely 16 inches from the breech; on the firing of it, the part of the barrel juſt behind the bullet was ſwelled out to double its diameter like a blown bladder, and two large pieces of two inches in length were burſt out of it." A piece will frequently burſt from having its mouth ſtopped up with earth or ſnow; which accident ſometimes happens to ſportſmen in leaping a ditch, in which they have aſſiſted themſelves with their fowling-piece, putting the mouth of it to the ground; and when this does not happen, it is only to be accounted for from the ſtoppage being extremely ſlight. For the ſame reaſon a muſket will certainly burſt if it be fired with the muzzle immerſed only a very little way in water. It will alſo burſt from an overcharge; but when ſuch an accident happens in other circumſtances, it is moſt probably to be attributed to a defect in the workmanſhip, or in the iron itſelf. Theſe defects are principally an imperfection in the welding, a deep flaw having taken place, or an inequality in the bore; which laſt is the moſt common of any, eſpecially in the low-priced barrels. The reaſon of a barrel's burſting from an inequality in the bore is, that the elaſtic fluid, ſet looſe by the inflammation of the powder, and endeavouring to expand itſelf in every direction, being repelled by the ſtronger parts, acts with additional force againſt the weaker ones, and frequently burſts through them, which it would not have done had the ſides been equally thick and ſtrong throughout. With regard to defects ariſing from the bad quality of the iron, it is impoſſible to ſay any thing certain. As the choice of the materials depends entirely on the gunſmith, the only way to be aſſured of having a barrel made of proper metal is to purchaſe it from an artiſt of known reputation, and to give a conſiderable price for the piece.

The recoil of a piece becomes an object of importance only when it is very great; for every piece recoils in ſome degree when it is diſcharged. The moſt frequent cauſe of an exceſſive recoil is an equality in the bore of the barrel; and by this it will be occaſioned even when the inequality is too ſmall to be perceived by the eye. The explanation of this upon mechanical principles indeed is not very eaſy: for as it is there an invariable law, that action and re-action are equal to one another, we ſhould be apt to ſuppoſe that every time a piece is diſcharged it ſhould recoil with the whole difference between the velocity of the bullet and that of the inflamed powder. But were this the caſe, no man could fire a muſket without being deſtroyed; for the bullet flies out only with a velocity of 1700 feet in a ſecond, or not much more, while that of the powder, as calculated by Mr Robins, is not leſs than 7000 feet in the ſame ſpace. But was the recoil to be made with the difference of theſe velocities, or with one half of it, it is plain that no man could bear it. The ſame thing therefore muſt take place in the recoil of a muſket which Dr Prieſtley obſerved in his experiments on the exploſion of inflammable and dephlogiſticated air, viz. that the force is exerted much more upon the part fartheſt from that where the inflammation begins than upon that next to it. At any rate, however, the ſtrength of the recoil will always be found proportionable to the weight of the piece; that is, the lighter the piece is, the greater the recoil, and *vice verſa*. The recoil may be increaſed by any thing which retards the paſſage of the ſhot; whence it is alſo augmented by the foulneſs of the barrel by repeated firing. M. de Marolles informs us alſo, that a piece will recoil, if, from the breech-plug being made too ſhort, ſome turns of the ſcrew remain empty; as in theſe a part of the powder is lodged which forms an obſtacle to the exploſion; though in what manner this takes place is not very apparent, as, though the powder lodged there might contribute little or nothing to the force of the exploſion, it can ſcarce be ſhown to ſtand in the way of it. The ſame author likewiſe informs us, that a barrel mounted upon a very ſtraight ſtock will recoil more than upon one that is conſiderably bent. Sometimes alſo a fowling-piece will recoil from the ſportſman applying it improperly to his ſhoulder; though this laſt circumſtance ſeems likewiſe inexplicable. It is moſt probable therefore that the ſuppoſed *greater* recoil taken notice of in this caſe, ariſes only from the uſual recoil being more ſenſibly felt in one poſition than another.

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The cauſe to which too great a recoil in muſkets has been uſually attributed, is the placing of the touch-hole at ſome diſtance from the breech-plug; ſo that the powder is fired about the middle, or towards its fore part, rather than at its baſe. To avoid this, ſome artiſts form a groove or channel in the breech-plug as deep as the ſecond or third turn of the ſcrew; the touch-hole opening into this channel, and thus firing the powder at its very loweſt part. It appears, however, from a number of experiments made upon this ſubject by M. le Clerc gunſmith to the king of France, that it made very little difference with regard to the recoil, whether the touch-hole was cloſe to the breech or an inch diſtant from it. The only circumſtance to be attended to with reſpect to its ſituation therefore is, that it be not quite cloſe to the breech-plug; as in ſuch a caſe it is found to be more apt to be choaked up than when placed about a quarter of an inch from it.

The only other circumſtance now to be determined with regard to muſket-barrels is their proper length. Formerly it was ſuppoſed that the longer they were made, the greater would be the diſtance to which they carried the ſhot, and that without any limitation. This opinion continued to prevail till about half a century ago, when it was firſt propoſed as a doubt whether long barrels carried farther than ſhort ones. With regard to cannon, indeed, it had long before this time been known that they might be made too long; and Balthazar Killar, a celebrated cannon-founder in the reign of Louis XIV. was able to account for it. When aſked by Monſ. Suriry de St Remy, why the culverin of Nancy, which is 22 feet long, did not carry a ball equally far with a ſhorter piece? he replied, that "the powder, when inflamed, ought to quit the cavity of the piece in a certain time, in order to exert its whole force upon the bullet: by a longer ſtay, part of the

force

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force is loſt; and the ſame cauſe may produce an inequality in the ſhots, by giving a variation to the bullet, ſo as to deſtroy its rectilineal courſe, and throw it to one ſide or other of the mark." Mr Robins, who on this as well as every other queſtion in gunnery has almoſt exhauſted the ſubject, informs us, that "if a muſket-barrel, of the common length and bore, be fired with a leaden bullet and half its weight of powder, and if the ſame barrel be afterwards ſhortened one-half and fired with the ſame charge, the velocity of the bullet in this ſhortened barrel will be about one-ſixth leſs than what it was when the barrel was entire; and if, inſtead of ſhortening the barrel, it be increaſed to twice its uſual length, when it will be near eight feet long, the velocity of the bullet will not hereby be augmented more than one-eighth part. And the greater the length of the barrel is in proportion to the diameter of the bullet, and the ſmaller the quantity of powder, the more inconſiderable will theſe alterations of velocity be." From theſe conſiderations it appears, that the advantages gained by long barrels are by no means equivalent to the diſadvantages ariſing from the weight and incumbrance of uſing them; and from a multitude of experiments it is now apparent, that every one may chooſe what length he pleaſes, without any ſenſible detriment to the range of his piece. The moſt approved lengths are from 32 to 38 inches.

An opinion has generally prevailed among ſportſmen, that by ſome unknown manœuvre the gunſmith is able to make a piece, loaded with ſmall ſhot, throw the contents ſo cloſe together, that even at the diſtance of 40 or 50 paces the whole will be confined within the breadth of a hat. From ſuch experiments as have been made on this ſubject, however, it appears, that the cloſeneſs or wideneſs with which a piece throws its ſhot is liable to innumerable variations from cauſes which no ſkill in the gunſmith can poſſibly reach. So variable are theſe cauſes, that there is no poſſibility of making the ſame piece throw its ſhot equally cloſe twice ſucceſſively. In general, however, the cloſer the wadding is, the better diſpoſed the ſhot ſeems to be to fall within a ſmall compaſs. The cloſeneſs of the ſhot therefore would ſeem to depend in a great meaſure on preventing the flame of the powder from inſinuating itſelf among its particles: whence the following method is ſaid to be practiſed with ſucceſs by thoſe who ſhoot for a wager at a mark with ſmall ſhot; viz. to put in the ſhot by ſmall quantities at a time, ramming down a little tow or thin paper over each; ſo as to fill the interſtices of the grains, and thus prevent the flame from getting in amongſt the grains and ſcattering them. In firing with ſmall ſhot, a curious circumſtance ſometimes occurs, viz. that the grains, inſtead of being equally diſtributed over the ſpace they ſtrike, are thrown in cluſters of 10, 12, 15, or more; whilſt ſeveral conſiderable ſpaces are left without a grain in them. Sometimes one-third or one-half of the charge will be collected into a cluſter of this kind; nay, ſometimes, though much more rarely, the whole charge will be collected into one maſs, ſo as to pierce a board near an inch thick at the diſtance of 40 or 45 paces. Small barrels are ſaid to be more liable to this cluſtering than large ones: and M. de Marolles informs us, that this is eſpecially the caſe when the barrels are new, and likewiſe when they are freſh-waſhed; though he acknowledges that it did not always happen with the barrels he employed even after they were waſhed. It is probable therefore, that the cloſeneſs of the ſhot depends on ſome circumſtances relative to the wadding rather than to the mechaniſm of the barrel.

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Some pieces are compoſed of two or more barrels joined together; in which caſe the thickneſs of each of the barrels is ſomewhat leſs than in ſingle-barrelled pieces. After being properly dreſſed, each of them is filed flat on the ſide where they are to join each other, ſo that they may fit more cloſely together. Two correſponding notches are then made at the muzzle and breech of each barrel; and into theſe are fitted two ſmall pieces of iron to hold them more ſtrongly together. Being then united by tinning the contiguous parts, a triangular piece of iron called the *rib* is faſtened on in like manner, running the whole length on the upper ſide; which ſerves to hold them more ſtrongly together. After this they are to be poliſhed and coloured in the manner deſcribed for ſingle barrels. Great care ſhould be taken that the barrels joined in this manner ſhould be quite equal in ſtrength to one another, and that both ſhould be quite upright, or of an equal thickneſs throughout. If any inequality takes place in the ſtrength of the barrels, the weaker will be warped by the action of the ſtronger; and the warping from this cauſe has ſometimes been ſo conſiderable as to render one of the barrels uſeleſs. To bring every part of the circumference of each barrel to an equal ſtrength as nearly as poſſible, ſo that no part may be ſtrained by the exploſion, that ſide where they touch each other muſt be ſo reduced, that the partition between the two calibers may be no thicker than either barrel was at the ſame place before it was filed to join in this manner. Formerly the double-barrelled pieces were made with one barrel lying over the other, each barrel having a ſeparate pan, hammer, and hammer-ſpring, but only one cock for both. The barrels were therefore made to turn round at the place where the breeches joined with the ſtock; ſo that as ſoon as one was fired off, the other could be brought into its place by preſſing a ſpring moved by the guard with the right hand, while with the left the barrels were turned upon their common axis; and as ſoon as the charged barrel was thus brought into its proper ſituation, the ſpring deſcended into a notch and kept it firm. But this method was found to be too complicated and embarraſſed, though upon the ſame plan three and four barrels were ſometimes mounted upon one ſtock; but theſe pieces were intoſerably heavy, and have no real ſuperiority over the double-barrelled pieces which do not turn round, and which of conſequence are now only made uſe of.

In forging barrels of all kinds, it is of conſiderable importance to have them made at firſt as near as poſſible to the weight intended when they are finiſhed, ſo that very little be taken away by the boring and filing; for as the outer ſurface, by having undergone the action of the hammer more immediately than any other part, is rendered the moſt compact and pure, we ſhould be careful to remove as little of it as poſſible; and the ſame holds, though in a leſs degree, with the inſide which is to be cut with the borer. Piſtol-barrels are forged in one piece, two at a time, joined by their muzzles;

Gunter, Gunter's line.

muzzles, and are bored before they are cut aſunder; by which means there is not only a ſaving of time and labour, but a greater certainty of the bore being the ſame in both.

GUNTER, EDMUND, an excellent Engliſh mathematician and aſtronomer, was born in Hertfordſhire in 1581, and ſtudied at Weſtminſter-ſchool; from whence he removed to Oxford, where he took the degree of maſter of arts in 1606, and afterwards entered into holy orders. In 1615 he took the degree of bachelor of divinity: but being peculiarly eminent for his knowledge in the mathematics, he had two years before been choſen profeſſor of aſtronomy in Greſham-college, London; where he diſtinguiſhed himſelf by his lectures and writings. He invented a ſmall portable quadrant; and alſo the famous line of proportions, which, after the inventor, is called *Gunter's ſcale*. He likewiſe publiſhed *Canon Triangulorum;* and a work entitled Of the Sector, Croſs-ſtaff, and other Inſtruments. This laſt was publiſhed, with an Engliſh tranſlation of his *Canon Triangulorum*, in 4to, by Samuel Foſter profeſſor of Greſham-college. Mr Gunter died at that college in 1626.

GUNTER's Line, a logarithmic line, uſually graduated upon ſcales, ſectors, &c.

It is alſo called the *line of lines* and *line of numbers;* being only the logarithms graduated upon a ruler, which therefore ſerves to ſolve problems inſtrumentally in the ſame manner as logarithms do arithmetically. It is uſually divided into 100 parts, every tenth whereof is numbered, beginning with 1 and ending with 10: ſo that if the firſt great diviſion, marked 1, ſtand for one-tenth of any integer, the next diviſion, marked 2, will ſtand for two tenths, 3, three-tenths, and ſo on; and the intermediate diviſions will in like manner repreſent 100dth-parts of the ſame integer. If each of the great diviſions repreſent 10 integers, then will the leſſer diviſions ſtand for integers; and if the greater diviſions be ſuppoſed each 100, the ſubdiviſions will be each 10.

Uſe of GUNTER's Line. 1. *To find the product of two numbers.* From 1 extend the compaſſes to the multiplier; and the ſame extent, applied the ſame way from the multiplicand, will reach to the product. Thus if the product of 4 and 8 be required, extend the compaſſes from 1 to 4, and that extent laid from 8 the ſame way will reach to 32, their product. 2. *To divide one number by another.* The extent from the diviſor to unity will reach from the dividend to the quotient: thus, to divide 36 by 4, extend the compaſſes from 4 to 1, and the ſame extent will reach from 36 to 9, the quotient ſought. 3. *To three given numbers to find a fourth proportional.* Suppoſe the numbers 6, 8, 9: extend the compaſſes from 6 to 8; and this extent, laid from 9 the ſame way, will reach to 12, the fourth proportional required. 4. *To find a mean proportional between any two given numbers.* Suppoſe 8 and 32: extend the compaſſes from 8, in the left-hand part of the line, to 32 in the right; then biſecting this diſtance, its half will reach from 8 forward, or from 32 backward, to 16, the mean proportional ſought. 5. *To extract the ſquare-root of any number.* Suppoſe 25: biſect the diſtance between 1 on the ſcale and the point repreſenting 25; then the half of this diſtance, ſet off from 1, will give the point repreſenting the root 5. In the ſame manner the cube root, or that of any higher power, may be found by dividing the diſtance on the line between 1 and the given number into as many equal parts as the index of the power expreſſes; then one of thoſe parts, ſet from 1, will find the point repreſenting the root required.

Gunter's quadrant || Gutta-ſerena.

GUNTER's Quadrant, one made of wood, braſs, &c. containing a kind of ſtereographic projection of the ſphere, on the plane of the equinoctial; the eye being ſuppoſed placed in one of the poles.

GUNTER's Scale, called by navigators ſimply the *gunter*, is a large plain ſcale, generally two feet long, and about an inch and a half broad, with artificial lines delineated on it, of great uſe in ſolving queſtions in trigonometry, navigation, &c.

GUNWALE, or GUNNEL, is the uppermoſt wale of a ſhip, or that piece of timber which reaches on either ſide from the quarter-deck to the forecaſtle, being the uppermoſt bend which finiſhes the upper works of the hull, in that part in which are put the ſtanchions which ſupport the waſte-trees.

GURK, an epiſcopal town of Carinthia in Germany ſeated on the river Gurk, in E. Long. 14. 18. N. Lat. 47. 12.

GURNARD. See TRIGLA, ICHTHYOLOGY *Index*.

GUST, a ſudden and violent ſquall of wind, burſting from the hills upon the ſea ſo as to endanger the ſhipping near the ſhore. Theſe are peculiar to ſome coaſts, as thoſe of South Barbary and Guinea.

GUSTAVIA, a genus of plants belonging to the monadelphia claſs. See BOTANY *Index*.

GUSTAVUS I. king of Sweden, ſon of Eric de Vaſa duke of Gripſholm. Chriſtian II. king of Denmark having made himſelf maſter of the kingdom of Sweden, confined Guſtavus at Copenhagen; but he making his eſcape, wandered a long time in the foreſts, till the cruelties of the tyrant having occaſioned a revolution, he was firſt declared governor of Sweden, and in 1513 elected king. This prince introduced Lutheraniſm into his dominions, which in a little time ſpread itſelf all over the kingdom. He died in 1560; having made his kingdom hereditary, which was before elective. See SWEDEN.

GUSTAVUS Adolphus, ſurnamed the *Great*, king of Sweden, was born at Stockholm in 1594, and ſucceeded his father Charles in 1611. He eſpouſed the cauſe of the Proteſtants in Germany, who were oppreſſed and almoſt entirely ruined by the emperor Ferdinand. He was a great warrior, and gained many victories, of which an account is given under the article SWEDEN. He was at laſt killed in the battle of Lutzen, where his troops got the victory, and defeated two of the emperor's armies.

GUTHALUS, or GUTTALUS, in *Ancient Geography*, is thought to be the *Viadrus* of Ptolemy. Now the *Oder*, which riſing in Moravia, runs through Sileſia, Brandenburg, and Pomerania, into the Baltic.

GUTTA, a Latin term for what in Engliſh we call *drop*.

GUTTA Roſacea, in *Medicine*, denotes a red or pimpled face; a diſtemper which, though not always owing its original to hard drinking, is nevertheleſs moſt incident to tipplers of ſtrong beer, wines, ſpirits, &c.

GUTTA Serena, a diſeaſe in which the patient, without

Gutta ‖ Guy.

out any apparent fault in the eye, is deprived of ſight. See MEDICINE *Index*.

GUTTA, in *Architecture*, are ornaments in the form of little cones uſed in the Doric corniche, or on the architrave underneath the triglyphs, repreſenting a ſort of drops or bells.

GUT-TIE, a diſeaſe incident to oxen and male calves at the time of caſtration. In the county of Hereford, thoſe who breed cattle open the ſcrotum of their calves, and forcibly extract the teſticles with their teeth, in conſequence of which every veſſel is ruptured belonging to theſe parts. The vaſa deferentia are ſeparated from the teſticles, and form a kind of bow from the urethra, where they are united to the tranſverſe muſcles. The jejunum is the part of the gut that is tied, where it turns from the right to the left, and from the left to the right. As the bow of the gut hangs over the vaſa deferentia, a hitch is formed over the bow of the gut, analogous to what is made by a carter over his cart line. In this manner an obſtruction is occaſioned in the bowels, which terminates in a mortification, commonly proving fatal in the courſe of four days.

The ſymptoms which attend a gut-tie reſemble thoſe of an incurable colic, or mortification of the inteſtines. To aſcertain the diſtinction between the gut-tie and the colic, the hand and arm of the operator ought to be oiled, in which ſtate it ſhould be introduced into the anus. Here the ſtring will be found united to the muſcles, and without occaſioning any pain to the animal, may be traced with eaſe to the ſtricture by the hand.

Mr Harris, farmer at Wickton, informs us, that the gut-tie may be prevented by the following ſimple and eaſy method of caſtration. "Open the ſcrotum, looſen out the teſticles, and tie the ſeveral veſſels with a waxed thread or ſilk, or ſear them with a hot iron, to prevent their bleeding, as in the common way of cutting colts. This method can never diſplace the veſſels of the bladder, teſticles, kidneys, or inteſtines; all of which remain covered or attached to the peritonæum, or lining of the abdomen of the beaſt, which renders it impoſſible that there ſhould ever be a ſtricture or tie on the gut.

GUTTURAL, a term applied to letters or ſounds pronounced or formed as it were in the throat.

GUTTY, in *Heraldry*, a term uſed when any thing is charged or ſprinkled with drops. In blazoning, the colour of the drops is to be named: as gutty of ſable, of gules, &c.

GUY, THOMAS, an eminent bookſeller, founder of the hoſpital for ſick and lame in Southwark bearing his name, was the ſon of Thomas Guy lighterman and coal-dealer in Horſley-down, Southwark. He was put apprentice, in 1660, to a bookſeller in the porch of Mercer's chapel; and ſet up trade with a ſtock of about 200l. in the houſe that forms the angle between Cornhill and Lombard-ſtreet. The Engliſh Bibles being at that time very badly printed, Mr Guy engaged with others in a ſcheme for printing them in Holland and importing them; but this being put a ſtop to, he contracted with the univerſity of Oxford for their privilege of printing them, and carried on a great bible-trade for many years to a conſiderable advantage. Thus he began to accumulate money, and his gains reſted in his hands; for being a ſingle man, and very penurious, his expences could not be great, when it was his cuſtom to dine on his ſhop-counter with no other table-covering than an old newſpaper: and beſides he was not more ſcrupulous about the ſtyle of his apparel. The bulk of his fortune, however, was acquired by purchaſing ſeamen's tickets during Queen Anne's wars, and by South-Sea ſtock in the memorable year 1720. To ſhow what great events ſpring from trivial cauſes, it is aſſerted, that the public owe the dedication of the greateſt part of his immenſe fortune to charitable purpoſes, to the indiſcreet officiouſneſs of his maid-ſervant in interfering with the mending of the pavement before the door. Guy had agreed to marry her, and, preparatory to his nuptials, had ordered the pavement before his door, which was in a neglected ſtate, to be mended, as far as to a particular ſtone which he pointed out. The maid, while her maſter was out, innocently looking on the paviers at work, ſaw a broken place that they had not repaired, and mentioned it to them: but they told her that Mr Guy had directed them not to go ſo far. Well, ſays ſhe, do you mend it; tell him I bade you, and I know he will not be angry. It happened, however, that the poor girl preſumed too much on her influence over her careful lover, with whom a few extraordinary ſhillings expence turned the ſcale totally againſt her: the men obeyed; Guy was enraged to find his orders exceeded, his matrimonial ſcheme was renounced, and ſo he built hoſpitals in his old age. In the year 1707 he built and furniſhed three wards on the north ſide of the outer court of St Thomas's Hoſpital in Southwark, and gave 100l. to it annually for eleven years preceding the erection of his own hoſpital: and, ſome time before his death, erected the ſtately iron gate, with the large houſes on each ſide, at the expence of about 3000l. He was 76 years of age when he formed the deſign of building the hoſpital contiguous to that of St Thomas's, which bears his name, and lived to ſee it roofed in, dying in the year 1724. The charge of erecting this vaſt pile amounted to 18,793l. and he left 219,499l. to endow it; a much larger ſum than had ever been dedicated to charitable uſes in this kingdom by any one man. He erected an alms-houſe with a library at Tanworth in Staffordſhire (the place of his mother's nativity, and for which he was repreſentative in parliament) for 14 poor men and women; and for their penſions, as well as for the putting out poor children apprentices, bequeathed 125l. a-year. Laſtly, he bequeathed 1000l. to every one who could prove themſelves in any degree related to him.

Guy, Guy's Cliff.

GUY, a rope uſed to keep ſteady any weighty body whilſt it is hoiſting or lowering, particularly when the ſhip is ſhaken by a tempeſtuous ſea.

GUY is likewiſe a large ſlack rope, extending from the head of the main-maſt to the head of the fore-maſt, and having two or three large blocks, faſtened to the middle of it. This is chiefly employed to ſuſtain the tackle uſed to hoiſt in and out the cargo of a merchant ſhip, and is accordingly removed from the maſt-head as ſoon as the veſſel is laden or delivered.

GUY's Cliff, in Warwickſhire, a great cliff on the weſt ſide of the Avon and the north ſide of Warwick, where in the Britons time was an oratory, and in that of the Saxons an hermitage, where Guy earl of War-

Guyon || Gygæus.

wick, who is ſaid to have retired to it after his fatigues by the toils and pleaſures of the world, built a chapel, and cohabited with the hermit; and that from thence it had the name. This hermitage was kept up to the reign of Henry VI. when Rich. Beauchamp earl of Warwick eſtabliſhed a chantry here, and in memory of the famous Guy erected a large ſtatue of him in the chapel eight feet in height, and raiſed a roof over the adjacent ſprings. The chapel is in the pariſh of St Nicholas, in the ſuburbs of Warwick.

GUYON, JOHANNA MARY BOURIERS DE LA MOTHE, a French lady, memorable for her writings, and for her ſufferings in the cauſe of Quietiſm, was deſcended from a noble family, and born at Montargis in 1648. She gave ſome extraordinary ſymptoms of illumination from her earlieſt infancy, and tried to take the veil before ſhe was of age to diſpoſe of herſelf; but her parents obliged her to marry a gentleman to whom they had promiſed her. She was a widow at the age of 28; when diſtinguiſhing herſelf in, and making many converts to, the way of contemplation and prayer known by the name of *Quietiſm*, complaints were made of her ſpiritualiſm, and ſhe was confined by order of the king, and ſeverely examined for eight months. She was diſcharged; but was afterwards involved in the perſecution of the archbiſhop of Cambray, and thrown into the Baſtile, where ſhe underwent many examinations: but nothing being made out againſt her, ſhe once more obtained her liberty, and lived private to her death in 1717. She ſpent her latter years in myſtical reveries; covering her tables, ceilings, and every thing that would receive them, with the ſallies of a viſionary imagination. Her pious verſes were collected after her death in 5 vols, entitled *Cantiques ſpirituels, ou d'Emblemes ſur l'Amour Divin.* Her publications were, *Le moyen court et très facile de faire Oraiſons;* and *Le Cantique des Cantiques de Salomon interprete ſelon le ſens myſtique;* which were condemned by the archbiſhop of Paris.

GUZ, an Indian meaſure which varies in different places, but is in general equal to a yard of Engliſh meaſure. The guz of Akbar did not exceed 41 fingers.

GWINIAD. See SALMO, ICHTHYOLOGY *Index.*

GYARUS, in *Ancient Geography*, one of the Cyclades, 12 miles in compaſs, lying to the eaſt of Delos. It was a deſert iſland, and allotted for a place of baniſhment by the Romans.

GYBING, the act of ſhifting any boom-ſail from one ſide of the maſt to the other.

In order to underſtand this operation more clearly, it is neceſſary to remark, that by a boom-ſail is meant any ſail whoſe bottom is extended by a boom, the fore-end of which is hooked to its reſpective maſt; ſo as to ſwing occaſionally on either ſide of the veſſel, deſcribing an arch, of which the maſt will be the centre. As the wind or the courſe changes, it alſo becomes frequently neceſſary to change the poſition of the boom, together with its ſail, which is accordingly ſhifted to the other ſide of the veſſel as a door turns upon its hinges. The boom is puſhed out by the effort of the wind upon the ſail, and is reſtrained in a proper ſituation by a ſtrong tackle communicating with the veſſel's ſtern, and called the *ſheet.* It is alſo confined on the fore part by another tackle called the *guy.*

GYGÆUS, in *Ancient Geography*; called alſo *Colous;* a lake of Lydia, diſtant 40 ſtadia, or five miles, from Sardis.

Gyges || Gymnaſium.

GYGES, in fabulous hiſtory, a Lydian, to whom Candaules king of the country ſhowed his wife naked. The queen was ſo incenſed at this inſtance of imprudence and infirmity in her huſband, that ſhe ordered Gyges either to prepare for death himſelf, or to put Candaules to death. He choſe the latter; and, marrying the queen, aſcended the vacant throne about 718 years before the Chriſtian era. He was the firſt of the Mermnadæ who reigned in Lydia. He reigned 38 years, and diſtinguiſhed himſelf by the immenſe preſents which he made to the oracle of Delphi (*Herod.* i. c. 8.)—According to Plato, Gyges deſcended into a chaſm of the earth, where he found a brazen horſe, whoſe ſides he opened, and ſaw within the body the carcaſe of a man of uncommon ſize, from whoſe finger he took a brazen ring. This ring, when he put it on his finger, rendered him inviſible; and by means of its virtue he introduced himſelf to the queen, murdered her huſband, and married her and uſurped the crown of Lydia. (*Cic. Off.* iii. c. 9.)

GYMNASIARCH, in antiquity, the director of the gymnaſium. He had two deputies under him; the one called *xyſtarch*, who preſided over the athletæ, and had the overſight of wreſtling; the other was *gymnaſtes*, who had the direction of all other exerciſes.

GYMNASIUM, in Grecian antiquity, a place fitted for performing exerciſes of the body, &c.—The word is Greek, formed of γυμνος, "naked;" by reaſon they anciently put off their clothes, to practiſe with the more freedom.

Gymnaſia, according to Potter, were firſt uſed at Lacedemon, but were afterwards very common in all parts of Greece; and imitated, very much augmented, and improved, at Rome. There were three principal gymnaſia at Athens; the academy where Plato taught; the Lyceum, noted for Ariſtotle's lectures; and the Cynoſarges, alloted for the populace.

Vitruvius deſcribes the ſtructure and form of the ancient gymnaſia, lib. v. cap. 11. They were called *gymnaſia*, becauſe ſeveral of the exerciſes were performed naked; and *palæſtræ*, from wreſtling, which was one of the moſt uſual exerciſes there: the Romans ſometimes alſo called them *thermæ*, becauſe the baths and bagnios made a principal part of the building.—It appears that they did not perform their exerciſes quite naked ſo early as the time of Homer, but always in drawers; which they did not lay aſide before the 32d Olympiad. One Orſippus is ſaid to have been the firſt who introduced the practice: for having been worſted by means of his drawers undoing and entangling him, he threw them quite aſide, and the reſt afterwards imitated him. They were not ſingle edifices, but a knot of buildings united, being ſufficiently capacious to hold many thouſands of people at once; and having room enough for philoſophers, rhetoricians, and the profeſſors of all other ſciences to read their lectures,—and wreſtlers, dancers, and all others who had a mind to exerciſe,—at the ſame time without the leaſt diſturbance or interruption. They conſiſted of a great many parts. Vitruvius recites no leſs than 12, viz. 1. The exterior porticoes, where the philoſophers, rhetoricians, mathematicians, phyſicians, and other virtuoſi, read public lectures, and where they alſo diſputed and rehearſed

Gymnaſium, Gymnaſtics.

hearſed their performances. 2. The ephebeum, where the youth aſſembled very early, to learn their exerciſes in private, without any ſpectators. 3. The coryceum, apodyterion, or gymnaſterion, a kind of wardrobe, where they ſtripped, either to bathe or exerciſe. 4. The elæotheſium, alipterion, or unctuarium, appointed for the unctions, which either preceded or followed the uſe of the bath, wreſtling, pancratia, &c. 5. The coniſterium or coniſtra, in which they covered themſelves with ſand or duſt, to dry up the oil or ſweat. 6. The palæſtra, properly ſo called, where they practiſed wreſtling, the pugillate, pancratia, and divers other exerciſes. 7. The ſphæriſterium or tennis-court, reſerved for exerciſes wherein they uſed balls. 8. Large unpaved alleys, which comprehended the ſpace between the porticoes and the walls wherewith the edifice was ſurrounded. 9. The xyſti, which were porticoes for the wreſtlers in winter or bad weather. 10. Other xyſtis or open alleys, allotted for ſummer and fine weather, ſome of which were quite open, and others planted with trees. 11. The baths, conſiſting of ſeveral different apartments. 12. The ſtadium, a large ſpace of a ſemicircular form, covered with ſand, and ſurrounded with ſeats for the ſpectators.

For the adminiſtration of the gymnaſia, there were different officers: the principal were, 1. The gymnaſiarcha, who was the director and ſuperintendant of the whole. 2. The xyſtarcha, who preſided in the xyſtus or ſtadium. 3. The gymnaſta, or maſter of the exerciſes, who underſtood their different effects, and could accommodate them to the different complexions of the athletæ. 4. The pædotriba, whoſe buſineſs was mechanically to teach the exerciſes, without underſtanding their theory or uſe. Under theſe four officers were a number of ſubalterns, whoſe names diſtinguiſhed their different functions.

The gymnaſtic exerciſes may be reduced to two general claſſes; as they depend either on the action of the body alone, or as they require external agents or inſtruments. The latter conſiſted chiefly in mounting the horſe, driving the chariot, and ſwimming. The former were chiefly of two kinds; orcheſtice, and palæſtrice.

The orcheſtice comprehended, 1. Dancing. 2. Cubiſtice, or the art of tumbling. 3. Sphæriſtice or tennis, including all the exerciſes with pilæ or balls.

The palæſtrice compriſed all exerciſes under the denomination *palæſtræ*; as wreſtling, boxing, pancratia, hoplomachia, running, leaping, throwing the diſcus, the exerciſe of the javelin, and that of the hoop, denominated by the Greeks τροχος, which conſiſted in rolling an iron hoop five or ſix feet in diameter, beſet with iron rings, the noiſe of which appriſing the people to give way, afforded them alſo an amuſement. Both ſtrength and ſkill were requiſite in directing this hoop, which was to be driven with an iron rod. To theſe muſt alſo be added the exerciſes belonging to the medicinal gymnaſtics; as, 1. Walking. 2. Vociferation, or ſhouting. 3. Holding one's breath. Hoffman enumerates no fewer than 55 ſorts of exerciſes that were practiſed in the gymnaſia.

GYMNASTICS, GYMNASTICE, or the GYMNASTIC art, denotes the art of performing exerciſes of the body, whether for defence, health, or diverſion. See GYMNASIUM.

Several modern writers have treated of this art. M. Burette has given the hiſtory of gymnaſtics in the Memoirs of the Royal Academy of Inſcriptions. Gymnaſtics.

On the firſt eſtabliſhment of ſociety, men, being appriſed of the neceſſity of military exerciſes for repelling the inſults of their neighbours, inſtituted games and propoſed prizes to animate their youth to combats of divers kinds. And as running, leaping, ſtrength and dexterity of arm in throwing the javelin, driving a ball, or toſſing a quoit, together with wreſtling, &c. were exerciſes ſuited to the manner of fighting in thoſe days; ſo the youth vied to excel in them, in the preſence of the aged, who ſat as their judges, and diſpenſed prizes to the conquerors; till what was originally only amuſement, became at length a matter of ſuch importance, as to intereſt great cities and entire nations in its practice. Hence aroſe an emulation and eagerneſs to excel, in hopes, one day, of being proclaimed and crowned conquerors in the public games, which was the higheſt honour a mortal could arrive at: nay, they went ſo far as to imagine, that even gods and demigods were not inſenſible of what men were ſo captivated with; and, in conſequence hereof, to introduce the greateſt part of theſe exerciſes into their religious ceremonies, the worſhip of their gods, and the funeral honours done to the manes of the dead.

Though it be hard to determine the preciſe epocha of the gymnaſtic art, yet it appears from ſeveral paſſages in Homer, and particularly the 23d book of the Iliad, where he deſcribes the games celebrated at the funeral of Patroclus, that it was not unknown at the time of the Trojan war. From that deſcription, which is the earlieſt monument now extant of the Grecian gymnaſtics, it appears, that they had chariot-races, boxing, wreſtling, foot-races, gladiators, throwing the diſcus, drawing the bow, and hurling the javelin; and it ſhould ſeem from the particular account Homer gives of theſe exerciſes, that even then the gymnaſtic art wanted little of perfection: ſo that when Galen ſays there was no gymnaſtic art in Homer's days, and that it began to appear no earlier than Plato, he is to be underſtood of the medicinal gymnaſtics only. This laſt, indeed, had its riſe later; becauſe, while men continued ſober and laborious, they had no occaſion for it; but when luxury and idleneſs had reduced them to the ſad neceſſity of applying to phyſicians, theſe, who had found that nothing contributed ſo much to the preſervation and re-eſtabliſhment of health as exerciſes, proportioned to the different complexions, ages, and ſexes, did not fail to refer them to the practice of gymnaſtics.

According to Plato, one Herodicus, prior a little time to Hippocrates, was the firſt who introduced this art into phyſic; and his ſucceſſors, convinced by experience of its uſefulneſs, applied themſelves in earneſt to improve it. Hippocrates, in his book of Regimen, has given inſtances of it, where he treats of exerciſe in general, and of the particular effects of walking, with regard to health; alſo of the different ſorts of races, either on foot or horſeback; leaping, wreſtling, the exerciſe of the ſuſpended ball, called *corycus*, chironomy, unctions, frictions, rolling in the ſand, &c. But as phyſicians did not adopt all the exerciſes of the gymnaſtic art in their practice, it came to be divided between them and the maſters of martial and athletic exerciſes, who kept ſchools, the number of which was

Gymnopyris. Gymnoſophiſts.

greatly increaſed in Greece. At length the Romans alſo caught the ſame taſte; and, adopting the military and athletic exerciſes of the Greeks, they improved and advanced them to the utmoſt pitch of magnificence, not to ſay extravagance. But the declenſion of the empire involved the arts in its ruin, and, among others, gymnaſtics and medicine; which laſt unhappily then relinquiſhed the title it had to the former, and has neglected to reſume it ever ſince.

GYMNOPYRIS, in *Natural Hiſtory*, an old name given to ſome ſpecies of pyrites. See PYRITES, MINERALOGY *Index*.

GYMNOSOPHISTS, a ſet of Indian philoſophers, famous in antiquity; ſo denominated from their going barefoot. The word is formed of the Greek γυμνοσοφιστης, q. d. a ſophiſt or philoſopher who goes naked.

This name was given to the Indian philoſophers, whom the exceſſive heat of the country obliged to go naked; as that of *Peripatetics* was given to thoſe who philoſophiſed walking. The Gymnoſophiſts, however, did not go abſolutely naked; but only clothed themſelves no farther than modeſty required. There were ſome of theſe ſages in Africa; but the moſt celebrated clan of them was in India. The African gymnoſophiſts dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either of houſe or cell. They did not form themſelves into ſocieties like thoſe of India; but each had his private receſs, where he ſtudied and performed his devotions by himſelf. If any perſon had killed another by chance, he applied to theſe ſages for abſolution, and ſubmitted to whatever penances they enjoined. They obſerved an extraordinary frugality, and lived only upon the fruits of the earth. Lucan aſcribes to theſe Gymnoſophiſts ſeveral new diſcoveries in aſtronomy.

As to the Indian Gymnoſophiſts, they dwelt in the woods, where they lived upon the wild products of the earth, and never drank wine nor married. Some of them practiſed phyſic, and travelled from one place to another; theſe were particularly famous for their remedies againſt barrenneſs. Some of them, likewiſe, pretended to practiſe magic, and to foretel future events.

In general, the Gymnoſophiſts were wiſe and learned men: their maxims and diſcourſes, recorded by hiſtorians, do not in the leaſt ſavour of a barbarous education; but are plainly the reſult of great ſenſe and deep thought. They kept up the dignity of their character to ſo high a degree, that it was never their cuſtom to wait upon any body, not even upon princes themſelves. They believed the immortality and tranſmigration of the ſoul: they placed the chief happineſs of man in a contempt of the goods of fortune, and the pleaſures of ſenſe, and gloried in having given faithful and diſintereſted counſels to princes and magiſtrates. It is ſaid, that when they became old and infirm, they threw themſelves into a pile of burning wood, in order to prevent the miſeries of an advanced age. One of them, named *Calanus*, thus burnt himſelf in the preſence of Alexander the Great.

* *Florid.* lib. i.

Apuleius* deſcribes the Gymnoſophiſts thus: "They are all devoted to the ſtudy of wiſdom, both the elder maſters and the younger pupils; and what to me appears the moſt amiable thing in their character is, that they have an averſion to idleneſs and indolence: accordingly, as ſoon as the table is ſpread, before a bit of victuals be brought, the youths are all called together from their ſeveral places and offices, and the maſters examine them what good they have done ſince the ſunriſe: here one relates ſomething he has diſcovered by meditation; another has learned ſomething by demonſtration; and as for thoſe who have nothing to allege why they ſhould dine, they are turned out to work faſting."

Gymnoſpermia || Gynandria.

The great leader of the Gymnoſophiſts, according to Jerome, was one Buddas, called by Clemens *Butta*, who is ranked by Suidas among the Brachmans. That laſt author makes Buddas the preceptor of Manes the Perſian, the founder of the Gymnoſophiſts.

GYMNOSPERMIA, in *Botany*, (from γυμνος "naked," and σπερμα "ſeed;") the firſt order in Linnæus's claſs of didynamina. It comprehends the plants of that claſs which have naked ſeeds. The ſeeds are conſtantly four in number, except in one genus, viz. phryma, which is monoſpermous. See BOTANY, p. 65. and 211.

GYMNOTUS, a genus of fiſhes belonging to the order of apodes. See ICHTHYOLOGY *Index*.

GYNÆCEUM, among the ancients, the apartment of the women, a ſeparate room in the inner part of the houſe, where they employed themſelves in ſpinning, weaving, and needle-work.

GYNÆCOCRACY, denotes the government of women, or a ſtate where women are capable of the ſupreme command. Such are Britain and Spain.

GYNÆCOCRATUMENI, an ancient people of Sarmatia Europæa, inhabiting the eaſtern banks of the river Tanais, near its opening into the Palus Mæotis; thus called, as authors relate, becauſe they had no women among them; or rather becauſe they were under the dominion of women. The word is formed of γυνη *woman*, and κρατουμενος, *vanquiſhed*, of κρατεω, *I overcome*, q. d. overcome by women.

Fa. Hardouin, in his notes on Pliny, ſays, they were thus called, becauſe, after a battle which they loſt againſt the Amazons, on the banks of the Thermodoon, they were obliged to have venereal commerce with them, in order to get them children; *et quod victricibus obſequantur ad procurandam eis ſobolem*.—Hardouin calls them the huſbands of the Amazons, *Amazonum connubia*; for, as the author obſerves, the word *unde* muſt be retrenched from Pliny, having been foiſted into the text by people who were not maſters of the author's meaning, *unde Amazonum connubia*. See AMAZONS. They who take the Amazons for a fabulous people, will conclude the ſame of the Gynæcocratumenians.

GYNANDRIA, (from γυνη a "woman;" and ανηρ a "man)," the name of the 20th claſs in Linnæus's ſexual ſyſtem, conſiſting of plants with hermaphrodite flowers, in which the ſtamina are placed upon the ſtyle, or pillar-ſhaped receptacle reſembling a ſtyle, which riſes in the middle of the flower, and bears both the ſtamina and ſtigma; that is, both the ſuppoſed organs of generation. See BOTANY, p. 65.

The flowers of this claſs, ſays Linnæus, have a monſtrous appearance, ariſing, as he imagines, from the ſingular and unuſual ſituation of the parts of fructification.

GYPSIES,

Gypſies. GYPSIES, or EGYPTIANS, an outlandiſh tribe of vagabonds, who diſguiſing themſelves in uncouth habits, ſmearing their faces and bodies, and framing to themſelves a canting language, wander up and down; and, under pretence of telling fortunes, curing diſeaſes, &c. abuſe the common people, trick them of their money, and ſteal all that they can come at.

They are a ſtrange kind of commonwealth among themſelves of wandering impoſtors and jugglers, who made their firſt appearance in Germany about the beginning of the 16th century. Munſter, it is true, who is followed and relied upon by Spelman, fixes the time of their firſt appearance to the year 1417: but as he owns that the firſt whom he ever ſaw were in 1529, it is probably an error of the preſs for 1517; eſpecially as other hiſtorians inform us, that when Sultan Selim conquered Egypt in the year 1517, ſeveral of the natives refuſed to ſubmit to the Turkiſh yoke, and revolted under one Zinganeus; whence the Turks call them Zinganees; but being at length ſurrounded and baniſhed, they agreed to diſperſe in ſmall parties all over the world, where their ſuppoſed ſkill in the black art gave them an univerſal reception in that age of ſuperſtition and credulity. In the compaſs of a very few years they gained ſuch a number of idle proſelytes (who imitated their language and complexion, and betook themſelves to the ſame arts of chiromancy, begging, and pilfering), that they became troubleſome, and even formidable, to moſt of the ſtates of Europe.—Hence they were expelled from France in the year 1560, and from Spain in 1591. And the government of England took the alarm much earlier; for in 1530 they are deſcribed by Stat. 22 Hen. VIII. c. 10. as "an outlandiſh people calling themſelves Egyptians, uſing no craft nor feat of merchandiſe, who have come into this realm, and gone from ſhire to ſhire, and place to place, in great companies, and uſed great, ſubtle, and crafty means to deceive the people; bearing them in hand that they by palmiſtry could tell men's and women's fortunes; and ſo many times by craft and ſubtility have deceived the people of their money, and alſo have committed many heinous felonies and robberies." Wherefore they are directed to avoid the realm, and not to return under pain of impriſonment, and forfeiture of their goods and chattels; and upon their trials for any felony which they may have committed, they ſhall not be entitled to a jury *de medietate linguæ*. And afterwards it is enacted, by ſtatutes 1ſt and 2d Ph. and Mary, c. 4. and 5th Eliz. c. 20. that if any ſuch perſons ſhall be imported into the kingdom, the importer ſhall forfeit 40l. And if the Egyptians themſelves remain one month in the kingdom, or if any perſon being 14 years old, whether natural-born ſubject or ſtranger, which hath been ſeen or found in the fellowſhip of ſuch Egyptians, or which hath diſguiſed him or herſelf like them, ſhall remain in the ſame one month at one or ſeveral times, it is felony without benefit of clergy. And Sir M. Hale informs us, that at one Suffolk aſſizes no leſs that 13 perſons were executed upon theſe ſtatutes a few years before the reſtoration. But, to the honour of our national humanity, there are no inſtances more modern than this of carrying theſe laws into practice; and the laſt ſanguinary act is itſelf now repealed by 23 Geo. III. c. 54.

In Scotland they ſeem to have enjoyed ſome ſhare of indulgence; for a writ of privy ſeal, dated 1594, Gypſies. ſupports John Faw, lord and earl of Little Egypt, in the execution of juſtice on his company and folk, conform to the laws of Egypt, and in puniſhing certain perſons there named who rebelled againſt him, left him, robbed him, and refuſed to return home with him. James's ſubjects are commanded to aſſiſt in apprehending them, and in aſſiſting Faw and his adherents to return home. There is a like writ in his favour from Mary queen of Scots 1553, and in 1554 he obtained a pardon for the murder of Nunan Small. So that it appears he had ſtaid long in Scotland, and perhaps ſome of the time in England; and from him this kind of ſtrolling people might receive the name of *Faw Gang*, which they ſtill retain.

A very circumſtantial account of this ſingular race of vagrants has been lately given in an expreſs *Inquiry* concerning them, written in German by H. M. G. Grellman, and tranſlated by Mr Raper. It is incredible to think how this regular ſwarm of banditti has ſpread itſelf over the face of the earth. They wander about in Aſia, in the interior parts of Africa, and like locuſts have overrun moſt of the European nations. In the reigns of Henry VIII. and Queen Elizabeth, as we have ſeen, they were ſet up as a mark of general perſecution in England; yet their numbers do not appear to have much diminiſhed. Spain is ſuppoſed by Mr Twiſs to contain 40,000 of theſe vagrants; but by others 60,000; and by ſome even double that number. They are leſs numerous in France in conſequence of the ſtrictneſs of the police. In Italy they abound, eſpecially in the dominions of the church, on account of the bad police and the prevalence of ſuperſtition, which permit and entice them to deceive the ignorant. They are ſcattered, though not in great numbers, through Germany, Denmark, Sweden, and Ruſſia; but their chief population is in the ſouth-eaſt parts of Europe, which ſeem to be the general rendezvous of the gypſy nation. At a moderate computation Europe contains more than ſeven hundred thouſand of theſe vagabonds.—For near four centuries they have wandered through the world; and in every region, and among every people, whether barbarous or civilized, they have continued equally unchanged by the lapſe of time, the variation of climate, and the force of example. Their ſingular phyſiognomy and particular manners are the ſame in every country.—Their ſwarthy complexion receives no darker ſhade from the burning ſun of Africa, nor any fairer tincture from the temperate climates of Europe: they contract no additional lazineſs in Spain, nor acquire any new induſtry in England; in Turkey they behold the moſque and the creſcent with equal indifference as they do the reformed and the catholic church in Europe. In the neighbourhood of civilized life they continue barbarous; and, beholding around them cities and ſettled inhabitants, they live in tents or holes in the earth, and wander from place to place as fugitives and vagabonds.

They are paſſionately fond of ornaments; in which however they conſult neither propriety nor conſiſtency; they will wear an old laced coat, while the reſt of their garments ſcarcely hang together. In Hungary and Tranſylvania their ſummer habitations are tents; their winter ones holes 10 or 12 feet deep in the earth, except

Gypſies. cept ſuch as keep inns, or exerciſe trades. They are fond of plate, particularly ſilver cups, which they bury under the hearth for ſecurity. Their principal occupations are, ſmith's work, or tinkers, or wooden ware, and horſe-dealing; and in Hungary and Tranſylvania they are executioners of criminals, ſlayers of dead beaſts, and waſhers of gold. The women deal in old cloaths, proſtitution, wanton dances, and fortune-telling. Notwithſtanding theſe occupations the majority of this people are lazy, beggars, and thieves. They bring up their children to their own profeſſions, and are very fond of them. They have few diſorders, except the meaſles and ſmallpox, and weakneſs in their eyes, occaſioned by the ſmoke; and live to an advanced age, with a ſtrong attachment to life. Their phyſic is ſaffron in their ſoups, or bleeding.

Theſe people, however, appear to be diſtinguiſhed by different ſingularities in different countries. At leaſt in the following circumſtances the German gypſies differ widely from thoſe we commonly meet with in England. It is a great feaſt to them, our author ſays, whenever they can procure a roaſt of cattle that died of any diſtemper. It is all one to them, whether it be carrion of a ſheep, hog, cow, or other beaſt, horſe-fleſh only excepted; they are ſo far from being diſguſted with it, that to eat their fill of ſuch a meal, is to them the height of epicuriſm. When any one cenſures their taſte, or ſhows ſurpriſe at it, they anſwer, "The fleſh of a beaſt which God kills, muſt be better than of one killed by the hand of man." They therefore take every opportunity of getting ſuch dainties. That they take carrion from a layſtall, as is affirmed of the gypſies in Hungary, is by no means certain, any more than that they eat horſe-fleſh. But if a beaſt out of a herd dies, and they find it before it becomes rotten and putrified, or if a farmer gives them notice of a cow dead, they proceed, without heſitation, to get poſſeſſion of this booty. Their favourite object is animals that have been deſtroyed by fire; therefore, whenever a conflagration has happened, either in town or country, the next day the gypſies, from every neighbouring quarter, aſſemble and draw the ſuffocated half-conſumed beaſts out of the aſhes. Men, women, and children, in troops, are extremely buſy, joyfully carrying the fleſh home to their dwelling-places; they return ſeveral times, provide themſelves plentifully with this roaſt meat, and gluttonize in their huts as long as their noble fare laſts.

The gypſies have, at leaſt in Tranſylvania, a ſort of regular government, rather nominal than real or effective. They have their leaders or chiefs, whom they diſtinguiſh by the Sclavonian title, *Waywode*. To this dignity every perſon is eligible who is of a family deſcended from a former waywode; but the preference is generally given to thoſe who have the beſt clothes and the moſt wealth; who are of a large ſtature, and not paſt the meridian of life.—Of religion, however, they have no ſenſe; though, with their uſual cunning and hypocriſy, they profeſs the eſtabliſhed faith of every country in which they live. They alſo ſpeak the languages of the reſpective countries, yet have a language of their own; from whence derived, authors differ. The only ſcience which they have attained is muſic. Their poetry is ungrammatical indecent rhyme.

Their general character and capacities are thus deſcribed: Imagine people of a childiſh way of thinking; Gypſies. their minds filled with raw, undigeſted conceptions; guided more by ſenſe than reaſon; uſing underſtanding and reflection ſo far only as they promote the gratification of any particular appetite; and you have a perfect ſketch of the gypſies character. They are lively, uncommonly loquacious and chattering; fickle in the extreme, conſequently inconſtant in their purſuits; faithleſs to every body, even their own caſt; void of the leaſt emotion of gratitude, frequently rewarding benefits with the moſt inſidious malice. Fear makes them ſlaviſhly compliant when under ſubjection; but having nothing to apprehend, like other timorous people, they are cruel. Deſire of revenge often cauſes them to take the moſt deſperate reſolutions. To ſuch a degree of violence is their fury ſometimes excited, that a mother has been known, in the exceſs of paſſion, to take her little infant by the feet, and with it ſtrike the object of her anger, when no other inſtrument has readily preſented itſelf. They are ſo addicted to drinking, as to ſacrifice what is moſt neceſſary to them, that they may feaſt their palate with ſpirits. They have, too, what one would little expect, an enormous ſhare of vanity, which ſhows itſelf in their fondneſs for fine clothes, and their gait and deportment when dreſſed in them. One might imagine, that this pride would have the good effect to render a gypſy cautious not to be guilty of ſuch crimes as ſubject him to public ſhame; but here comes in the levity of character, for he never looks to the right nor to the left in his tranſactions. In an hour's time he forgets that he is juſt untied from the whipping poſt. But their pride is grounded on mere idle conceit, as appears plainly from their making it a point of honour to abuſe their companions, and put on a terrible appearance in the public market, where they are ſure to have many ſpectators; they cry out, make a violent noiſe, challenge their adverſary to fight, but very ſeldom any thing comes of it. Thus the gypſy ſeeks honour, of which his ideas coincide very little with thoſe of other people, and ſometimes deviate entirely from propriety.

"Nothing (continues our author) can exceed the unreſtrained depravity of manners exiſting among theſe people, I allude particularly to the other ſex. Unchecked by any idea of ſhame, they give way to every deſire. The mother endeavours, by the moſt ſcandalous arts, to train up her daughter for an offering to ſenſuality; and *this* is ſcarce grown up before ſhe becomes the ſeducer of others. Lazineſs is ſo prevalent among them, that were they to ſubſiſt by their own labour only, they would hardly have bread for two of the ſeven days in the week. This indolence increaſes their propenſity to ſtealing and cheating, the common attendants on idleneſs. They ſeek to avail themſelves of every opportunity to ſatisfy their lawleſs deſires. Their univerſal bad character therefore for fickleneſs, infidelity, ingratitude, revenge, malice, rage, depravity, lazineſs, knavery, thieviſhneſs, and cunning, though not deficient in capacity and cleverneſs, render theſe people of no uſe in ſociety, except as ſoldiers to form marauding parties. Perſons in their company, and under their diſguiſe, have formed dangerous deſigns againſt cities and countries. They have been baniſhed from almoſt all civilized ſtates, in their turn, except Hungary and Tranſylvania, and to little purpoſe." Our author is of

opinion,

Gypſies. opinion, that as Turkey would allow them toleration, it would be better for the European ſtates to take ſome ſteps for cultivating and civilizing them, and making them uſeful. But while they are inſenſible of religion and ſtrongly attached to their own manners, it is to be feared the attempt will be impracticable. This appears from a very intelligent Hungarian lady's experience on the ſubject, communicated in a letter as follows: 'There are a great number of them on my eſtates, but I have permitted two families in particular to eſtabliſh themſelves at the place of my own reſidence, under the expreſs condition that no others ſhall come here and join them. I took all poſſible pains to make them reaſonable creatures. I ſet the elder ones to work; the younger ones tend the cattle. I obſerved that they were more fond of horſes than any thing elſe; for which reaſon I placed a gypſy under each groom. I had their children clothed, that none of them might be running about naked, according to their uſual practice. It appeared, however, that cuſtom was become nature with them. The old ones worked diligently ſo long as any body ſtood over them; the moment their backs were turned, they all got together in a circle, their legs acroſs, facing the ſun, and chattered. Thus they cannot poſſibly earn more, indeed hardly ſo much, as would find them bread, although very cheap with us; for the bread I give them does not ſtand me in half a kreutzer the pound. Even in winter they cannot bear a hat on their head or ſhoes on their feet. The boys run like wild things wherever they are ſent, either on foot or on horſeback; but they ſpoil horſes unmercifully, beat them on the head, jerk the bits in their mouths, ſo as to make them run down with blood. They cannot be brought by any means whatever to dreſs horſes. Clothe them as you will, they always ſell or loſe their clothes. In a word, one cannot but conſider them as void of reaſon; it is really ſhocking to ſee even well grown children put whatever they find into their mouths, like infants before they can ſpeak; wherefore they eat every thing, even carrion, let it ſtink never ſo much. Where a mortality happens among the cattle, there theſe wretched beings are to be found in the greateſt numbers.'

The origin of this people, as we have ſeen, has been generally believed to be Egyptian; and that belief is as old as their exiſtence in Europe. Thomaſius, Salmon the Engliſh geographer, and lately Signior Griſelini, have endeavoured to prove it by ſatisfactory evidence. This theory, however, according to our author, is without foundation. The Egyptian deſcent of theſe people, he thinks, is not only deſtitute of proofs, but the moſt poſitive evidence is found to contradict it. Their language differs entirely from the Coptic; and their cuſtoms are very different from thoſe of the Egyptians. They are indeed to be found in Egypt; but they wander about there as ſtrangers, and form a diſtinct people, as in other countries. The expreſſions of Bellonius are ſtrong and deciſive: "No part of the world, I believe, is free from thoſe banditti, wandering about in troops, whom we by miſtake call *Egyptians* and *Bohemians*. When we were at Cairo, and in the villages bordering on the Nile, we found troops of theſe ſtrolling thieves ſitting under palm trees; and they are eſteemed foreigners in Egypt as well as among us."

The Egyptian deſcent of the gypſies being rejected, our author next endeavours to ſhow that they come from Hindoſtan. The chief baſis of his theory, however, is no other than that very dubious one, a ſimilarity of language. He adds a long vocabulary of the gypſy and the Hindoſtanic languages; in which, it muſt be confeſſed, many words are the ſame; but many are different. A principal proof which he adduces on this head is from the relation of Captain Szekely von Doba, to whom a printer in 1763 related, that a preacher of the Reformed church, when a ſtudent at Leyden, being intimately acquainted with three young Malabar ſtudents, took down 1000 of their words, which he fancied correſponded with the gypſy language; and they added, that a tract of land in their iſland was named *Oziganía*. He repeated theſe words to the Raber gypſies, who explain them without trouble or heſitation. This account was publiſhed in the Vienna Gazette. Suppoſing theſe three young men to be ſons of Bramins, who uſe the Sanſcrit, the common language of Hindoſtan comes as near to that as modern Italian to pure Latin. The compariſon of the two languages takes up above 30 pages; and Mr Grellman thinks it eſtabliſhes his ſyſtem. The ſame opinion is maintained by Mr Marſden, in a paper upon this ſubject in the 7th volume of the Archeologia. The numerals, however, both in Hindoſtanic and gypſy, differ greatly as ſtated by the two authors. And here, as in other ſuch compariſons, one is aſtoniſhed at the credulity of the comparers of orthoepy and orthography (as a periodical critic obſerves), which can have no connection in languages with which we are not perfectly familiar, even were both languages reduced to writing by their reſpective people: how much leſs, then, where one of the two languages is never reduced to writing, as is the caſe of the gypſy, but it is blended with the language of the country where the clan reſides? This appears from the correſpondence of ſeveral words in all languages with the gypſy. Mr Grellman acknowledges the two gypſy verſions of the Lord's Prayer, at different periods, differ ſo widely, that one would almoſt be inclined to doubt whether they were really the ſame language. We think we can diſcern a few words differently indeed written, but probably pronounced alike. Nor can we, in all the languages in which Chamberlayne gives the Lord's Prayer, perceive the leaſt reſemblance to the gypſy name of father, *Dade* and *Dad*, except in the Welſh, *Taad*. In proſecuting his argument, Mr Grellman does not inſiſt on the ſimilarity of colour between the two people, nor on the cowardice common to both, nor on the attachment of the Indians to tents, or letting their children go naked; all theſe being traits to be met with in other nations: but he dwells on the word *Polgar*, the name of one of the firſt gypſy leaders, and of the Hindoſtanic god of marriage; alſo on the correſpondence between the travelling ſmiths in the two people, who carry two pair of bellows; the Indian's boy blows them in India, the wife or child of the gypſy in Europe: as if every travelling tinker, in every nation where tinkers travel, had not the ſame journeymen. In laſcivious dances and chiromancy the two people agree; nor are theſe uncommon in other parts of the globe. The exceſſive loquacity of the two people is produced as ſimilar; as if no other nations in the world were loquacious. Fainter reſemblances are, a fondneſs

Gypſies.

for

Gypſies. for ſaffron, and the intermarrying only with their own people. The laſt poſition in the author's theory is, that the gypſies are of the loweſt claſs of Indians, namely, *Parias*, or, as they are called in Hindoſtan, *Suders*. He compares the manners of this claſs with thoſe of the gypſies, and enumerates many circumſtances in which they agree: ſome of the compariſons are frivolous, and prove nothing. As an inſtance of which we may take the following: 'Gypſies are fond of being about horſes; the Suders in India likewiſe, for which reaſon they are commonly employed as horſe-keepers by the Europeans reſident in that country.' This reaſoning does not prove that the gypſies are Suders, any more than that they are Arabians or Yorkſhire farmers.

The objections, however, to which this learned and induſtrious author's theory is liable, are ſuch as only ſhow it to be by no means ſatisfactory; but do not prove that it is wrong. It may poſſibly be right; and upon this ſuppoſition the cauſe of their emigration from their country, he conjectures, not without probability, to be the war of Timur Beg in India. In the years 1408 and 1409 this conqueror ravaged India; and the progreſs of his arms was attended with devaſtation and cruelty. All who made reſiſtance were deſtroyed; thoſe who fell into the enemy's hands were made ſlaves; of theſe very ſlaves 100,000 were put to death. As on this occaſion an univerſal panic took place, what could be more natural than that a great number of terrified inhabitants ſhould endeavour to ſave themſelves by flight?—In the laſt place, the author endeavours to trace the route by which the gypſies came from Hindoſtan to Europe: but here he juſtly acknowledges that all that can be ſaid on the ſubject is mere ſurmiſe; and, upon the whole, after peruſing all the preceding details, the reader will probably be of opinion that there ſtill hangs a cloud over the origin of this extraordinary race. Gypſophila || Gyſhorn.

GYPSOPHILA, a genus of plants belonging to the decandria claſs; and in the natural method ranking under the 22d order, *Caryophyllei*. See BOTANY *Index*.

GYPSUM, PLASTER-STONE, or *Alabaſter*. See GYPSUM, MINERALOGY *Index*.

GYR-FALCO, the name of a large and fierce ſpecies of falcon, called in Engliſh the *jer-falcon*. See ORNITHOLOGY *Index*.

GYRINUS, a genus of inſects of the *Coleoptera* order. See ENTOMOLOGY *Index*.

GYSHORN, a town of Germany, in the duchy of Lunenburgh, ſituated on the river Aller, in E. Long. 10. 49. N. Lat. 52. 49.

H.

H || Habakkuk.

H, THE eighth letter and ſixth conſonant in our alphabet; though ſome grammarians will have it to be only an aſpiration, or breathing. But nothing can be more ridiculous than to diſpute its being a diſtinct ſound, and formed in a particular manner by the organs of ſpeech, at leaſt in our language: witneſs the words *eat* and *heat*, *arm* and *harm*, *ear* and *hear*, *at* and *hat*, &c. as pronounced with or without the *h*.

It is pronounced by a ſtrong exſpiration of the breath between the lips, cloſing, as it were, by a gentle motion of the lower jaw to the upper, and the tongue nearly approaching the palate.

There ſeems to be no doubt, that our *h*, which is the ſame with that of the Romans, derived its figure from that of the Hebrew ה. And, indeed, the Phœnicians, moſt ancient Greeks and Romans, uſed the ſame figure with our H, which in the ſeries of all theſe alphabets keeps its primitive place, being the eighth letter.

H, uſed as a numeral, denotes 200; and with a daſh over it, $\overline{\text{H}}$ 200,000.

As an abbreviation, H was uſed by the ancients to denote *homo*, *hæres*, *horæ*, &c. Thus H. B. ſtood for *hæres bonorum*; and H. S. corruptly for L L S. ſeſterce; and H. A. for Hadrianus.

HAAG, or HAG, a town of the duchy of Bavaria in Germany, ſeated on a hill on the weſt ſide of the river Inn, in E. Long. 12. 15. N. Lat. 48. 18.

HABAKKUK, one of the twelve leſſer prophets, whoſe prophecies are taken into the canon of the Old Teſtament. The name is written in the Hebrew with ח *heth*; and ſignifies "a wreſtler." There is no preciſe time mentioned in Scripture when this Habakkuk lived; but from his predicting the ruin of the Jews by the Chaldeans, it may be concluded that he propheſied before Zedekiah, or about the time of Manaſſeh. He is reported to have been the author of ſeveral prophecies which are not extant: but thoſe that are indiſputably his, are contained in three chapters. In theſe the prophet complains very pathetically of the diſorders which he obſerved in the kingdom of Judæa. God reveals to him, that he would ſhortly puniſh them in a very terrible manner by the arms of the Chaldæans. He foretels the conqueſts of Nebuchadnezzar, his metamorphoſis, and death. He foretels, that the vaſt deſigns or Jehoiakim would be fruſtrated. He ſpeaks againſt a prince (probably the king of Tyre) who built with blood and iniquity; and he accuſes another king (perhaps the king of Egypt) of having intoxicated his friend, in order to diſcover his nakedneſs. The third chapter is a ſong or prayer to God, whoſe majeſty he deſcribes with the utmoſt grandeur and ſublimity of expreſſion. Habakkuk || Habdala.

HABAT, a province of Aſia, in Barbary, and in the kingdom of Fez. It is ſurrounded by the Mediterranean, the ſtraits of Gibraltar, and the Atlantic ocean. The principal towns are Arzilla, Tetuan, and Ceuta; which laſt is in poſſeſſion of the Spaniards.

HABDALA, a ceremony of the Jews obſerved on the evening of the ſabbath, when every one of the family

Habeas Corpus.

mily is come home. At that time they light a taper or lamp, with two wicks at leaſt. The maſter of the family then takes a cup, with ſome wine, mixed with fragrant ſpices, and having repeated a paſſage or two of Scripture, as for example, "I will take the cup of ſalvation," &c. Pſal. cxvi. and "The Jews had light and gladneſs," &c. Eſth. viii. he bleſſes the wine and ſpices. Afterwards he bleſſes the light of the fire; and then caſts his eyes on his hands and nails, as remembering that he is going to work. The whole is intended to ſignify, that the ſabbath is over, and is from that moment divided from the day of labour which follows. For this reaſon the ceremony is called *Habdala*, which ſignifies "diſtinction." After the ceremony is over, and the company breaks up, they wiſh one another, not "a good night," but "a good week."

HABEAS CORPUS, in law, is the great remedy in caſes of *False Imprisonment*. The incapacity of the three other remedies referred to under that article, to give complete relief in every caſe, hath almoſt entirely antiquated them, and hath cauſed a general reſource to be had, in behalf of perſons aggrieved by illegal impriſonment, to the preſent writ, the moſt celebrated in the Engliſh law. Of this there are various kinds made uſe of by the courts at Weſtminſter, for removing priſoners from one court into another for the more eaſy adminiſtration of juſtice. Such is the *habeas corpus ad reſpondendum*, when a man hath a cauſe of action againſt one who is confined by the proceſs of ſome inferior court; in order to remove the priſoner, and charge him with this new action in the court above. Such is that *ad ſatisfaciendum*, when a priſoner hath had judgment againſt him in an action, and the plaintiff is deſirous to bring him up to ſome ſuperior court to charge him with proceſs of execution. Such alſo are thoſe *ad proſequendum*, *teſtificandum*, *deliberandum*, &c.; which iſſue when it is neceſſary to remove a priſoner, in order to proſecute or bear teſtimony in any court, or to be tried in the proper juriſdiction wherein the fact was committed. Such is, laſtly, the common writ *ad faciendum et recipiendum*, which iſſues out of any of the courts of Weſtminſter-hall, when a perſon is ſued in ſome inferior juriſdiction, and is deſirous to remove the action into the ſuperior court; commanding the inferior judges to produce the body of the defendant, together with the day and cauſe of his caption and detainer (whence the writ is frequently denominated an *habeas corpus cum cauſa*), to *do and receive* whatſoever the king's court ſhall conſider in that behalf. This is a writ grantable of common right, without any motion in court; and it inſtantly ſuperſedes all proceedings in the court below. But, in order to prevent the ſurreptitious diſcharge of priſoners, it is ordered by ſtatute 1 & 2 P. & M. c. 13. that no *habeas corpus* ſhall iſſue to remove any priſoner out of any goal, unleſs ſigned by ſome judge of the court out of which it is awarded. And, to avoid vexatious delays by removal of frivolous cauſes, it is enacted by ſtatute 21 Jac. I. c. 23. that, where the judge of an inferior court of record is a barriſter of three ears ſtanding, no cauſe ſhall be removed from thence by *habeas corpus* or other writ, after iſſue or demurrer deliberately joined; that no cauſe, if once remanded to the inferior court by writ of *procedendo* or otherwiſe ſhall ever afterwards be again removed; and that no cauſe ſhall be removed at all, if the debt or damages laid in the declaration do not amount to the ſum of five pounds. But an *expedient* having been found out to elude the latter branch of the ſtatute, by procuring a nominal plaintiff to bring another action for five pounds or upwards (and then by the courſe of the court the *habeas corpus* removed both actions together), it is therefore enacted by ſtatute 12 Geo. I. c. 29. that the inferior court may proceed in ſuch actions as are under the value of five pounds, notwithſtanding other actions may be brought againſt the ſame defendant to a greater amount.

Habeas Corpus.

But the great and efficacious writ, in all manner of illegal confinement, is that of *habeas corpus ad ſubjiciendum;* directed to the perſon detaining another, and commanding him to produce the body of the priſoner, with the day and cauſe of his caption and detention, *ad faciendum, ſubjiciendum, et recipiendum*, to do, ſubmit to, and receive whatſoever the judge or court awarding ſuch writ ſhall conſider in that behalf. This is a high prerogative writ, and therefore by the common law iſſuing out of the court of king's bench, not only in term-time, but alſo during the vacation, by a *fiat* from the chief juſtice, or any other of the judges, and running into all parts of the king's dominions: for the king is at all times intitled to have an account why the liberty of any of his ſubjects is reſtrained, wherever that reſtraint may be inflicted. If it iſſues in vacation, it is uſually returnable before the judge himſelf who awarded it, and he proceeds by himſelf thereon; unleſs the term ſhould intervene, and then it may be returned in court. Indeed, if the party were privileged in the courts of common pleas and exchequer, as being an officer or ſuitor of the court, an *habeas corpus ad ſubjiciendum* might alſo have been awarded from thence; and, if the cauſe of impriſonment were palpably illegal, they might have diſcharged him: but if he were committed for any criminal matter, they could only have remanded him, or taken bail for his appearance in the court of king's bench; which occaſioned the common pleas to diſcountenance ſuch applications. It hath alſo been ſaid, and by very reſpectable authorities, that the like *habeas corpus* may iſſue out of the court of chancery in vacation: but upon the famous application to Lord Nottingham by Jenks, notwithſtanding the moſt diligent ſearches, no precedent could be found where the chancellor had iſſued ſuch a writ in vacation; and therefore his lordſhip refuſed it. *Blackſt. Comment.*

In the court of king's-bench it was, and is ſtill, neceſſary to apply for it by motion to the court, as in the caſe of all other prerogative writs (*certiorari*, prohibition, *mandamus*, &c.) which do not iſſue as of mere courſe, without ſhowing ſome probable cauſe why the extraordinary power of the crown is called in to the party's aſſiſtance. For, as was argued by Lord chief juſtice Vaughan, "it is granted on motion, becauſe it cannot be had of courſe; and there is therefore no *neceſſity* to grant it; for the court ought to be ſatisfied that the party hath a probable cauſe to be delivered." And this ſeems the more reaſonable, becauſe, when once granted, the perſon to whom it is directed can return no ſatisfactory excuſe for not bringing up the body of the priſoner. So that, if it

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iſſued of mere courſe, without ſhowing to the court or judge ſome reaſonable ground for awarding it, a traitor or felon under ſentence of death, a ſoldier or mariner in the king's ſervice, a wife, a child, a relation, or a domeſtic, confined for inſanity or other prudential reaſons, might obtain a temporary enlargement by ſuing out an *habeas corpus*, though ſure to be remanded as ſoon as brought up to the court. And therefore Sir Edward Coke, when chief juſtice, did not ſcruple, in 13 Jac. I. to deny a *habeas corpus* to one confined by the court of admiralty for piracy; there appearing, upon his own ſhowing, ſufficient grounds to confine him. On the other hand, if a probable ground be ſhown, that the party is impriſoned without juſt cauſe, and therefore hath a right to be delivered, the writ of *habeas corpus* is then a writ of right, which "may not be denied, but ought to be granted to every man that is committed, or detained in priſon, or otherwiſe reſtrained, though it be by the command of the king, the privy-council, or any other."

In the articles LIBERTY and RIGHTS, will be found a full diſcuſſion of the perſonal liberty of the ſubject. This is ſhown to be a natural inherent right, which could not be ſurrendered or forfeited unleſs by the commiſſion of ſome great and atrocious crime, and which ought not to be abridged in any caſe without the ſpecial permiſſion of law; a doctrine coeval with the firſt rudiments of our conſtitution; and handed down to us from the Anglo-Saxons, notwithſtanding all their ſtruggles with the Danes, and the violence of the Norman conqueſt: aſſerted afterwards and confirmed by the conqueror himſelf and his deſcendants; and though ſometimes a little impaired by the ferocity of the times, and the occaſional deſpotiſm of jealous or uſurping princes, yet eſtabliſhed on the firmeſt baſis by the proviſions of *magna charta*, and a long ſucceſſion of ſtatutes enacted under Edward III. To aſſert an abſolute exemption from impriſonment in all caſes, is inconſiſtent with every idea of law and political ſociety; and in the end would deſtroy all civil liberty, by rendering its protection impoſſible: but the glory of the Engliſh law conſiſts in clearly defining the time, the cauſes, and the extent, when, wherefore, and to what degree, the imprisonment of the ſubject may be lawful. This it is which induces the abſolute neceſſity of expreſſing upon every commitment the reaſon for which it is made: that the court, upon an *habeas corpus*, may examine into its validity; and according to the circumſtances of the caſe may diſcharge, admit to bail, or remand the priſoner.

And yet, early in the reign of Charles I. the court of king's-bench, relying on ſome arbitrary precedents (and thoſe perhaps miſunderſtood), determined * that they could not upon an *habeas corpus* either bail or deliver a priſoner, though committed without any cauſe aſſigned, in caſe he was committed by the ſpecial command of the king, or by the lords of the privy-council. This drew on a parliamentary inquiry, and produced the *petition of right*, 3 Car. I. which recites this illegal judgment, and enacts that no freeman hereafter ſhall be ſo impriſoned or detained. But when, in the following year, Mr Selden and others were committed by the lords of the council, in purſuance of his majeſty's ſpecial command, under a general charge of "notable contempts and ſtirring up ſedition againſt the king and government," the judges delayed for two terms (including alſo the long vacation) to deliver an opinion how far ſuch a charge was bailable; and when at length they agreed that it was, they however annexed a condition of finding ſureties for the good behaviour, which ſtill protracted their impriſonment; the chief juſtice Sir Nicholas Hyde, at the ſame time declaring ‡, that "if they were again remanded for that cauſe, perhaps the court would not afterwards grant a *habeas corpus*, being already made acquainted with the cauſe of the impriſonment." But this was heard with indignation and aſtoniſhment by every lawyer preſent; according to Mr Selden's own account of the matter, whoſe reſentment was not cooled at the diſtance of four and twenty years.

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‡ *Ibid.* 240.

Theſe pitiful evaſions gave riſe to the ſtatute 16 Car. I. c. 10. §. 8. whereby it is enacted, that if any perſon be committed by the king himſelf in perſon, or by his privy council, or by any of the members thereof, he ſhall have granted unto him, without any delay, upon any pretence whatſoever, a writ of *habeas corpus*, upon demand or motion made to the court of king's bench or common pleas; who ſhall thereupon, within three court days after the return is made, examine and determine the legality of ſuch commitment, and do what to juſtice ſhall appertain, in delivering, bailing, or remanding ſuch priſoner. Yet ſtill in the caſe of Jenks, before alluded to, who in 1676 was committed by the king in council for a turbulent ſpeech at Guildhall, new ſhifts and devices were made uſe of to prevent his enlargement by law; the chief juſtice (as well as the chancellor), declining to award a writ of *habeas corpus ad ſubjiciendum* in vacation, though at laſt he thought proper to award the uſual writs *ad deliberandum*, &c. whereby the priſoner was diſcharged at the Old Bailey. Other abuſes had alſo crept into daily practice, which had in ſome meaſure defeated the benefit of this great conſtitutional remedy. The party impriſoning was at liberty to delay his obedience to the firſt writ, and might wait till a ſecond and a third, called an *alias* and a *pluries*, were iſſued, before he produced the party; and many other vexatious ſhifts were practiſed to detain ſtate-priſoners in cuſtody. But whoever will attentively conſider the Engliſh hiſtory, may obſerve, that the flagrant abuſe of any power, by the crown or its miniſters, has always been productive of a ſtruggle; which either diſcovers the exerciſe of that power to be contrary to law, or (if legal) reſtrains it for the future. This was the caſe in the preſent inſtance. The oppreſſion of an obſcure individual gave birth to the famous *habeas corpus* act, 31 Car. II. c. 2. which is frequently conſidered as another *magna charta* of the kingdom; and by conſequence has alſo in ſubſequent times reduced the method of proceeding on theſe writs (though not within the reach of that ſtatute, but iſſuing merely at the common law) to the true ſtandard of law and liberty.

The ſtatute itſelf enacts, 1. That the writ ſhall be returned and the priſoner brought up, within a limited time according to the diſtance, not exceeding in any caſe twenty days. 2. That ſuch writs ſhall be endorſed, as granted in purſuance of this act, and ſigned by the perſon awarding them. 3. That on complaint and requeſt,

* *State Trials*, viii. 236.

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request in writing by or on behalf of any person committed and charged with any crime (unless committed for treason or felony expressed in the warrant, or for suspicion of the same, or as accessary thereto before the fact, or convicted or charged in execution by legal process), the lord chancellor, or any of the twelve judges in vacation, upon viewing a copy of the warrant, or affidavit that a copy is denied, shall (unless the party has neglected for two terms to apply to any court for his enlargement) award a *habeas corpus* for such prisoner, returnable immediately before himself or any other of the judges; and upon the return made shall discharge the party, if bailable, upon giving security to appear and answer to the accusation in the proper court of judicature. 4. That officers and keepers neglecting to make due returns, or not delivering to the prisoner or his agent within six hours after demand a copy of the warrant of commitment, or shifting the custody of a prisoner from one to another without sufficient reason or authority (specified in the act), shall for the first offence forfeit 100l. and for the second offence 200l. to the party grieved, and be disabled to hold his office. 5. That no person, once delivered by *habeas corpus*, shall be recommitted for the same offence, on penalty of 500l. 6. That every person committed for treason or felony shall, if he requires it the first week of the next term, or the first day of the next session of *oyer* and *terminer*, be indicted in that term or session, or else admitted to bail; unless the king's witnesses cannot be produced at that time: and if acquitted, or if not indicted and tried in the second term or session, he shall be discharged from his imprisonment for such imputed offence: but that no person, after the assizes shall be opened for the county in which he is detained, shall be removed by *habeas corpus*, till after the assizes are ended; but shall be left to the justice of the judges of assize. 7. That any such prisoner may move for and obtain his *habeas corpus*, as well out of the chancery or exchequer as out of the king's bench or common pleas; and the lord chancellor or judges denying the same, on sight of the warrant, or oath that the same is refused, forfeit severally to the party grieved the sum of 500l. 8. That the writ of *habeas corpus* shall run into the counties palatine, cinque ports, and other privileged places, and the islands of Jersey and Guernsey. 9. That no inhabitant of England (except persons contracting, or convicts praying to be transported; or having committed some capital offence in the place to which they are sent) shall be sent prisoners to Scotland, Ireland, Jersey, Guernsey, or any places beyond the seas, within or without the king's dominions, on pain that the party committing, his advisers, aiders, and assistants, shall forfeit to the party grieved a sum not less than 500l. to be recovered with treble costs; shall be disabled to bear any office of trust or profit; shall incur the penalties of *præmunire;* and shall be incapable of the king's pardon.

This is the substance of that great and important statute, which extends (we may observe) only to the case of commitments for such criminal charge as can produce no inconvenience to public justice by a temporary enlargement of the prisoner; all other cases of unjust imprisonment being left to the *habeas corpus* at common law. But even upon writs at the common law it is now expected by the court, agreeable to ancient precedents and the spirit of the act of parliament, that this writ should be immediately obeyed, without waiting for any *alias* or *pluries;* otherwise an attachment will issue. By which admirable regulations, judicial as well as parliamentary, the remedy is now complete for removing the injury of unjust and illegal confinement. A remedy the more necessary, because the oppression does not always arise from the ill nature, but sometimes from the mere inattention, of government. For it frequently happens in foreign countries (and has happened in England during the temporary suspension of the statute), that persons apprehended upon suspicion have suffered a long imprisonment, merely because they were forgotten.

Haberdasher || Habit.

HABERDASHER, in commerce, a seller of hats and other small wares.—The master and warden of the the company of haberdashers in London, calling to their assistance one of the company of cappers, and another of the hat-makers, and mayors, &c. of towns, may search the wares of all hatters who work hats with foreign wool, and who have not been apprentices to the trade, or who dye them with any thing but copperas and galls, or woad and madder; in which cases, they are liable to penalties by stat. 8 Eliz. cap. 7. and 5 Geo. II. cap. 22. See BERDASH.

HABERGION, or HAUBERGEON, HABERGETUM, a coat of mail; an ancient piece of defensive armour, in form of a coat, descending from the neck to the middle, and formed of little iron rings or meshes, linked into each other.—It is also written *haberge*, *hauberge*, *haubere*, *haubert*, *hautber*, *hautbert*, and *haubert*. Spelman takes it from the ancient French *hault*, "high," and *berg*, "armour, covering;" as serving to defend the upper part of the body. Du Cange and Skinner derive it from the Belgic *hals*, or Teutonic *halts*, "neck," and *bergen*, "to cover;" *i. e.* a defence for the neck. Others will have it formed of *al*, *alla*, q.d. *all*, and *bergen*, "to cover;" as importing it a cover for the whole body. In Scripture it seems to signify an offensive weapon. "The sword of him that layeth at him cannot hold; the spear, the dart, nor the habergeon," Job. xli. 26.

HABIT, in *Philosophy*, an aptitude or disposition either of mind or body, acquired by a frequent repetition of the same act. See *CUSTOM and Habit*.

HABIT is also used for a dress or garb, or the composition of garments, wherewith a person is covered. The principal part of the dress worn by the Jews and Greeks was the ἱμάτιον and the χιτὼν. The ἱμάτιον was an upper garment, consisting of a loose square piece of cloth wrapped round the body; the χιτὼν was an under garment, or tunic, which was fastened round the body and embraced it closely, falling down to the midthigh. It is proper in this place to observe that a person divested of this upper garment or ἱμάτιον, in the eastern language, is styled *naked*, and in this sense David danced naked before the ark.

The several sorts of garments in use with both sexes, amongst the Romans, were the toga, tunica, peluna, lacerna, chlamys, paludamentum, læna, stola, pallium or palla. See TOGA, &c.

For the habits of the priests amongst the Jews, Greeks, and Romans, see the article PRIESTS.

HABIT is particularly used for the uniform garments of the religious, conformable to the rule and order

Habite || Hacket.

whereof they make profeſſion; as the habit of St Benedict, of St Auguſtine, &c.

In this ſenſe we ſay abſolutely, ſuch a perſon has taken the habit; meaning he has entered upon a noviciate in a certain order. So he is ſaid to quit the habit, when he renounces the order. See VOW.

The habits of the ſeveral religious are not ſuppoſed to have been calculated for ſingularity or novelty: the founders of the orders, who were at firſt chiefly inhabitants of deſerts and ſolitudes, gave their monks the habit uſual among the country people. Accordingly, the primitive habits of St Anthony, St Hilarion, St Benedict, &c. are deſcribed by the ancient writers as conſiſting chiefly of ſheep ſkins, the common dreſs of the peaſants, ſhepherds, and mountaineers of that time; and the ſame they gave to their diſciples.

The orders eſtabliſhed in and about cities and inhabited places took the habit worn by other eccleſiaſtics at the time of their inſtitution. Thus, St Dominic gave his diſciples the habit of regular canons, which he himſelf had always worn to that time. And the like may be ſaid of the Jeſuits, Barnabites, Theatins, Oratorians, &c. who took the common habit of the eccleſiaſtics at the time of their foundation. And what makes them differ ſo much from each other, as well as from the eccleſiaſtical habit of the preſent times, is, that they have always kept invariably to the ſame form; whereas the eccleſiaſtics and laics have been changing their mode on every occaſion.

HABITE *and* REPUTE, in *Scots Law*, the common opinion of the people, among whom a perſon lives, with reſpect to any circumſtance relating to him.

HABITUDE, among ſchoolmen, the reſpect or relation one thing bears to another. See RELATION.

HABSBURG, or HAPSBURG, an ancient caſtle of Swiſſerland, in the canton of Bern. It is the place where the ancient counts of Hapſburg reſided, and is ſeated near the lake of Lucern, and to the eaſt of the town of that name. E. Long. 8. 10. N. Lat. 47. 22.

HACHA, a ſea-port town of South America, in Terra Firma, ſeated at the mouth of a river of the ſame name. Here the Spaniſh galleons touch at their arrival in South America, from whence expreſſes are ſent to all the ſettlements to give them notice of it. W. Long. 72. 8. N. Lat. 11. 30.

HACKET, JOHN, biſhop of Litchfield and Coventry, was born in 1592. In 1623 he was made chaplain to James I. and prebendary of Lincoln: and ſoon after obtained the rectory of St Andrew's Holborn, with that of Cheam in Surry; his patron telling him, he intended Holborn for wealth, and Cheam for health. In 1642 he was preſented to a prebendary and reſidentiary; but was deprived of the enjoyment of them, as well as of St Andrew's, by the enſuing troubles. He then lived retired at Cheam with little diſturbance, until he recovered his preferments by the reſtoration of Charles II. by whom he was preferred to the ſee of Litchfield and Coventry in 1661. Finding the beautiful cathedral of Litchfield almoſt battered to the ground, he in eight years finiſhed a complete church ſuperior to the former, at his own expence of 20,000l. excepting 1000l. he had from the dean and chapter, with what he could procure from private benefactors. He laid out 1000l. on a prebendal houſe, his palaces at Litchfield and Eccleſhall having been demoliſhed during the civil wars; and beſide theſe acts of munificence, left ſeveral other benefactions at his death in 1670. He publiſhed, before he entered into orders, a comedy intitled *Loyola*, which was twice acted before King James I. After his death there appeared a "Century of his ſermons on ſeveral remarkable ſubjects," in folio; and "The life of Archbiſhop Williams," in folio, which was abridged in 1700 by Ambroſe Philips. Hackney.

HACKNEY, a pariſh of Middleſex, on the north-eaſt ſide of London, containing no leſs than 12 hamlets. At the bottom of Hackney-Marſh; through which the river Lea runs, between Old Ford and the Wyck, there have been diſcovered the remains of a great ſtone cauſeway, which, by the Roman coins, &c. found there, was no doubt one of the famous highways made by the Romans. The church here is of a very ancient foundation, ſo old as Edward II. That part next London is called *Marc-ſtreet;* the middle *Church-ſtreet;* and the north part *Clapton;* Dorleſton and Shaklewell are on the weſt, and Hummerton, which leads to the Marſh, on the eaſt. Here are three meeting-houſes and ſeveral boarding ſchools, beſides the free-ſchool in the church-yard, a charity-ſchool, and 17 almſhouſes. It was from this place that the coaches let to the people in London firſt received their name; for in the laſt century, many people having gone on viſits to ſee their friends at Hackney, it occaſioned them often to hire horſes or carriages, ſo that in time it became a common name for ſuch horſes, coaches and chairs, as were let to the people of London; and the name has now diffuſed itſelf not only throughout Britain, but likewiſe Ireland.

HACKNEY-Coaches, thoſe expoſed to hire in the ſtreets of London, and ſome other great cities, at rates fixed by authority. See COACH.—Theſe firſt began to ply in the ſtreets of London, or rather waited at inns, in the year 1625, and were only 20 in number; but in 1635 they were ſo much increaſed, that King Charles iſſued out an order of council for reſtraining them. In 1637, he allowed 50 hackney-coachmen, each of whom might keep 12 horſes. In 1652, their number was limited to 200; and in 1654, it was extended to 300. In 1661, 400 were licenſed, at 5l. annually for each. In 1694, 700 were allowed, and taxed by the 5 and 6 of W. and M. at 4l. per annum each. By 9 Anne cap. 23. 800 coaches were allowed in London and Weſtminſter; but by 8 Geo. III. cap. 24. the number is increaſed to 1000, which are to be licenſed by commiſſioners, and to pay a duty of 5s per week to the king. On Sundays there were formerly only 175 hackney-coaches to ply, which were to be appointed by commiſſioners; but their number is now unlimited.

The fare of hackney-coachmen in London, or within ten miles of the city, is 12 ſhillings and ſixpence per day, allowing 12 hours per day. By the hour it is 1s. 6d. for the firſt, and 1s. for every hour after; and none are obliged to pay above 1s. for any diſtance not exceeding a mile and a half; or above 1s. 6d. for any diſtance not exceeding two miles. Where hackney coachmen refuſe to go at, or exact more than, their limited hire, they are ſubject to a forfeit not under *Such were the fares, &c. ſome years ago.*

Haddington. der 10s. or exceeding 3l. and which the commiſſioners have power to determine. Every hackney-coach muſt be provided with check ſtrings, and every coachman plying without them incurs a penalty of 5s.—Drivers of hackney-coaches are to give way to perſons of quality and gentlemen's coaches, under the penalty of 5l.

The duty ariſing from licences to hackney-coaches and chairs in London, forms a branch of the king's extraordinary and perpetual revenue ‡. This revenue is governed by commiſſioners of its own, and is in truth a benefit to the ſubject; as the expence of it is felt by no individual, and its neceſſary regulations have eſtabliſhed a competent juriſdiction, whereby a very refractory race of men may be kept in tolerable order.

‡ See *Revenue.*

HADDINGTON, County of, otherwiſe called *Eaſt Lothian*, is bounded by Mid Lothian on the weſt; on the north by the frith of Forth; on the eaſt by the German ocean; and it is ſeparated from the county of Berwick by the Lammermuir hills. It is about 25 miles long, and from 12 to 16 broad, being computed one of the moſt fertile counties in the kingdom, producing abundance of wheat and every ſpecies of grain. Even the mountainous part of it towards the ſouth is admirably adapted to the rearing of ſheep. The inhabitants on the ſea coaſts employ themſelves in fiſhing, making of ſalt, foreign trade, and the exportation of corn. Several branches of the linen and woollen manufacture have been eſtabliſhed in the interior of the county, and are in a flouriſhing condition. There is a manufacture of ſulphuric acid (oil of vitriol) eſtabliſhed at Preſtonpans, and one for ſal ammoniac near the ſame place.

It contains three royal boroughs, viz. Haddington, North Berwick, and Dunbar; beſides a number of well peopled villages and towns, ſuch as Tranent, Preſtonpans, Aberlady, Dirleton, &c. In this county alſo there are many ſeats of noblemen and gentlemen, ſuch as thoſe of the duke of Roxburgh, marquis of Tweedale, earl of Haddington, Lord Blantyre, earl of Wemyſs, Lord Elibank, earl of Hopetoun, Sir James Hall, Hay of Drummelzier, &c. &c. In this county there is abundance of coal of an excellent quality, of freeſtone and limeſtone; ironſtone is found in the pariſh of Humbie, and in the vicinity of Stenton there are ſome traces of an ore of lead. It is divided into 24 pariſhes. The population in 1801 amounted to 29,986 ſouls, and the actual rent of the whole has been eſtimated at 168,878l. 5s. 10d. ſterling. The following table exhibits a view of the population of this county, according to the Statiſtical Hiſtory of Scotland.

	Pariſhes.	Population in 1755.	Population in 1790-98.
1	Aberlady	739	800
	Athelſtaneford	691	927
	Bolton	359	235
	Dirleton	1700	1200
5	Dunbar	3281	3700
	Garvald	774	730
	Gladſmuir	1415	1380
	Haddington	3975	3915
	Humbie	1570	676
10	Innerwick	941	960
	Morham	245	190
	North Berwick	1412	1300
	Oldhamſtocks	622	498
	Ormiſton	810	864
15	Pencaitland	910	1033
	Preſtonhaugh	1318	1176
	Preſtonpans,	1596	2028
	Salton	761	830
	Spot	727	619
20	Stenton	631	624
	Tranent	2459	2732
	Whitekirk	968	994
	Whittingham	714	655
24	Yeſter	1091	900
		29,709	28,966
		28,966	
	Decreaſe,	743	

Haddington ‖ Haderſleben.

Haddington, a borough-town of Scotland and the capital of Eaſt Lothian, or Haddingtonſhire, is ſituated about 16 miles eaſt from Edinburgh, being the firſt ſtage on the London road, and in W. Long. 2. 25. N. Lat. 55. 50. It ſtands on the river Tyne, has four ſtreets which are neatly built, cutting each other at right angles, with a townhouſe erected in 1748, from a deſign by the celebrated Mr Adams. The ſchool is commodious, with lodgings for the maſters, and accommodation for boarders. The pariſh church is large, which formerly belonged to the Franciſcan monaſtery, and was probably built about the beginning of the 13th century. The weſt end is now the place of worſhip, for the reſt of it is completely in ruins. The aiſle is the burying place of the family of Maitland, and contains ſeveral marble ſtatues of the dukes of Lauderdale. On the monument of Maitland of Thirlſtane is an epitaph compoſed by James VI. Haddington is a place of great antiquity, for it is ſtiled by the mother of Malcolm IV. in a charter granted in 1178, *meum Burgum de Haddington.* Its political conſtitution is compoſed of a provoſt, three bailies, a dean of guild, treaſurer, and 12 counſellors. Its incorporated trades are ſeven in number. It was once ſtrongly fortified, of which different traces are ſtill to be ſeen.

A conſiderable manufacture of coarſe woollen cloth is carried on in the town and ſuburbs. It has two annual fairs, and a weekly market on Friday, computed to be the greateſt in Scotland for all ſorts of grain. Haddington has ſuffered much from the ravages of fire and the inundations of the Tyne, which roſe 17 feet above its uſual level in the year 1775, by which one half of the town was laid under water. Here the celebrated John Knox, father of the reformation, is ſaid to have been born, and ſtrangers are ſtill ſhewn the houſe where he firſt drew his breath. It has a vote in electing a member of parliament along with North Berwick, Dunbar, Jedburgh, and Lauder. Its revenue is eſtimated at about 400l. ſterling per annum.

HADDOCK, the Engliſh name of a ſpecies of Gadus. See Gadus, Ichthyology *Index.*

HADERSLEBEN, a ſea-port town of Denmark, in

Hades ‖ Hæretico.

in the duchy of Sleſwic, with a ſtrong citadel, built upon a ſmall iſland. It is ſeated on a bay of the Baltic ſea, and has a well frequented harbour. E. Long. 9. 50. N. Lat. 55. 18.

HADES, in the ſcriptures, is uſed in various ſenſes. Sometimes it ſignifies the inviſible regions of the dead, ſometimes the place of the damned, and ſometimes the grave. In Greek authors it is uſed to ſignify in general the regions of the dead. See HELL.

HADLEY, a town of Suffolk, ſeated in a bottom on the river Preſton. It conſiſts of about 600 houſes; with a handſome church, a chapel of eaſe, and a Preſbyterian meeting-houſe. The ſtreets are pretty broad, but not paved. Large quantities of yarn are ſpun here for the Norwich manufacture; and this town had once a conſiderable woollen manufacture, which is now decayed. E. Long. 1. 0. N. Lat. 52. 7.

HADRIAN. See ADRIAN.

HÆMAGOGOS, among phyſicians, a compound medicine, conſiſting of fetid and aromatic ſimples mixed with black hellebore, and preſcribed in order to promote the menſtrual and hæmorrhoidal fluxes; as alſo to bring away the lochia.

HÆMANTHUS, the BLOOD-FLOWER, a genus of plants belonging to the hexandria claſs; and in the natural method ranking under the ninth order, *Spathaceæ*. See BOTANY *Index*.

HÆMATITES, or BLOOD-STONE, a ſpecies of iron ore. See MINERALOGY *Index*.

HÆMATOPUS, the SEA-PYE, a genus of birds belonging to the order of grallæ. See ORNITHOLOGY *Index*.

HÆMATOXYLUM, LOGWOOD, or *Campeachy Wood*; a genus of plants belonging to the decandria claſs; and in the natural method ranking under the 33d order, *Lomentaceæ*. See BOTANY *Index*; and for its properties and uſe as a dye ſtuff, ſee DYEING *Index*.

HÆMOPTYSIS, HÆMAPTYSIS, or *Hæmoptoe*; a ſpitting of blood. See MEDICINE *Index*.

HÆMORRHAGY, (compounded of αἷμα "blood," and ῥῆγνυμι "I burſt forth),") in medicine, a flux of blood at any part of the body; ariſing either from a rupture of the veſſels, as when they are too full or too much preſſed; or from an eroſion of the ſame, as when the blood is too ſharp and corroſive.—The hæmorrhagy, properly ſpeaking, as underſtood by the Greeks, was only a flux of blood at the noſe; but the moderns extend the name to any kind of flux of blood, whether by the noſe, mouth, lungs, ſtomach, inteſtines, fundament, matrix, or whatever part. See MEDICINE and SURGERY *Index*.

HÆMORRHOIDAL, an appellation given by anatomiſts to the arteries and veins going to the inteſtinum rectum.

HÆMORRHOIDS, or PILES, an hæmorrhage or iſſue of blood from the hemorrhoidal veſſels. See MEDICINE *Index*.

HÆMUS, in *Ancient Geography*, a vaſt ridge, running from Illyricum toward the Euxine, (Pliny); ſo high as to afford a proſpect both of the Euxine and Adriatic. Here, in after ages, was conſtituted a province called *Hæmimons*, or *Hæmimontus*.

HÆRETICO COMBURENDO, a writ which anciently lay againſt an heretic, who, having once been convicted of hereſy by his biſhop, and having abjured it, afterwards falling into it again, or into ſome other, is thereupon committed to the ſecular power. This writ is thought by ſome to be as ancient as the common law itſelf; however, the conviction of hereſy by the common law was not in any petty eccleſiaſtical court, but before the archbiſhop himſelf in a provincial ſynod, and the delinquent was delivered up to the king to do with him as he pleaſed: ſo that the crown had a controul over the ſpiritual power. But by 2 Hen. IV. cap. 15. the diocеſan alone, without the intervention of a ſynod, might convict of heretical tenets; and unleſs the convict abjured his opinions, or if after abjuration he relapſed, the ſheriff was bound *ex officio*, if required by the biſhop, to commit the unhappy victim to the flames, without waiting for the conſent of the crown. This writ remained in force, and was actually executed on two Anabaptiſts in the ſeventh of Elizabeth, and on two Arians in the ninth of James I.—Sir Edward Coke was of opinion, that this writ did not lie in his time: but it is now formally taken away by ſtatute 29 Car. II. cap. 9. But this ſtatute does not extend to take away or abridge the juriſdiction of Proteſtant archbiſhops or biſhops, or any other judges of any eccleſiaſtical courts, in caſes of atheiſm, blaſphemy, hereſy, or ſchiſm, and other damnable doctrines and opinions; but they may prove and puniſh the ſame according to his majeſty's eccleſiaſtical laws, by excommunication, deprivation, degradation, and other eccleſiaſtical cenſures, not extending to death, in ſuch ſort and no other, as they might have done before the making of this act, ſec. 2. See HERESY.

Haerlem ‖ Haggai.

HAERLEM. See HARLEM.

HAG. See MYXINE, HELMINTHOLOGY *Index*.

HAGARENS, the deſcendants of Iſhmael. They are called alſo *Iſhmaelites* and *Saracens*: and laſtly, by the general name of *Arabians*.

As to the Hagarens, they dwelt in Arabia the Happy, according to Pliny. Strabo joins them with the Nabathæans, and Chavlotæans, whoſe habitation was rather in Arabia Deſerta. Others think their capital was Petra, otherwiſe Agra, and conſequently they ſhould be placed in Arabia Petræa. The author of the lxxxiii. Pſalm, ver. 6. joins them with the Moabites; and in the Chronicles it is ſaid (1 Chr. v. 10.), that the ſons of Reuben, in the time of Saul, made war againſt the Hagarens, and became maſters of their country eaſtward of the mountains of Gilead. This therefore was the true and ancient country of the Hagarens. When Trajan came into Arabia, he beſieged the capital of the Hagarens, but could not take it. The ſons of Hagar valued themſelves of old upon their wiſdom, as appears by Baruch iii. 23.

HAGENAU, a town of Germany, and capital of a bailiwick of the ſame name, which was formerly imperial, but now belongs to the French. It was taken by them in 1673; the Imperialiſts retook it in 1702; after which it was ſeveral times taken and retaken by both parties; but at laſt the French got poſſeſſion of it in 1706. It is divided by the river Motter into two parts; and is ſeated near a foreſt of its own name, in E. Long. 7. 53. N. Lat. 48. 49.

HAGGAI, the tenth of the ſmall prophets, was born, in all probability, at Babylon, in the year of the world 3457, from whence he returned with Zerubbabel. It was this prophet who by command from God (Ezra v. 1, 2, &c.) exhorted the Jews, after their re-

turn

Hagiographa || Hague.

turn from the captivity, to finiſh the rebuilding of the temple, which they had intermitted for 14 years. His remonſtrances had their effect; and to encourage them to proceed in the work, he aſſured them from God, that the glory of this latter houſe ſhould be greater than the glory of the former houſe; which was accordingly fulfilled, when Chriſt honoured it with his preſence: for with reſpect to the building, this latter temple was nothing in compariſon of the former.

We know nothing certain of Haggai's death. The Jews pretend, that he died in the laſt year of the reign of Darius, at the ſame time with the prophets Zechariah and Malachi, and that thereupon the ſpirit of prophecy ceaſed among the children of Iſrael. Epiphanius will have it, that he was buried at Jeruſalem among the prieſts. The Greeks keep his feſtival on the 16th of December, and the Latins on the 4th of July.

HAGIOGRAPHA, a name given to part of the books of Scripture, called by the Jews *Cetuvim*. The word is compounded of *αγιος* "holy;" and *γραφω* "I write." The name is very ancient: St Jerome makes frequent mention of it: before him, St Epiphanius called theſe books ſimply *Γραφαι*.

The Jews divide the ſacred writings into three claſſes: The Law, which comprehends the five books of Moſes: the Prophets, which they call *Neviim*: And the *Cetuvim* כתובים, called by the Greeks, &c. *Hagiographa*; comprehending the books of Pſalms, Proverbs, Job, Daniel, Ezra, including alſo the books of Nehemiah, Chronicles, Canticles, Ruth, the Lamentations, Eccleſiaſtes, and Eſther.

The Jews ſometimes call the books the *Writings*, by way of eminence, as being written by immediate inſpiration of the Holy Spirit. Thus ſays Kimchi, in his preface to the Pſalms, Maimonides in More Nevoch, and Elias Levita in his Thiſbi, under the word כתב.

They diſtinguiſh the hagiographers, however, from the prophets; in that the authors of the former did not receive the matters contained in them by the way called *Prophecy*, which conſiſts in dreams, viſions, whiſpers, ecſtaſies, &c. but by mere inſpiration and direction of the Spirit.

HAGUE, a town of the United Provinces, in Holland, ſituated in E. Long. 4. 10. N. Lat. 48. 49. —In Latin it is called *Haga Comitis*; in French, *La Haye*; in Dutch, *der Haag*, or *'S-Graavenhage*, i. e. the Earl's Grove or Wood, from the wood near which it is built, and in which the earls of Holland had a country-houſe. Though it ſends no deputies to the ſtates, it is one of the moſt conſiderable towns in Holland, pleaſantly ſituated, and exceeding beautiful. It may indeed compare with almoſt any city in Europe, though geographers account it but a village. The inhabitants alſo breathe a better air than thoſe of the other cities, as it ſtands on a dry ſoil, ſomewhat higher than the reſt of the country. It has no gates or walls, but is ſurrounded by a moat over which there are many draw-bridges. Two hours are required to walk round it, and it contains about 40,000 or 50,000 ſouls. It is a place of much ſplendor and buſineſs, being the ſeat of the high colleges of the republic and province of Holland, and the reſidence of the ſtadtholder and foreign ambaſſadors; and there are a great many fine ſtreets and ſquares in it. In the inner court, all the high colleges and courts of juſtice hold their aſſemblies; there alſo the foot-guards do duty, as the horſe-guards in the outer, when the ſtates are ſitting. De Plaats is an open airy place, in form of a triangle, adorned with neat and beautiful buildings: the Vyverbeg is an eminence, laid out into ſeveral fine ſhady walks, with the Vyver, a large baſon of water, at the bottom: the Voorhout is the moſt celebrated part of the Hague, and conſiſts of the mall, and three ways for coaches on each ſide, planted with trees, being much the ſame as St James's park at London: the palace of Opdam, or Waſſenaar, is built in a very elegant taſte: the Prince and Princeſs Grafts are fine ſtreets: the Plan, in Dutch *Het Pleyn*, is a beautiful grove, laid out in ſeveral croſs walks, and ſurrounded with ſtately houſes. The Jewiſh ſynagogue is well worth being ſeen by a curious traveller; and alſo the palaces of the prince of Orange, the hotel of Spain, the new Woorhout, the mauſoleum of the baron of Opdam in the great church, and the ſeveral hoſpitals. The environs of the Hague are exceedingly pleaſant. Among other agreeable objects are the wood, with the palace of Orange at the extremity of it, called the *houſe in the wood*; the village of Scheveling; and the ſand-hills along the north ſea; with the village of Voorburg, and the charming ſeats and fine gardens round it. Two miles from the Hague is Ryſwick, a village: and, a quarter of a mile from that, a noble palace formerly belonging to the prince of Orange, famous for the treaty of peace concluded there in 1697. Looſduynen, where Margaret, counteſs of Henneburg, and daughter of Florence IV. count of Holland and Zealand, is ſaid to have been delivered of 365 children at a birth in 1276, is about five miles from the Hague. Five miles beyond Looſduynen, and not far from the beautiful village of Graveſande, is Honſlardyck, another palace belonging to the prince of Orange, and one of the fineſt ſtructures in the Low Countries.

Hague, Hai-nan.

HAI-NAN. See HAINAN.

Hai-Tang, a beautiful Chineſe ſhrub, originally brought from the bottom of the rocks which border the ſea-coaſt. It has been cultivated in China for more than 14 centuries; and is celebrated as often in the works of the Chineſe poets, as roſes and lilies are in thoſe of ours. Painters and embroiderers ornament almoſt all their works with its foliage and flowers. The ſtalk of the hai-tang is of a cylindric form, and ſhoots forth a number of branches of a purple tint towards their baſes, and full of knots, which are alſo of a purple colour round the edges. It produces a number of ſhoots, the talleſt of which are about two feet and a half in height. Its leaves (which are much indented, of an oval form towards the ſtalk, pointed at their upper extremities, and full of ſmall prickles) grow almoſt oppoſite one another on the branches, and at the ſame diſtance as the knots. Their colour above is a deep-green; that below is much lighter, and almoſt effaced by their fibres, which are large, and of a delicate purple: all theſe leaves together have a beautiful effect to the eye. The flowers grow in bunches at the extremities of the branches. Each flower is compoſed of four petals, two great and two ſmall, reſembling in colour, the bloom of a peach-tree, and

which

Hail. which have almoſt the ſame figure as the bloſſom of our cherry-trees. The two large are cemented one upon the other, in the form of a purſe; and when they blow, the two ſmall blow alſo in their turn; and then the whole four repreſent a croſs. The piſtil is compoſed of very bright yellow grains, which ſeparate gradually one from another by the lengthening of the filaments to which they adhere; they then open into little bells, and compoſe a ſmall yellow tuft, ſupported by a ſlender ſtalk, which riſes above the petals. The calyx, which ſuſtains each of the flowers, is compoſed of two purple-coloured leaves, united in form of a purſe. In proportion as the flowers grow and increaſe in ſize, the two leaves of the calyx open, become pale and dry, and drop off. The flowers, ſupported by ſmall ſtalks, ſeparate one from the other, and produce of themſelves other flowers, which riſe up from a new calyx.

This plant is propagated from ſeed, but with difficulty. It thrives beſt in a ſandy ſoil; dung or mould deſtroy it; and great care muſt be taken to refreſh it only with the pureſt water. As it cannot endure the ſun in any ſeaſon, it is always planted below walls that are expoſed to the north. It generally begins to flower about the end of Auguſt. After it has produced ſeed, all its branches are cut; and it commonly ſhoots forth new ones before the ſpring following; but it is neceſſary to heap up gravel and pieces of bricks round its roots, to prevent them from rotting. Notwithſtanding all the care that is taken to cultivate this tree at Peking, it does not thrive ſo well there as in the ſouthern provinces. The ſmell of its leaves has an affinity both to that of the roſe and the violet; but it is weaker, and never extends to any great diſtance.

HAIL, in *Natural Hiſtory*, a meteor generally defined frozen rain, but differing from it in that the hailſtones are not formed of ſingle pieces of ice, but of many little ſpherules agglutinated together. Neither are theſe ſpherules all of the ſame conſiſtence; ſome of them being hard and ſolid like perfect ice; others ſoft, and moſtly like ſnow hardened by a ſevere froſt. Sometimes the hailſtone hath a kind of core of this ſoft matter; but more frequently the core is ſolid and hard, while the outſide is formed of a ſofter matter. Hailſtones aſſume various figures, being ſometimes round, at other times pyramidal, crenated, angular, thin, and flat, and ſometimes ſtellated, with ſix radii like the ſmall cryſtals of ſnow.

Natural hiſtorians furniſh us with various accounts of ſurpriſing ſhowers of hail, in which the hailſtones were of extraordinary magnitude. Mezeray, ſpeaking of the war of Louis XII. in Italy, in the year 1510, relates, that there was for ſome time an horrible darkneſs, thicker than that of night; after which the clouds broke into thunder and lightning, and there fell a ſhower of hailſtones, or rather (as he calls them) pebble-ſtones, which deſtroyed all the fiſh, birds, and beaſts of the country.—It was attended with a ſtrong ſmell of ſulphur; and the ſtones were of a bluiſh colour, ſome of them weighing a hundred pounds. *Hiſt. de France*, tom. ii. p. 339.

At Liſle in Flanders, in 1686, fell hailſtones of a very large ſize; ſome of which contained in the middle a dark brown matter, which, thrown on the fire, gave a very great report. Phil. Tranſ. N° 203.

Hailing || Haman.

Dr Halley and others alſo relate, that in Cheſhire, Lancaſhire, &c. April 29. 1697, a thick black cloud, coming from Caernarvonſhire, diſpoſed the vapours to congeal in ſuch a manner, that for about the breadth of two miles which was the limit of the cloud, in its progreſs for the ſpace of 60 miles, it did inconceivable damage; not only killing all ſorts of fowls and other ſmall animals, but ſplitting trees, knocking down horſes and men, and even ploughing up the earth; ſo that the hailſtones buried themſelves under ground an inch or an inch and a half deep. The hailſtones, many of which weighed five ounces, and ſome half a pound, and being five or ſix inches about, were of various figures; ſome round, others half round; ſome ſmooth, others emboſſed and crenated: the icy ſubſtance of them was very tranſparent and hard, but there was a ſnowy kernel in the middle of them.

In Hertfordſhire, May 4. the ſame year, after a ſevere ſtorm of thunder and lightning, a ſhower of hail ſucceeded, which far exceeded the former: ſome perſons were killed by it, their bodies beat all black and blue; vaſt oaks were ſplit, and fields of rye cut down as with a ſcythe. The ſtones meaſured from 10 to 13 or 14 inches about. Their figures were various, ſome oval, others picked, ſome flat. Philoſoph. Tranſ. N° 229. See METEOROLOGY *Index*.

HAILING, the ſalutation or accoſting of a ſhip at a diſtance, either at ſea, or in a harbour. The uſual expreſſion is, "Hoa, the ſhip ahoay!" To which ſhe anſwers, "Holloa? Whence came ye? Where are ye bound? Good voyage! What cheer? All well! How fare ye?" &c.

HAIMSUCKEN. See HAMESECKEN.

HAINAN, a conſiderable iſland of Aſia, ſituated in between 18° and 20° N. Lat. It is ſubject to China, and belongs to the province of Quang-ton. It has on the north the province of Quang-ſi; on the ſouth the channel formed between the bank Paracel and the eaſtern coaſt of Cochinchina; on the weſt, the ſame kingdom and part of Tong-king; and on the eaſt, the Chineſe ſea. Its extent from eaſt to weſt is between 60 and 70 leagues, and from north to ſouth 45; this iſland therefore is about 160 leagues in circumference. Kiun-tcheou-fou, it capital, ſtands on a promontory, and ſhips often anchor at the bottom of its walls. Two different kinds of mandarins command here, as in all the other provinces of China: the firſt are called *literati;* the ſecond, *mandarins of arms*, or military officers. Its juriſdiction extends over three cities of the ſecond claſs and ten of the third. The greater part of the iſland is under the dominion of the emperor of China; the reſt is independent, and inhabited by a free people, who have never yet been ſubdued. Compelled to abandoned their plains and fields to the Chineſe, they have retreated to the mountains in the centre of the iſland, where they are ſheltered from the inſults of their neighbours.

Theſe people formerly had a free and open correſpondence with the Chineſe. Twice a year they expoſed, in an appointed place, the gold which they dug from their mines, with their eagle-wood and calamba, ſo much eſteemed by the Orientals. A deputy was ſent

Hainan, Hainault.

ſent to the frontiers, to examine the cloths and other commodities of the Chineſe, whoſe principal traders repaired to the place of exchange fixed on; and after the Chineſe wares were delivered, they put into their hands with the greateſt fidelity what they had agreed for. The Chineſe governors made immenſe profits by this barter.

The emperor Kang-hi, informed of the prodigious quantity of gold which paſſed through the hands of the mandarins by this traffic, forbade his ſubjects, under pain of death, to have any communication with theſe iſlanders: however, ſome private emiſſaries of the neighbouring governors ſtill find the means of having intercourſe with them; but what they get at preſent by this clandeſtine trade is little, in compariſon of that which they gained formerly. The natives of this iſland are very deformed, ſmall of ſtature, and of a copper colour: both men and women wear their hair thruſt through a ring on their forehead; and above they have a ſmall ſtraw-hat, from which hang two ſtrings that are tied under the chin. Their dreſs conſiſts of a piece of black or dark-blue cotton cloth, which reaches from the girdle to their knees: the women have a kind of robe of the ſame ſtuff, and mark their faces from the eyes to the chin with blue ſtripes made with indigo.

Among the animals of this iſland are a curious ſpecies of large black apes, which have the ſhape and features of a man; they are ſaid to be very fond of women: there are alſo found here crows with a white ring round their necks; ſtarlings which have a ſmall creſcent on their bills; blackbirds of a deep blue colour, with yellow ears riſing half an inch; and a multitude of other birds, remarkable for their colour or ſong. Beſides mines of gold and lapis lazuli, which enrich the iſland of Hainan, it produces in abundance various kinds of curious and valuable wood. The predeceſſor of the preſent emperor cauſed ſome of it to be tranſported to Peking, at an immenſe expence, to adorn an edifice which he intended for a mauſoleum. The moſt valuable is called by the natives *hoali*, and by the Europeans *roſe* or *violet wood* from its ſmell; it is very durable, and of a beauty which nothing can equal; it is therefore reſerved for the uſe of the emperor.

Hainan, on account of its ſituation, riches, and extent, deſerves to be ranked among the moſt conſiderable iſlands of Aſia. Not far from thence is another ſmall iſland, commonly called *San-cian*. It is celebrated by the death of St Francis Xavier: his tomb is ſtill to be ſeen on a ſmall hill, at the bottom of which is a plain covered on one ſide with wood, and on the other ornamented with ſeveral gardens. This iſland is not a deſert, as ſome travellers have pretended: it contains five villages; the inhabitants of which are poor people, who have nothing to ſubſiſt on but rice and the fiſh which they catch.

HAINAULT, a province of the Netherlands, belonging partly to France and partly to the houſe of Auſtria. It is bounded to the ſouth by Champagne and Picardy; to the north by Flanders; to the eaſt by the duchy of Brabant, the county of Namur, and the biſhopric of Liege; and to the weſt by Artois and Flanders. Its extent from north to ſouth is about 45 miles, and about 48 from eaſt to weſt. The air is pleaſant and temperate, and the ſoil fruitful: it abounds in rich paſtures, corn-fields, woods and foreſts, coal, iron, lead, beautiful marble, ſlate, and other uſeful ſtones: it is well watered by rivers and lakes, and breeds abundance of black cattle, and ſheep whoſe wool is very fine. Its principal rivers are the Schelde, the Selle, and the Dender. This province is reckoned to contain 24 walled towns, 950 villages, one duchy, and ſeveral principalities, earldoms, peerdoms, and baronies. The abbeys in it are 27. For ſpiritual matters, the greater part of it is ſubject to the archbiſhop of Cambray, and the reſt to the biſhops of Liege and Arras. The ſtates of the province conſiſt of the clergy, nobility, and commoners. The clergy are the abbots, deputies of the chapters, and rural deans; but the chapters of St Waudru and St Germain, in Mons, ſend no deputies, as they contribute nothing to the public taxes. The nobility conſiſt of the earls and barons, and all thoſe who by their birth have a right to a ſeat in the aſſembly of the ſtates. The commoners are compoſed of the deputies of the towns. The clergy in this county are uncommonly rich. The ſtates meet only when they are ſummoned by the ſovereign; but there is a ſtanding committee at Mons which meets weekly. This county had counts of its own, till the year 1436; when Philip the Good, duke of Burgundy, arrived to the poſſeſſion of it, upon the death of Jaqueline, the heireſs, without iſſue. The French acquired that part of it which they poſſeſs, partly by the peace of the Pyrenees, and partly by thoſe of Nimeguen and Ryſwick. The arms of this county are quartered, and contain four lions, in a field *or*. It was formerly governed by a ſovereign council, at the head of which was the high bailiff, who had very great authority; he repreſented the ſovereign, was governor of Mons, and captain-general of the province.

Hainault, Hair.

HAIR, ſmall filaments iſſuing out of the pores of the ſkins of animals; and ſerving moſt of them as a tegument or covering*. In lieu of hair, the nakedneſs of ſome animals is covered with feathers, wool, ſcales, &c.

* See *Anatomy*, N° 82.

Hair is found on all parts of the human body, except the ſoles of the feet and the palms of the hands.—But it grows longeſt on the head, chin, breaſt, in the armpits, and about the privities.

The ancients held the hair a ſort of excrement, fed only with excrementitious matters, and no proper part of a living body.—They ſuppoſed it generated of the fuliginous parts of the blood, exhaled by the heat of the body to the ſurface, and there condenſed in paſſing through the pores.—Their chief reaſons were, that the hair being cut, will grow again apace, even in extreme old age, and when life is very low: that in hectic and conſumptive people, where the reſt of the body is continually emaciating and attenuating, the hair ſhall thrive: nay, and that it will grow again in dead carcaſes.—They added, that hair does not feed and grow like the other parts, by introſuſception, i. e. by a juice circulating within it; but, like the nails, by juxtapoſition, each part next the root thruſting forward that immediately before it.

But the moderns are agreed, that every hair does properly and truly live, and receive nutriment to fill and diſtend it like the other parts; which they argue

Hair. hence, that the roots do not turn gray in aged perſons ſooner than the extremities, but the whole changes colour at once, and the like is obſerved in boys, &c.; which ſhows that there is a direct communication, and that all the parts are affected alike.

It may be obſerved, however, that, in propriety, the life and growth of hairs is of a different kind from that of the reſt of the body; and is not immediately derived therefrom, or reciprocated therewith. It is rather of the nature of vegetation. They grow as plants do out of the earth; or, as ſome plants ſhoot from the parts of others; from which though they draw their nouriſhment, yet each has, as it were, its ſeveral life and a diſtinct economy. They derive their food from ſome juices in the body, but not from the nutritious juices; whence they may live though the body be ſtarved.—Wulferus, in the *Philoſophical Collections*, gives an account of a woman buried at Nurimberg, whoſe grave being opened forty-three years after her death, there was hair found iſſuing forth plentifully through the clefts of the coffin; inſomuch, that there was reaſon to imagine the coffin had ſome time been covered all over with hair. The cover being removed, the whole corps appeared in its perfect ſhape; but, from the crown of the head to the ſole of the foot, covered over with a thick-ſet hair, long and curled. The ſexton going to handle the upper part of the head with his fingers, the whole ſtructure fell at once, leaving nothing in his hand but an handful of hair: there was neither ſkull nor any other bone left; yet the hair was ſolid and ſtrong enough.—Mr Arnold, in the ſame collection, gives a relation of a man hanged for theft, who in a little time, while he yet hung upon the gallows, had his body ſtrangely covered over with hair.—Some moderns, however, deny the authenticity of theſe and other ſimilar inſtances.

The hairs ordinarily appear round or cylindrical; but the microſcope alſo diſcovers triangular and ſquare ones; which diverſity of figure ariſes from that of the pores, to which the hairs always accommodate themſelves. Their length depends on the quantity of the proper humour to feed them, and their colour on the quality of that humour: whence, at different ſtages of life, the colour uſually differs. Their extremities ſplit into two or three branches, eſpecially when kept dry, or ſuffered to grow too long; ſo that what appears only a ſingle hair to the naked eye, ſeems a bruſh to the microſcope.

The hair of a mouſe, viewed by Mr Derham with a microſcope, ſeemed to be one ſingle tranſparent tube, with a pith made up of fibrous ſubſtances, running in dark lines, in ſome hairs tranſverſely, in others ſpirally. The darker medullary parts or lines, he obſerves, were no other than ſmall fibres convolved round, and lying cloſer together than in the other parts of the hair. They run from the bottom to the top of the hair, and he imagines, may ſerve to make a gentle evacuation of ſome humour out of the body. Hence the hair of hairy animals, this author ſuggeſts, may not only ſerve as a fence againſt cold, &c. but as an organ of inſenſible perſpiration.

Though the external ſurface of the body is the natural place of hairs, we have many well-atteſted inſtances of their being found alſo on the internal ſurface. Amatus Luſitanus mentions a perſon who had hair upon his tongue. Pliny and Valerius Maximus concur in their teſtimonies, that the heart of Ariſtomenes the Meſſenian was hairy. Cælius Rhodiginus relates the ſame of Hermogenes the rhetorician; and Plutarch, of Leonidas the Spartan.—Hairs are ſaid to have been frequently found in the breaſts of women, and to have occaſioned the diſtemper called *trichiaſis*; but ſome authors are of opinion, that theſe are ſmall worms and not hairs. There have been, however, various and indiſputable obſervations of hairs found in the kidneys, and voided by urine. Hair.

Hippocrates is of opinion, that the glandular parts are the moſt ſubject to hair: but bundles of hair have been found in the muſcular parts of beef, and in ſuch parts of the human body as are equally firm with that.—Hair has been often found in abſceſſes and impoſthumations. Schultetus, opening the abdomen of a woman, found 12 pints of water, and a large lock or bundle of hair ſwimming looſe in it. But of all the internal parts, there is none ſo much ſubject to an unnatural growth of hair as the ovaries of females, and that as well of the human ſpecies as of other animals. Of this Dr Tyſon relates three remarkable inſtances; two of theſe were young women, and the other was a bitch. The animal had been much emaciated in its hinder parts; the hair was about an inch and an half long: but the moſt remarkable particular was, that hair was alſo found lying looſe in the cavities of the veins. We have ſeveral inſtances of mankind being affected in the ſame manner. Cardan relates, that he found hair in the blood of a Spaniard; and Slonatius in that of a gentlewoman of Cracovia; and Schultetus declares from his own obſervation, that thoſe people who are afflicted with the plica polonica, have very often hair in their blood.

Diſeaſes of the HAIR. Almoſt the only diſeaſe of the hair, beſides the remarkable one called *plica polonica*, is its falling off, or *baldneſs*. For this many remedies have been recommended, but ſcarce any of them can be depended upon. The juice of burdock, and the lixivial ſalts of vine aſhes, are ſaid to be efficacious; alſo the powder of hermodactyls, and the decoction of boxwood. A remarkable inſtance of the efficacy of this laſt is given under the article BUXUS.—Some authors give inſtances of the hair changing its colour in a ſhort time, through grief, or by reaſon of a fright, &c.

HAIR as an Ornament, or as an Enſign of Dignity or of Religion. By the Jews hair was worn naturally long, juſt as it grew; but the prieſts had theirs cut every fortnight, while they were in waiting at the temple: they made uſe of no razors, however, but ſciſſars only. The Nazarites, while their vow continued, were forbidden to touch their heads with a razor. See NAZARITE.

The falling of the hair, or a change of its colour, was regarded amongſt the Hebrews as a ſign of the leproſy. Black hair was eſteemed by them as the moſt beautiful. Abſalom's hair was cut once a-year, and is ſaid to have weighed 200 ſhekels, by the king's weight, which is about 31 ounces. The law of God hath left no particular ordinances with reſpect to the hair.

The hair of both Jewiſh and Grecian women engaged a principal ſhare of their attention, and the Roman ladies

Hair. ladies ſeem to have been no leſs curious with reſpect to theirs. They generally wore it long, and dreſſed it in a variety of ways, ornamenting it with gold, ſilver, pearls, &c. On the contrary, the men amongſt the Greeks and Romans, and amongſt the later Jews, wore their hair ſhort, as may be collected from books, medals, ſtatues, &c. This formed a principal diſtinction in dreſs betwixt the ſexes. This obſervation illuſtrates a paſſage in St Paul's epiſtle to the Corinthians (1 Cor. xi. 14. 15.)

St Paul forbids the Corinthian women, when praying by divine inſpiration, to have their hair diſhevelled; probably becauſe this made them reſemble the heathen prieſteſſes, when actuated by the pretended influence of their gods.

Amongſt the Greeks, both ſexes, a few days before marriage, cut off and conſecrated their hair as an offering to their favourite deities. It was alſo cuſtomary among them to hang the hair of the dead on the doors of their houſes previous to interment. They likewiſe tore, cut off, and ſometimes ſhaved their hair, when mourning for their deceaſed relations or friends, which they laid upon the corpſe or threw into the pile, to be conſumed together with the body. The ancients imagined that no perſon could die till a lock of hair was cut off; and this act they ſuppoſed was performed by the inviſible hand of death, or Iris, or ſome other meſſenger of the gods. This hair, thus cut off, they fancied conſecrated the perſon to the infernal deities, under whoſe juriſdiction the dead were ſuppoſed to be. It was a ſort of firſt fruits which ſanctified the whole. (See *Virg. Æn.* iv. 694.)

Whatever was the faſhion with reſpect to the hair, in the Grecian ſtates, ſlaves were forbidden to imitate the freemen. The hair of the ſlaves was always cut in a particular manner, called θριξ ανδραποδωδης, which they no longer retained after they procured their freedom.

It was eſteemed a notable honour among the ancient Gauls to have long hair, and hence came the appellation *Gallia Comata*. For this reaſon Julius Cæſar, upon ſubduing the Gauls, made them cut off their hair as a token of ſubmiſſion.—It was with a view to this, that ſuch as afterwards quitted the world to go and live in cloiſters, procured their hair to be ſhaven off; to ſhow that they bade adieu to all earthly ornaments, and made a vow of perpetual ſubjection to their ſuperiors.

Greg. of Tours aſſures us, that in the royal family of France, it was a long time the peculiar mark and privilege of kings and princes of the blood to wear long hair, artfully dreſſed and curled: every body elſe was obliged to be polled, or cut round, in ſign of inferiority and obedience. Some writers aſſure us, that there were different cuts for all the different qualities and conditions; from the prince who wore it at full length, to the ſlave or villain who was quite cropt. —To cut off the hair of a ſon of France, under the firſt race of kings, was to declare him excluded from the right of ſucceeding to the crown, and reduced to the condition of a ſubject.

In the eighth century, it was the cuſtom of people of quality to have their children's hair cut the firſt time by perſons they had a particular honour and eſteem for; who, in virtue of this ceremony, were reputed a Hair. ſort of ſpiritual parents or godfathers thereof: Though this practice appears to have been more ancient; inaſmuch as we read, that Conſtantine ſent the pope the hair of his ſon Heraclius, as a token that he deſired him to be his adoptive father.

The parade of long hair became ſtill more and more obnoxious in the progreſs of Chriſtianity, as ſomething utterly inconſiſtent with the profeſſion of perſons who bore the croſs. Hence numerous injunctions and canons to the contrary. Pope Anicetus is commonly ſuppoſed to have been the firſt who forbade the clergy to wear long hair; but the prohibition is of an older ſtanding in the churches of the eaſt; and the letter wherein that decree is written, is of a much later date than that pope.—The clerical tonſure is related by Iſidore Hiſpalenſis, as of apoſtolical inſtitution.

Long hair was anciently held ſo odious, that there is a canon ſtill extant of the year 1096, importing, that ſuch as wore long hair ſhould be excluded coming into church while living, and not be prayed for when dead. We have a furious declamation of Luitprand againſt the emperor Phocas, for wearing long hair, after the manner of the other emperors of the eaſt, all except Theophilas, who being bald, enjoined all his ſubjects to ſhave their heads.

The French hiſtorians and antiquaries have been very exact in recording the head of hair of their ſeveral kings. Charlemagne wore it very ſhort, his ſon ſhorter; Charles the bald had none at all. Under Hugh Capet it began to appear again: this the eccleſiaſtics took in dudgeon, and excommunicated all who let their hair grow. Peter Lombard expoſtulated the matter ſo warmly with Charles the Young, that he cut off his hair; and his ſucceſſors for ſome generations wore it very ſhort.—A profeſſor of Utrecht, in 1650, wrote expreſsly on the queſtion, Whether it be lawful for men to wear long hair? and concluded for the negative.—Another divine, named Reves, who had written for the affirmative, replied to him.

The ancient Britons were extremely proud of the length and beauty of their hair, and were at much pains in dreſſing and adorning their heads. Some of them carried their fondneſs for and admiration of their hair to an extravagant height. It is ſaid to have been the laſt and moſt earneſt requeſt of a young warrior, who was taken priſoner and condemned to be beheaded, that no ſlave might be permitted to touch his hair, which was remarkably long and beautiful, and that it might not be ſtained with his blood. We hardly ever meet with a deſcription of a fine woman or beautiful man, in the poems of Oſſian, but their hair is mentioned as one of their greateſt beauties. Not contented with the natural colour of their hair, which was commonly fair or yellow, they made uſe of certain waſhes to render it ſtill brighter. One of theſe waſhes was a compoſition of lime, the aſhes of certain vegetables, and tallow. They made uſe of various arts alſo to make the hair of their heads grow thick and long; which laſt was not only eſteemed a great beauty, but was conſidered as a mark of dignity and noble birth. Boadicea, queen of the Iceni, is deſcribed by Dio with very long hair, flowing over her ſhoulders, and reaching down below the middle of her back. The Britons

Hair. ſhaved all their beards, except their upper lips; the hair of which they, as well as the Gauls, allowed to grow to a very inconvenient length.

In after-times, the Anglo-Saxons and Danes alſo conſidered fine hair as one of the greateſt beauties and ornaments of their perſons, and were at no little pains in dreſſing it to advantage. Young ladies before marriage wore their hair uncovered and untied, flowing in ringlets over their ſhoulders; but as ſoon as they were married, they cut it ſhorter, tied it up, and put on a head-dreſs of ſome kind or other according to the prevailing faſhion. To have the hair entirely cut off was ſo great a diſgrace, that it was one of the greateſt puniſhments inflicted on thoſe women who were guilty of adultery. The Daniſh ſoldiers who were quartered upon the Engliſh, in the reigns of Edgar the Peaceable and of Ethelred the Unready, were the beaux of thoſe times, and were particularly attentive to the dreſſing of their hair; which they combed at leaſt once every day, and thereby captivated the affections of the Engliſh ladies. The clergy, both ſecular and regular, were obliged to ſhave the crowns of their heads, and keep their hair ſhort, which diſtinguiſhed them from the laity; and ſeveral canons were made againſt their concealing their tonſure, or allowing their hair to grow long. The ſhape of this clerical tonſure was the ſubject of long and violent debates between the Engliſh clergy on the one hand, and thoſe of the Scots and Picts on the other; that of the former being circular, and that of the latter only ſemicircular. It appears very plainly, that long flowing hair was univerſally eſteemed a great ornament; and the tonſure of the clergy was conſidered as an act of mortification and ſelf-denial, to which many of them ſubmitted with reluctance, and endeavoured to conceal as much as poſſible. Some of them who affected the reputation of ſuperior ſanctity inveighed with great bitterneſs againſt the long hair of the laity; and laboured earneſtly to perſuade them to cut it ſhort, in imitation of the clergy. Thus the famous St Wulſtan biſhop of Worceſter, is ſaid to have declaimed with great vehemence againſt luxury of all kinds, but chiefly againſt long hair as moſt criminal and moſt univerſal. "The Engliſh (ſays William of Malmſbury in his life of St Wulſtan) were very vicious in their manners, and plunged in luxury, through the long peace which they had enjoyed in the reign of Edward the Confeſſor. The holy prelate Wulſtan reproved the wicked of all ranks with great boldneſs; but he rebuked thoſe with the greateſt ſeverity who were proud of their long hair. When any of thoſe vain people bowed their heads before him to receive his bleſſing, before he gave it, he cut a lock of their hair with a little ſharp knife, which he carried about him for that purpoſe; and commanded them, by way of penance for their ſins, to cut all the reſt of their hair in the ſame manner. If any of them refuſed to comply with this command, he denounced the moſt dreadful judgments upon them, reproached them for their effeminacy, and foretold, that as they imitated women in the length of their hair, they would imitate them in their cowardice when their country was invaded; which was accompliſhed at the landing of the Normans."

This continued to be long a topic of declamation among the clergy, who even repreſented it as one of the greateſt crimes, and moſt certain marks of reprobation. Anſelm, archbiſhop of Canterbury, went ſo far as to pronounce the then terrible ſentence of excommunication againſt all who wore long hair, for which pious zeal he is very much commended. Serlo, a Norman biſhop, acquired great honour by a ſermon which he preached before Henry I. A. D. 1104, againſt long and curled hair, with which the king and all his courtiers were ſo much affected, that they conſented to reſign their flowing ringlets, of which they had been ſo vain. The prudent prelate gave them no time to change their minds, but immediately pulled a pair of ſhears out of his ſleeve, and performed the operation with his own hand. Another incident happened about 25 years after, which gave a temporary check to the prevailing fondneſs for long hair. It is thus related by a contemporary hiſtorian: "An event happened, A. D. 1129, which ſeemed very wonderful to our young gallants; who, forgetting that they were men, had transformed themſelves into women by the length of their hair. A certain knight, who was very proud of his long luxuriant hair, dreamed that a perſon ſuffocated him with its curls. As ſoon as he awoke from his ſleep, he cut his hair to a decent length. The report of this ſpread over all England, and almoſt all the knights reduced their hair to the proper ſtandard. But this reformation was not of long continuance; for in leſs than a year all who wiſhed to appear faſhionable returned to their former wickedneſs, and contended with the ladies in length of hair. Thoſe to whom nature had denied that ornament ſupplied the defect by art.

The Greeks, and, after their example, the Romans, wore falſe hair.

Commerce of Hair. Hair makes a very conſiderable article in commerce, eſpecially ſince the mode of perukes has obtained. The hair of the growth of the northern countries, as England, &c. is valued much beyond that of the more ſouthern ones, as Italy, Spain, the ſouth parts of France, &c. The merit of good hair conſiſts in its being well fed, and neither too coarſe nor too ſlender; the bigneſs rendering it leſs ſuſceptible of the artificial curl, and diſpoſing it rather to frizzle, and the ſmallneſs making its curl of too ſhort duration. Its length ſhould be about 25 inches; the more it falls ſhort of this, the leſs value it bears.

There is no certain price for hair; but it is ſold from five ſhillings to five pounds an ounce, according to its quality.

The ſcarceneſs of gray and white hair has put the dealers in that commodity upon the methods of reducing other colours to this. This is done by ſpreading the hair to bleach on the graſs like linen, after firſt waſhing it out in a lixivious water. This ley, with the force of the ſun and air, brings the hair to ſo perfect a whiteneſs, that the moſt experienced perſon may be deceived therein; there being ſcarce any way of detecting the artifice, but by boiling and drying it, which leaves the hair of the colour of a dead walnut-tree leaf.

There is alſo a method of dyeing hair with biſmuth, which renders ſuch white hair as borders too much upon the yellow of a bright ſilver colour: boiling is the proof of this too, the biſmuth not being able to ſtand it.

Hair

Hair.

Hair may be alſo changed from a red, gray, or other diſagreeable colour, to a brown or deep black, by a ſolution of ſilver. The liquors ſold under the name of *hair-waters*, are at bottom no more than ſolutions of ſilver in aquafortis, largely diluted with water, with the addition perhaps of other ingredients, which contribute nothing to their efficacy. The ſolution ſhould be fully ſaturated with the ſilver, that there may be no more acid in it than is neceſſary for holding the metal diſſolved; and beſides dilution with water, a little ſpirit of wine may be added for the further dulcification of the acid. It muſt be obſerved, that for diluting the ſolution, diſtilled water, or pure rain-water, muſt be uſed; the common ſpring-waters turning it milky, and precipitating a part of the diſſolved ſilver.—It is to be obſerved alſo, that if the liquor touches the ſkin, it has the ſame effect on it as on the matter to be ſtained, changing the part moiſtened with it to an indelible black.—Hair may alſo be dyed of any colour, in the ſame manner as wool.

Hair which does not curl or buckle naturally is brought to it by art, by firſt boiling and then baking it in the following manner: After having picked and ſorted the hair, and diſpoſed it in parcels according to lengths, they roll them up and tie them tight down upon little cylindrical inſtruments, either of wood or earthen ware, a quarter of an inch thick, and hollowed a little in the middle, called *pipes;* in which ſtate they are put in a pot over the fire, there to boil for about two hours. When taken out, they let them dry; and when dried, they ſpread them on a ſheet of brown paper, cover them with another, and thus ſend them to the paſtry-cook; who making a cruſt or coffin around them of common paſte, ſets them in an oven till the cruſt is about three-fourths baked.

The end by which a hair grows to the head is called the *head of the hair;* and the other, with which they begin to give the buckle, the *point*. Formerly the peruke-makers made no difference between the ends, but curled and wove them by either indifferently: but this made them unable to give a fine buckle; hair woven by the point never taking a right curl. Foreigners own themſelves obliged to the Engliſh for this diſcovery, which was firſt carried abroad by a peruke-maker of our country.

Hair is alſo uſed in various other arts and manufactures.—In particular, the hair of beavers, hares, conies, &c. is the principal matter whereof hats are made. Spread on the ground, and left to putrefy on corn-lands, hair, as all other animal ſubſtances, viz. horns, hoofs, blood, garbage, &c. proves good manure.

Hair, in *Farriery*, is generally called the *coat;* and, with regard to horſes, deſerves particular conſideration. The hair growing on the fetlock ſerves as a defence to the prominent part of it in travelling in ſtony ways or in froſty weather. If the hair of a horſe's neck, and the parts moſt uncovered, be cloſe, ſmooth, and ſleek, it is an indication of his being in health and good caſe. In order to make the hair of a horſe ſoft and ſleek, he muſt be kept warm at heart, for the leaſt inward cold will cauſe the hair to ſtare; alſo ſweat him often, for that will looſen and raiſe the duſt and filth that renders his coat foul; and when he is in the heat of a ſweat, ſcrape off all the white foam, ſweat, and filth, that is raiſed up with an old ſword blade; and alſo when he is blooded, if you rub him all over with his own blood, repeating it two or three days, and curry and dreſs him well, it will make his coat ſhine as if covered with a fine varniſh. Hair, Hair-Cloth.

Hair falling from the mane or tail is cauſed either by his having taken ſome heat, which has engendered a dry mange; or from ſome ſurfeit, which cauſes the evil humours to reſort to thoſe parts. To cure this, anoint the horſe's mane and creſt with black ſoap; make a ſtrong ley of aſhes, and waſh it all over with it. But if a canker ſhould grow on a horſe's tail, which will eat away both fleſh and bone, then put ſome oil of vitriol to it, and it will conſume it: and if you find that the vitriol corrodes too much, you need only wet it with cold water, and it will put a ſtop to it.

If you would take away hair from any part of a horſe's body, boil half a pound of lime in a quart of water, till a fourth part is conſumed, to which add an ounce of orpiment; make this into a plaſter, and lay it on.

Hair, or *Down*, of plants; a general term expreſſive of all the hairy and glandular appearances on the ſurface of plants, to which they are ſuppoſed by naturaliſts to ſerve the double purpoſe of defenſive weapons and veſſels of ſecretion.

Theſe hairs are minute threads of greater or leſs length and ſolidity; ſome of them viſible to the naked eye, whilſt others are rendered viſible only by the help of glaſſes. Examined by a microſcope, almoſt all the parts of plants, particularly the young ſtalks or ſtems, appear covered with hairs.

Hairs on the ſurface of plants preſent themſelves under various forms; in the leguminous plants, they are generally cylindric; in the mallow tribe, terminated in a point; in agrimony, ſhaped like a fiſh hook; in nettle, awl-ſhaped and jointed; and in ſome compound flowers with hollow or funnel-ſhaped florets, they are terminated in two crooked points.

Probable as ſome experiments have rendered it, that the hairs on the ſurface of plants contribute to ſome organical ſecretion, their principal uſe ſeems to be to preſerve the parts in which they are lodged from the bad effects of violent frictions, from winds, from extremes of heat and cold, and ſuch like external injuries.

M. Guettard, who eſtabliſhed a botanical method from the form, ſituation, and other circumſtances of the hairy and glandular appearances on the ſurface of plants, demonſtrated, that theſe appearances are generally conſtant and uniform in all the plants of the ſame genus. The ſame uniformity ſeems to characteriſe all the different genera of the ſame natural order.

The different ſorts of hairs which form the down upon the ſurface of plants were imperfectly diſtinguiſhed by Grew in 1682, and by Malpighi in 1686. M. Guettard juſt mentioned was the firſt who examined the ſubject both as a botaniſt and a philoſopher. His obſervations were publiſhed in 1747.

Hair-Cloths, in military affairs, are large pieces of cloth made with half hair. They are uſed for covering the powder in waggons, or upon batteries; as alſo for covering charged bombs or hand-grenades, and many other uſes in magazines.

Hair-Powder. See STARCH.

Hair-Worm || Halberſtadt.

Hair-Worm. See GORDIUS, HELMINTHOLOGY *Index.*

HAKE, the Engliſh name of a fiſh common in the Engliſh and ſome other ſeas, called by authors the *merlucius* and *lucius marinus*. This fiſh was uſed of old dried and ſalted. Hence the proverb obtains in Kent, *As dry as a hake.* See ICHTHYOLOGY *Index.*

HAKLUYT, RICHARD, a naval hiſtorian, is ſuppoſed to have been born in London about the year 1553, and deſcended of a genteel family in Herefordſhire, as the name frequently occurs in the liſt of high ſheriffs for that county in former reigns. He was educated at Weſtminſter-ſchool; and thence, in 1570, removed to Chriſt-church, Oxford; where he applied himſelf particularly to the ſtudy of coſmography, and read public lectures in that ſcience. Sir Edward Stafford being ſent ambaſſador to France in 1583, Mr Hakluyt was one of his attendants, probably in the capacity of chaplain. He was at this time maſter of arts and profeſſor of divinity. In 1585 he obtained the royal mandate for the next vacant prebend of Briſtol, to which preferment he ſucceeded during his reſidence at Paris. Conſtantly attentive to his favourite coſmographical inquiries, in ſearching the French libraries, he found a valuable hiſtory of Florida, which had been diſcovered about 20 years before by Captain Loudonniere and others: this he cauſed to be publiſhed, at his own expence, in the French language, and ſoon after reviſed and republiſhed Peter Martyr's book *De orbe novo*. After five years reſidence in France, Mr Hakluyt returned to England in company with Lady Sheffield, ſiſter to the lord admiral Howard. In the year 1589 he publiſhed his Collection of Voyages in one folio volume, which in 1598 was republiſhed in three. In 1605 our author was made prebendary of Weſtminſter; which, with the rectory of Wetheringſet in the county of Suffolk, ſeems to have been the ſummit of his preferment. He died in 1616, and was buried in Weſtminſter-abbey; bequeathing to his ſon Edmund his manor of Bridge Place, and ſeveral houſes in Tothil-ſtreet, Weſtminſter. He was an indefatigable and faithful hiſtorian. His works are, 1. A Collection of Voyages and Diſcoveries, a ſmall volume. 2. Hiſtory of Florida, above mentioned. 3. The principal Navigations, Voyages, and Diſcoveries of the Engliſh Nation, made by Sea or over Land to the fartheſt diſtant Quarters of the Earth, at any time within the compaſs of theſe 1500 years, in three vols folio. 4. The Diſcoveries of the World, from the firſt Original to the Year 1555, written in the Portugal tongue by Ant. Galvano; corrected, much amended and tranſlated into Engliſh, by Richard Hakluyt. 5. Virginia richly valued, by the Deſcription of the Main Land of Florida, her next Neighbour, &c. written by a Portugal gentleman of Elvas, and tranſlated by Richard Hakluyt. Beſides theſe, he left ſeveral manuſcripts, which were printed in Purchas's collection.

HALBERSTADT, a ſmall principality of Germany, bounded on the north-eaſt by the duchy of Magdeburg, on the ſouth by the principality of Anhault, on the weſt by the dioceſe of Hildſheim, on the eaſt by part of the electorate of Saxony, and on the north by Brunſwick Wolfenbuttle. It is near 40 miles in length and 30 in breadth. The ſoil in general is fertile in corn and flax; and there are ſome woods, though in general fuel is ſcarce. There are three large towns in it which ſend repreſentatives to the diet, together with 10 ſmall ones, and 91 county-towns and villages. The number of the inhabitants is computed at about 200,000: the greateſt part of them are Lutherans; but there are alſo Calviniſts, Jews, and Roman Catholics. The manufactures are chiefly woollen (for the country produces a great number of ſheep); the exports are grain, and a kind of beer called *broihan*. The annual revenue ariſing from this principality, and the incorporated counties and lordſhips, is ſaid to amount to 500,000 rix-dollars. Till the treaty of Weſtphalia in 1648 this country was a dioceſe, but was then transferred to the electoral houſe of Brandenburg as a temporal principality. It is intitled to a vote both in a diet of the empire and that of the circle. The principal places are Halberſtadt, Groningen, Oſcherſleben, Oſterwick, &c.

Halberſtadt || Halde.

HALBERSTADT, a city of Germany, in the circle of Lower Saxony, ſeated near the river Hothein. It is a neat uniform place; and has ſome good churches and other handſome buildings, of which the cathedral is the chief. There is an inn in this place, which is looked upon to be the largeſt and to have the beſt accommodations of any in Europe. Before the Reformation, it was a biſhop's ſee. E. Long. 11. 24. N. Lat. 52. 6.

HALBERT, or HALBARD, in the art of war, a well-known weapon carried by the ſerjeants of foot and dragoons. It is a ſort of ſpear, the ſhaft of which is about five feet long, and made of aſh or other wood. Its head is armed with a ſteel point, not unlike the point of a two-edged ſword. But, beſides this ſharp point which is in a line with the ſhaft, there is a croſs piece of ſteel, flat and pointed at both ends; but generally with a cutting edge at one extremity, and a bent ſharp point at the other; ſo that it ſerves equally to cut down or to puſh withal. It is alſo uſeful in determining the ground between the ranks, and adjuſting the files of a battalion. The word is formed of the German *hal*, "hall," and *bard*, "an hatchet." Voſſius derives it from the German *hallebaert*, of *hel*, "clarus, ſplendens," and *baert*, "axe."

The halbert was anciently a common weapon in the army, where there were companies of halbardiers. It is ſaid to have been uſed by the Amazons, and afterwards by the Rhætians and Vindelicians about the year 570.

It was called the *Daniſh axe*, becauſe the Danes bore an halbert on the left ſhoulder. From the Danes it was derived to the Scots, from the Scots to the Engliſh Saxons, and from them to the French.

HALCYON, a name given by the ancients to the alcedo or king's fiſher. See ALCEDO, ORNITHOLOGY *Index.*

Halcyon Days, in antiquity, a name given to ſeven days before and as many after the winter ſolſtice; by reaſon the halcyon, invited by the calmneſs of the weather, laid its eggs in neſts built in the rocks, cloſe by the brink of the ſea, at this ſeaſon.

HALDE, JOHN BAPTIST DU, was born at Paris in the year 1674, and having entered into the ſociety of the Jeſuits, he was by them entruſted with the care of collecting and arranging the letters which they received from different quarters of the globe. He alſo filled

the

Hale. the office of ſecretary to Father le Tellier, who was confeſſor to the king of France. He died in the year 1743, leaving a character behind him truly amiable for mildneſs, piety, and unwearied induſtry. He was the author of ſome Latin poems, but that which moſt diſtinguiſhed him was his being the editor of the *Lettres Edifiantes et Curieuſes*, from the ninth to the 26th collection incluſive, with a valuable preface written by himſelf. He was alſo the author (ſome ſay editor) of *Deſcription Hiſtorique, Geographique, et Phyſique, de l'Empire de la Chine, et de la Tartarie Chinoiſe*, 4 vols. folio, conſidered as the completeſt account of that prodigious empire which has appeared in Europe. It has, with ſome neceſſary abridgements, been tranſlated into Engliſh. It has all the appearance of veracity, and the ſtyle is ſimple and unaffected.

HALE, in the ſea language, ſignifies *pull;* as, to hale up, is to pull up; to hale in or out, is to pull in or out. To over-hale a rope, is to hale it too ſtiff, or to hale it the contrary way.

Keel-Hale. See DUCKING.

HALE, *Sir Matthew*, lord chief juſtice of the king's-bench in the reign of Charles II. was the ſon of Robert Hale, Eſq. a barriſter of Lincoln's Inn, and was born in 1609. He was educated at Oxford, where he made a conſiderable progreſs in learning; but was afterwards diverted from his ſtudies by the levities of youth. From theſe he was reformed by Mr John Glanvill ſerjeant at law; and applying to the ſtudy of the law, entered into Lincoln's Inn. Noy the attorney-general took early notice of him, and directed him in his ſtudies. Mr Selden alſo took much notice of him; and it was this acquaintance that firſt ſet Mr Hale on a more enlarged purſuit of learning, which he had before confined to his own profeſſion. During the civil wars, he behaved ſo well as to gain the eſteem of both parties. He was employed in his practice by all the king's party; and was appointed by the parliament one of the commiſſioners to treat with the king. The murder of King Charles gave him very ſenſible regret. However, he took the engagement; and was appointed, with ſeveral others, to conſider of the reformation of the law. In 1653 he was by writ made ſerjeant at law, and ſoon after appointed one of the juſtices of the Common Pleas. Upon the death of Oliver Cromwell he refuſed to accept of the new commiſſion offered him by Richard his ſucceſſor. He was returned one of the knights of Glouceſterſhire in the parliament which called home Charles II. Soon after he was made lord chief baron of the exchequer; but declined the honour of knighthood, till lord chancellor Hyde, ſending for him upon buſineſs when the king was at his houſe, told his majeſty, that "there was his modeſt chief baron;" upon which he was unexpectedly knighted. He was one of the principal judges that ſat in Clifford's Inn about ſettling the difference between landlord and tenant, after the fire of London, in which he behaved to the ſatisfaction of all parties concerned, and alſo in his poſt of chief baron acted with inflexible integrity. One of the firſt peers went once to his chamber, and told him, "That having a ſuit in law to be tried before him, he was then to acquaint him with it, that he might the better underſtand it when it ſhould come to be tried in court." Upon which the lord chief baron interrupted him, and ſaid, "He did not deal fairly to come to his chambers about ſuch affairs; for he never received information of ſuch cauſes but in open court, where both parties were to be heard alike." Upon which his grace (for he was a duke) went away not a little diſſatisfied, and complained of it to the king as a rudeneſs that was not to be endured; but his majeſty bid him content himſelf that he was uſed no worſe; and ſaid, "That he verily believed he would have uſed him no better if he had gone to ſolicit him in any of his own cauſes." Another remarkable incident happened in one of his circuits. A gentleman who had a trial at the aſſizes had ſent him a buck for his table. When Judge Hale therefore heard his name, he aſked "if he was not the ſame perſon who had ſent him the veniſon?" and finding that he was the ſame, told him, that "he could not ſuffer the trial to go on till he had paid him for his buck." The gentleman anſwered, that "he never ſold his veniſon; and that he had done nothing to him which he did not do to every judge who had gone that circuit:" which was confirmed by ſeveral gentlemen preſent. The lord chief baron, however, would not ſuffer the trial to proceed till he had paid for the preſent: upon which the gentleman withdrew the record. In ſhort, he was in 1671 advanced to be lord chief juſtice of the king's bench; but about four years after this promotion, his health declining, he reſigned his poſt in February 1675-6, and died in December following. This excellent man, who was an ornament to the bench, to his country, and to human nature, wrote, 1. An Eſſay on the Gravitation and Non-gravitation of Fluid Bodies. 2. Obſervations touching the Torricellian Experiment. 3. Contemplations, moral and divine. 4. The Life of Pomponius Atticus, with political and moral Reflections. 5. Obſervations on the Principles of natural Motion. 6. The primitive Origination of Mankind. He alſo left a great number of manuſcripts, in Latin and Engliſh, upon various ſubjects; among which are, his Pleas of the Crown, ſince publiſhed by Mr Emyln in two volumes folio; and his Original Inſtitution, Power, and Juriſdiction of Parliaments.

Hale, Hales.

HALES, STEPHEN, D. D. a celebrated divine and philoſopher, was born in 1677. He was the ſixth ſon of Thomas Hales, Eſq. the eldeſt ſon of Sir Robert Hales, created a baronet by King Charles II. and Mary the heireſs of Richard Langley of Abbots-Wood in Hertfordſhire. In 1696 he was entered a penſioner at Bennet-college, Cambridge; and was admitted a fellow in 1703, and became bachelor of divinity in 1711. He ſoon diſcovered a genius for natural philoſophy. Botany was his firſt ſtudy; and he uſed frequently to make excurſions among Gogmagog hills, in company with Dr Stukely, with a view of proſecuting that ſtudy. In theſe expeditions he likewiſe collected foſſils and inſects, having contrived a curious inſtrument for catching ſuch of the latter as have wings. In company with this friend he alſo applied himſelf to the ſtudy of anatomy, and invented a curious method of obtaining a repreſentation of the lungs in lead. They next applied themſelves to the ſtudy of chemiſtry; in which, however, they did not make any remarkable diſcoveries. In the ſtudy of aſtronomy Mr Hales was equally aſſiduous. Having made himſelf acquainted with the Newtonian ſyſtem, he contrived a machine for-

Hales. for ſhowing the phenomena on much the ſame principles with that afterwards made by Mr Rowley, and, from the name of his patron, called an *Orrery*.

About the year 1710 he was preſented to the perpetual cure of Teddington near Twickenham, in Middleſex; and afterwards accepted of the living of Porlock in Somerſetſhire, which vacated his fellowſhip in the college, and which he exchanged for the living of Faringdon in Hampſhire. Soon after, he married Mary, the daughter and heireſs of Dr Newce, who was rector of Haliſham in Suſſex, but reſided at Much-Haddam in Hertfordſhire. On the 13th of March 1718, he was elected member of the Royal Society; and on the 5th of March, in the year following, he exhibited an account of ſome experiments he had lately made on the effect of the ſun's warmth in raiſing the ſap in trees. This procured him the thanks of the ſociety, who alſo requeſted him to proſecute the ſubject. With this requeſt he complied with great pleaſure; and on the 14th of June 1725 exhibited a treatiſe in which he gave an account of his progreſs. This treatiſe being highly applauded by the ſociety, he farther enlarged and improved it; and in April 1727 he publiſhed it under the title of *Vegetable Statics*. This work he dedicated to his late majeſty King George II. who was then prince of Wales: and he was the ſame year choſen one of the council of the Royal Society, Sir Hans Sloane being at the ſame annual election choſen their preſident. The book being well received, a ſecond edition of it was publiſhed in 1731. In a preface to this edition Mr Hales promiſed a ſequel to the work, which he publiſhed in 1733 under the title of *Statical Eſſays*, &c. In 1732 he was appointed one of the truſtees for eſtabliſhing a new colony in Georgia. On the 5th of July 1733 the univerſity of Oxford honoured him with a diploma for the degree of doctor in divinity; a mark of diſtinction the more honourable, as it is not uſual for one univerſity to confer academical honours on thoſe who are educated at another. In 1734, when the health and morals of the lower and middling claſs of people were ſubverted by the exceſſive drinking of gin, he publiſhed, though without his name, A friendly Admonition to the Drinkers of Brandy and other ſpirituous Liquors; which was twice reprinted. The latter end of the ſame year he publiſhed a ſermon which he preached at St Bride's before the reſt of the truſtees for eſtabliſhing a new colony in Georgia. His text was, "Bear ye one another's burthens, and ſo fulfil the law of Chriſt;" Galatians vi. 2. In 1739 he printed a volume in 8vo, entitled, Philoſophical Experiments on Sea-water, Corn, Fleſh, and other Subſtances. This work, which contained many uſeful inſtructions for voyagers, was dedicated to the lords of the admiralty. The ſame year he exhibited to the Royal Society an account of ſome farther experiments towards the diſcovery of medicines for diſſolving the ſtone in the kidneys and bladder, and preſerving meat in long voyages; for which he received the gold medal of Sir Godfrey Copley's donation. The year following he publiſhed ſome account of Experiments and Obſervations on Mrs Stephens's Medicines for diſſolving the Stone, in which their diſſolvent power is inquired into and demonſtrated.

In 1741 he read before the Royal Society an account of an inſtrument which he invented, and called a *ventilator*, for conveying freſh air into mines, hoſ- Hales. pitals, priſons, and the cloſe parts of ſhips: he had communicated it to his particular friends ſome months before; and it is very remarkable, that a machine of the ſame kind, for the ſame purpoſe, was in the ſpring of the ſame year invented by one Martin Triewald, an officer in the ſervice of the king of Sweden, called *captain of mechanics*, for which the king and ſenate granted him a privilege in October following, and ordered every ſhip of war in the ſervice of that ſtate to be furniſhed with one of them; a model alſo of this machine was ſent into France, and all the ſhips in the French navy were alſo ordered to have a ventilator of the ſame ſort. It happened alſo, that about the ſame time one Sutton, who kept a coffeehouſe in Alderſgate-ſtreet, invented a ventilator of another conſtruction to draw off the foul air out of ſhips by means of the cook-room fire: but poor Sutton had not intereſt enough to make mankind accept the benefit he offered them; though its ſuperiority to Dr Hales's contrivance was evident, and among others Dr Mead and the ingenious Mr Benjamin Robins gave their teſtimony in its favour (See *Air-Pipes*.) The public, however, is not leſs indebted to the ingenuity and benevolence of Dr Hales, whoſe ventilators came more eaſily into uſe for many purpoſes of the greateſt importance to life, particularly for keeping corn ſweet, by blowing through it freſh ſhowers of air; a practice very ſoon adopted by France, a large granary having been made, under the direction of Duhamel, for the preſervation of corn in this manner, with a view to make it a general practice.

In 1743, Dr Hales read before the Royal Society a deſcription of a method of conveying liquors into the abdomen during the operation of tapping, and it was afterwards printed in their Tranſactions. In 1745, he publiſhed ſome experiments and obſervations on tar-water, which he had been induced to make by the publication of a work called *Siris*, in which the learned and moſt excellent Dr Berkeley, biſhop of Cloyne, had recommended tar-water as an univerſal medicine: on this occaſion ſeveral letters paſſed between them on the ſubject, particularly with reſpect to the uſe of tar-water in the diſeaſe of the horned cattle. In the ſame year he communicated to the public, by a letter to the editor of the Gentleman's Magazine, a deſcription of a *back-heaver*, which will winnow and clean corn much ſooner and better than can be done by the common method. He alſo, at the ſame time, and by the ſame channel, communicated to the public a cheap and eaſy way to preſerve corn ſweet in ſacks; an invention of great benefit to farmers, eſpecially to poor leaſers, who want to keep ſmall quantities of corn for ſome time, but have no proper granary or repoſitory for that purpoſe. He alſo the ſame year took the ſame method to publiſh directions how to keep corn ſweet in heaps without turning it, and to ſweeten it when muſty. He publiſhed a long paper, containing an account of ſeveral methods to preſerve corn by ventilators; with a particular deſcription of ſeveral ſorts of ventilators, illuſtrated by a cut, ſo that the whole mechaniſm of them may be eaſily known, and the machine conſtructed by a common carpenter. He publiſhed alſo in the ſame volume, but without his name, a detection of the fallacious boaſts concerning the efficacy of the liquid ſhell in

Hales. in diſſolving the ſtone in the bladder. In 1746 he communicated to the Royal Society a propoſal for bringing ſmall paſſable ſtones ſoon, and with eaſe, out of the bladder; and this was alſo printed in their Tranſactions. In the Gentleman's Magazine for July 1747, he publiſhed an account of a very conſiderable improvement of his back-heaver, by which it became capable of clearing corn of the very ſmall grain, ſeeds, blacks, ſmutt-balls, &c. to ſuch perfection as to make it fit for ſeed-corn. In 1748 he communicated to the Royal Society a propoſal for checking, in ſome degree, the progreſs of fires, occaſioned by the great fire which happened that year in Cornhill: And the ſubſtance of this propoſal was printed in their Tranſactions. In the ſame year he alſo communicated to the Society two memoirs, which are printed in their Tranſactions; one on the great benefit of ventilators, and the other on ſome experiments in electricity. In 1749, his ventilators were fixed in the Savoy priſon, by order of the right hon. Henry Fox, Eſq; then ſecretary at war, afterwards Lord Holland; and the benefit was ſo great, that though 50 or 100 in a year often died of the gaol diſtemper before, yet from the year 1749 to the year 1752 incluſive, no more than four perſons died, though in the year 1750 the number of priſoners was 240; and of thoſe four, one died of the ſmall-pox, and another of intemperance. In the year 1750 he publiſhed ſome conſiderations on the cauſes of earthquakes; occaſioned by the ſlight ſhocks felt that year in London. The ſubſtance of this work was alſo printed in the Philoſophical Tranſactions. The ſame year he exhibited an examination of the ſtrength of ſeveral purging waters, eſpecially of the water of *Jeſſop's well*, which is printed in the Philoſophical Tranſactions.

Dr Hales had now been ſeveral years honoured with the eſteem and friendſhip of his royal highneſs Frederick prince of Wales; who frequently viſited him at Teddington, from his neighbouring palace at Kew, and took a pleaſure in ſurpriſing him in the midſt of thoſe curious reſearches into the various parts of nature which almoſt inceſſantly employed him. Upon the prince's death, which happened this year, and the ſettlement of the houſehold of the princeſs dowager, he was, without his ſolicitation, or even knowledge, appointed clerk of the cloſet or almoner to her royal highneſs. In 1751 he was choſen by the college of phyſicians to preach the annual ſermon called *Crowne's lecture*: Dr William Crowne having left a legacy for a ſermon to be annually preached on "the wiſdom and goodneſs of God diſplayed in the formation of man." Dr Hales's text was, *With the ancient is wiſdom, and in length of days underſtanding*, Job. xii. 12. This ſermon, as uſual, was publiſhed at the requeſt of the college. In the latter end of the year 1752, his ventilators, worked by a windmill, were fixed in Newgate, with branching trunks to 24 wards; and it appeared that the diſproportion of thoſe that died in the gaol before and after this eſtabliſhment was as 16 to 7. He publiſhed alſo a farther account of their ſucceſs, and ſome obſervations on the great danger ariſing from foul air, exemplified by a narrative of ſeveral perſons ſeized with the gaol-fever by working in Newgate.

On the death of Sir Hans Sloane, which happened in the year 1753, Dr Hales was elected a member of the Academy of Sciences at Paris in his room. The ſame year he publiſhed in the Gentleman's Magazine ſome farther conſiderations about means to draw the foul air out of the ſick rooms of occaſional army hoſpitals, and private houſes in town. He alſo publiſhed many other curious particulars relative to the uſe and ſucceſs of ventilators. The ſame year a deſcription of a ſea-gage, which the Doctor invented to meaſure unfathomable depths, was communicated to the public in the ſame miſcellany: this paper was drawn up about the year 1732 or 1733, by the Doctor, for Colin Campbell, Eſq. This gentleman employed the ingenious Mr Hawkſbee to make the machine it deſcribes, which was tried in various depths, and anſwered with great exactneſs. It was however loſt near Bermuda. In 1754, he communicated to the Royal Society ſome experiments for keeping water and fiſh ſweet with lime-water, an account of which was publiſhed in the Philoſophical Tranſactions. He alſo continued to enrich their memoirs with many uſeful articles from this time till his death, particularly a method of forwarding the diſtillation of freſh from ſalt water by blowing ſhowers of freſh air up through the latter during the operation. In 1757 he communicated to the editor of the Gentleman's Magazine an eaſy method of purifying the air, and regulating its heat in melon-frames and green-houſes; alſo further improvements in his method of diſtilling ſea-water. Hales.

His reputation and the intereſt of his family and friends might eaſily have procured him farther preferment: but of farther preferment he was not deſirous; for being nominated by his late majeſty to a canonry of Windſor, he engaged the princeſs to requeſt his majeſty to recal his nomination. That a man ſo devoted to philoſophical ſtudies and employments, and ſo conſcientious in the diſcharge of his duty, ſhould not deſire any preferment which would reduce him to the dilemma either of neglecting his duty, or foregoing his amuſement, is not ſtrange; but that he would refuſe an honourable and profitable appointment, for which no duty was to be done that would interrupt his habits of life, can ſcarce be imputed to his temperance and humility without impeaching his benevolence; for if he had no wiſh of any thing more for himſelf, a liberal mind would ſurely have been highly gratified by the diſtribution of ſo conſiderable a ſum as a canonry of Windſor would have put into his power, in the reward of induſtry, the alleviation of diſtreſs, and the ſupport of helpleſs indigence. He was, however, remarkable for ſocial virtue and ſweetneſs of temper; his life was not only blameleſs, but exemplary in a high degree; he was happy in himſelf and beneficial to others, as appears by this account of his attainments and purſuits; the conſtant ſerenity and cheerfulneſs of his mind, and the temperance and regularity of his life, concurred, with a good conſtitution, to preſerve him in health and vigour to the uncommon age of fourſcore and four years. He died at Teddington in 1761; and was buried, purſuant to his own directions, under the tower of the pariſh church, which he built at his own expence not long before his death.—Her royal highneſs the princeſs of Wales erected a monument to his memory in Weſtminſter abbey.

Hale'ſia || Halifax.

HALESIA, a genus of plants belonging to the dodecandria claſs, and in the natural method ranking under the 18th order, *Bicornes*. See BOTANY *Index*.

HALESWORTH, a town of Suffolk in England, ſeated on a neck of land between two branches of the river Blith, 101 miles from London. It has a trade in linen-yarn and ſail-cloth, one large church, and about 700 good houſes. About the town is raiſed a great deal of hemp. E. Long. 1. 40. N. Lat. 52. 30.

HALF-BLOOD, in *Law*, is where a man marries a ſecond wife, the firſt being dead, and by the firſt venter he has a ſon, and by his ſecond venter has likewiſe a ſon; the two brothers, in this caſe, are but of half-blood. See CONSANGUINITY and DESCENT.

HALF-*Merk*; a noble, or 6s. 8d.

HALF-*Moon*, in *Fortification*; an outwork compoſed of two faces, forming a ſalient angle, whoſe gorge is in form of a creſcent or half-moon, whence the name.

HALFPENNY, a copper coin, whoſe value is expreſſed by its name, in reference to the penny.

HALI-BEIGH, firſt dragoman or interpreter at the Grand Signior's court in the 17th century, was born of Chriſtian parents in Poland; but having been taken by the Tartars when he was young, they ſold him to the Turks, who brought him up in their religion in the ſeraglio. His name, in his native country, was Bobowſki. He learnt many languages, and Sir Paul Ricaut owns he was indebted to him for ſeveral things which he relates in his *Preſent ſtate of the Ottoman empire*. He held a great correſpondence with the Engliſh, who perſuaded him to tranſlate ſome books into the Turkiſh language; and he propoſed to return into the boſom of the Chriſtian church, but died before he could accompliſh the deſign. Dr Hyde publiſhed his book *Of the liturgy of the Turks, their pilgrimages to Mecca, their circumciſion and viſiting of the ſick*. He tranſlated the catechiſm of the church of England and the bible into the Turkiſh language. The MS. is lodged in the library of Leyden. He wrote likewiſe a Turkiſh grammar and dictionary.

HALICARNASSUS, in *Ancient Geography*, a principal town of Caria, ſaid to be built by the Argives, and ſituated between two bays, the Ceramicus and Jaſius.

It was the royal reſidence, (called *Zephyra* formerly); eſpecially of Mauſolus, made more illuſtrious by his monument. This monument was one of the ſeven wonders, and erected by Artemiſia. Halicarnaſſeus, or Halicarnaſſenſis, was the gentilitious name of Herodotus and Dionyſius. The former was called the Father of Hiſtory; and the latter was not only a good hiſtorian but alſo a diſtinguiſhed critic.

HALIÆTUS. See FALCO, ORNITHOLOGY *Index*.

HALIEUTICS, HALIEUTICA, Ἁλιευτικα, formed of ἁλιευς, *fiſherman*, which is derived from ἁλς, *ſea*; books treating of fiſhes, or the art of fiſhing.—We have ſtill extant the halieutics of Oppian.

HALIFAX, the capital of the province of Nova Scotia in America, ſituated in W. Long. 64. 30. N. Lat. 44. 45. It was founded in 1749, in order to ſecure the Britiſh ſettlements there from the attempts of the French and Indians. It was divided into 35 ſquares, each containing 16 lots of 40 by 60 feet; one eſtabliſhed church and one meeting-houſe, and a ſmall number of houſes out of the regular ſtreets. The town was originally guarded by forts on the outſide; but from the commencement of the American revolution, it was very ſtrongly fortified. Along the river Chebucto, to the ſouthward of the town, are buildings and fiſh-flakes for at leaſt two miles, and to the northward on the river for about one mile. The plan, however, was greatly improved by the earl of Halifax, who was the original contriver. The proclamation iſſued for this ſettlement, offered 50 acres of land to every ſoldier and ſailor who would ſettle in that part of America, without rent or ſervice, for ten years, and no more than one ſhilling per annum for each 50 acres ever afterwards: to every ſoldier and ſailor who had a wife and children, ten acres more were added for every individual of his family, and for every increaſe that ſhould afterwards happen in the ſame proportion: To each non-commiſſioned officer 80 acres, and 15 for each of his family; 200 acres to each enſign; 300 to each lieutenant; 400 to each captain; 600 to every officer in rank above a captain, and 30 for each of his family. Government alſo engaged to tranſport and maintain the new ſettlers for one year at its own expence, and furniſh them with ſuch arms, proviſions, utenſils, implements, &c. as ſhould be neceſſary to put them in a way to cultivate their lands, to build habitations, and to commence a fiſhery. The ſame conditions were likewiſe offered to all carpenters and other handicraftſmen; and ſurgeons were offered the ſame conditions with the enſigns.—This proclamation was publiſhed in March, and by the month of May 3700 perſons had offered themſelves. They accordingly embarked, and eſtabliſhed themſelves in the bay of Chebucto; calling the city *Halifax*, from the title of their patron. Before the end of October the ſame year, 350 comfortable wooden houſes were built, and as many more during the winter.—The ſame year in which the ſettlers embarked, the government granted them 40,000l. for their expences. In 1750, they granted 57,582l. 17s. 3¼d. for the ſame purpoſe; in 1751, 53,927l. 14s. 4d.; in 1752, 61,492l. 19s. 4¼d.; in 1753, 94,615l. 12s. 4d.; in 1754, 58,447l. 2s.; and in 1755, 49,418l. 7s. 8d.—The place at laſt attained a degree of ſplendor that ſeemed to rival the firſt cities in the united ſtates; for this it has been equally indebted to the American war, to the great increaſe of population from the exiled loyaliſts, and the foſtering care of Great Britain. About this time the number of inhabitants was more than doubled in ten years. Halifax.

The harbour, which is well ſheltered from all winds, is ſo ſpacious, that a thouſand ſail of ſhips may ride in ſafety. Upon it there are built a great number of commodious wharfs, which have from 12 to 18 feet water at all times of the tide, for the convenience of loading and unloading ſhips. The ſtreets of the town are regularly laid out, and croſs each other at right angles; the whole riſing gradually from the water upon the ſide of a hill whoſe top is regularly fortified, but not ſo as to be able to withſtand a regular attack. Many conſiderable merchants reſide at this place, and are poſſeſſed of ſhipping to the amount of ſeveral thouſand tons, employed in a flouriſhing trade both with Europe and the Weſt Indies. There is a ſmall but excellent careening yard for ſhips of the royal navy that are upon this ſtation, or that may have occaſion to come in to refit, and take water, fuel, or freſh proviſions on board, in their paſſage

Halifax. passage to and from the West Indies. It is always kept well provided with naval stores; and ships of the line are hove down and repaired with great ease and safety. Several batteries of heavy cannon command the harbour, particularly those that are placed upon George's island, which being very steep and high, and situated in mid-channel, a little way below the town, is well calculated to annoy vessels in any direction, as they must of necessity pass very near it before they are capable of doing any mischief. Above the careening yard, which is at the upper end of the town, there is a large bason, or piece of water, communicating with the harbour below, near 20 miles in circumference, and capable of containing the whole navy of England, entirely sheltered from all winds, and having only one narrow entrance, which, as we observed before, leads into the harbour. There are a number of detached settlements lately formed by the loyalists upon the bason; the lands at a small distance from the water being generally thought better than those near to Halifax; but what success may attend their labours, will require some time to determine. An elegant and convenient building has been erected near the town for the convalescence of the navy; but the healthiness of the climate has as yet prevented many persons from becoming patients, scarcely any ships in the world being so free from complaints of every kind, in regard to health, as those that are employed upon this station. There is a very fine lighthouse, standing upon a small island just off the entrance of the harbour, which is visible, either by night or day, six or seven leagues off at sea.

HALIFAX, earl of. See SAVILLE.

HALIFAX, a town in the west riding of Yorkshire in England, seated on the river Calder, in W. Long. 2. 0. N. Lat. 53. 45. It has the title of an earldom, and is very eminent for the clothier trade. The parish is said to be the most populous, if not the most extensive, in England: for it is above 30 miles in circumference; and, besides the mother church at Halifax, and 16 meeting-houses, has 12 chapels, two of which are parochial. What is a little singular, all the meeting-houses here, except the quakers, have bells and burying grounds. The woollens principally manufactured here are kerseys and shalloons. Of the former it is affirmed, that one dealer hath sent by commission 60,000 pounds worth in a year to Holland and Hamburg; and of the latter, it is said, 100,000 pieces are made in this parish yearly. The inhabitants here and in the neighbouring towns are so entirely employed in these manufactures, that agriculture is but little minded. Most of their provisions of all sorts are brought from the north and east ridings, and from Lancashire, Cheshire, Nottinghamshire, and Warwickshire. The markets are very much crowded for the buying and selling provisions and manufactures. The cloths, at the first erecting of the woollen manufactures in these parts, having been frequently stolen off the tenters in the night, a law was made, by which the magistrates of Halifax were empowered to pass sentence on and execute all offenders, if they were taken in the fact, or owned it, or if the stolen cloth was found upon them, provided also the crime was committed, and the criminal apprehended, within the liberties of the forest of Hardwick. These found guilty were executed in the following manner: an axe was drawn by a pulley to the top of a wooden engine, and fastened by a pin, which being pulled out, the axe fell down in an instant, and did its work. If they had stole an ox, horse, or any other beast, it was led with them to the scaffold, and there fastened by a cord to the pin that held up the axe; and when the signal was given by the jurors, who were the first burghers within the several towns of the forest, the beast was driven away, and the pin plucked out, upon which the axe fell and did its office. This severe and summary course of justice gave occasion to a kind of litany, which, it is said, is often in the mouths of the beggars and vagrants who usually frequent these places, viz.

Haliotis || Hall.

From Hell, Hull, and Halifax, good Lord deliver us:

though neither the engine, nor manner of proceeding against them, are now in use. The *Maiden* of Scotland, and the *Guillotine* of France, were similar instruments. See MAIDEN and GUILLOTINE.

HALIOTIS, the EAR-SHELL, a genus of shell-fish, belonging to the order of vermes testacea. See CONCHOLOGY *Index*.

HALITZ, a town of Poland, and capital of a territory of the same name, in Red Russia, with a castle. It is seated on the river Neister. E. Long. 26. 0. N. Lat. 49. 20.

HALL, in *Architecture*, a large room at the entrance of a fine house and palace. Vitruvius mentions three kinds of halls; the tetrastyle, with four columns supporting the platfond or ceiling; the Corinthian, with columns all round let into the wall, and vaulted over; and the Egyptian, which had a peristyle of insulated Corinthian columns, bearing a second order with a ceiling.

The hall is properly the finest as well as first member of an apartment: and in the houses of ministers of state, magistrates, &c. is the place where they dispatch business, and give audience. In very magnificent buildings, where the hall is larger and loftier than ordinary, and placed in the middle of the house, it is called a *saloon*.

The length of a hall should be at least twice and a quarter its breadth; and in great buildings, three times its breadth. As to the height of halls, it may be two-thirds of the breadth; and, if made with an arched ceiling, it will be much handsomer, and less liable to accidents by fire. In this case, its height is found by dividing its breadth into six parts, five of which will be the height from the floor to the under side of the key of the arch.

HALL is also particularly used for a court of justice; or an edifice wherein there is one or more tribunals.

In Westminster-hall are held the great courts of England, viz. the king's bench, chancery, common pleas, and exchequer. In adjoining apartments is likewise held the high court of parliament.

Westminster-hall was the royal palace or place of residence of our ancient kings; who ordinarily held their parliaments, and courts of judicature, in their dwelling-houses (as is still done by the kings of Spain), and frequently sat in person in the courts of judicature as they still do in parliament. A great part of this palace was burnt under Henry VIII.: what remains is still re-

Hall ‖ Hallein.

ſerved for the ſaid judicatories. The great hall, wherein the courts of king's bench, &c. are kept, is ſaid to have been built by William Rufus; others ſay by Richard I. or II. It is reckoned ſuperior, in point of dimenſions, to any hall in Europe; being 300 feet long and 100 broad.

HALL, *Joſeph*, an eminent prelate of the church of England, was born in 1574, and educated at Cambridge. He became profeſſor of rhetoric in that univerſity, and then ſucceſſively was made rector of Halſted, in Suffolk, preſented to the living of Waltham in Eſſex, made prebendary of Wolverhampton, dean of Worceſter, biſhop of Exeter, and laſtly of Norwich. His works teſtify his zeal againſt Popery, and are much eſteemed. He lamented the diviſions of the Proteſtants, and wrote ſomething concerning the means of putting an end to them. July 1616, he attended the embaſſy of Lord Doncaſter into France, and upon his return was appointed by his majeſty to be one of the divines who ſhould attend him into Scotland. In 1618 he was ſent to the ſynod of Dort with other divines, and pitched upon to preach a Latin ſermon before that aſſembly. But being obliged to return from thence before the ſynod broke up, on account of his health, he was by the ſtates preſented with a gold medal. He wrote, 1. Miſcellaneous epiſtles. 2. *Mundus alter et idem.* 3. A juſt cenſure of travellers. 4. The Chriſtian Seneca. 5. Satires, in ſix books. 6. A century of meditations; and many other works, which, beſides the above ſatires, make in all five volumes in folio and quarto. He died in 1656.

HALLAGE, a fee or toll paid for cloth brought to be ſold in Blackwell-hall, London.

HALLAMAS, in our old writers, the day of all-hallows, or all-ſaints, viz. November 1. It is one of the croſs quarters of the year, which was computed, in ancient writings, from Hallamas or Candlemas.

HALLAND, a country of Sweden, in the iſland of Schonen, lying along the ſea-coaſt, at the entrance of the Baltic ſea, and oppoſite to Jutland. It is 60 miles along the coaſt, but it is not above 12 in breadth. Halmſtadt is the capital town.

HALLATON, a town of Leiceſterſhire, in England. It is ſeated on a rich ſoil, 12 miles ſouth-eaſt of Leiceſter, in E. Long. 0. 50. N. Lat. 52. 35.

HALLE, a little diſmantled town of the Auſtrian Netherlands, in Hainault. The church of Notre Dame contains an image of the Virgin Mary, held in great veneration. E. Long. 3. 15. N. Lat. 50. 44.

HALLE, a handſome and conſiderable town of Germany, in the circle of Upper Saxony, and in the duchy of Magdeburg, with a famous univerſity and ſalt-works. It belongs to the king of Pruſſia; and is ſeated in a pleaſant plain on the river Sale, in E. Long. 12. 33. N. Lat. 51. 36.

HALLE, a free and imperial town of Germany, in Suabia, famous for its ſalt-pits. It is ſeated on the river Kocher, among rocks and mountains, in E. Long. 10. 50. N. Lat. 49. 6.

HALLEIN, a town of Germany, in the circle of Bavaria, and archbiſhopric of Saltſburg; ſeated on the river Saltza, among the mountains, wherein are mines of ſalt, which are the chief riches of the town and country. E. Long. 12. 15. N. Lat. 47. 33.

HALLELUJA, a term of rejoicing, ſometimes ſung or rehearſed at the end of verſes on ſuch occaſions. Hallelujah ‖ Haller.

The word is Hebrew; or rather, it is two Hebrew words joined together: one of them הללו *hallelu*, and the other יה *jah*; an abridgment of the name of God, יהוה *Jehovah*. The firſt ſignifies *laudate*, "praiſe ye;" and the other, *Dominum*, "the Lord."

St Jerome firſt introduced the word hallelujah into the church ſervice: for a conſiderable time it was only uſed once a-year in the Latin church, viz. at Eaſter; but in the Greek church it was much more frequent. St Jerome mentions its being ſung at the interments of the dead, which ſtill continues to be done in that church, as alſo on ſome occaſions in the time of Lent.

In the time of Gregory the Great, it was appointed to be ſung all the year round in the Latin church, which raiſed ſome complaints againſt that pope; as giving too much into the Greek way, and introducing the ceremonies of the church of Conſtantinople into that of Rome. But he excuſed himſelf by alleging, that this had been the ancient uſage of Rome; and that it had been brought from Conſtantinople at the time when the word hallelujah was firſt introduced under Pope Damaſcus.

HALLENBERG, a town of Germany, in Weſtphalia, ſeven miles of Medebach, and 62 eaſt of Cologne.

HALLENCOURT, a town of France, in the department of Somme, ſeven miles and a half ſouth of Abbeville.

HALLER, ALBERT VAN, an eminent phyſician, was born at Bern, on the 16th of October 1708. He was the ſon of an advocate of conſiderable eminence in his profeſſion. His father had a numerous family, and Albert was the youngeſt of five ſons. From the firſt period of his education, he ſhowed a very great genius for literature of every kind: to forward the progreſs of his ſtudies, his father took into his family a private tutor, named *Abraham Billodz*; and ſuch was the diſcipline exerted by this pedagogue, that the accidental ſight of him, at any future period of life, excited in Haller very great uneaſineſs, and renewed all his former terrors. According to the accounts which are given us, the progreſs of Haller's ſtudies, at the earlieſt periods of life, was rapid almoſt beyond belief. When other children were beginning only to read, he was ſtudying Bayle and Moreri; and at nine years of age he was able to tranſlate Greek, and was beginning the ſtudy of Hebrew. Not long after this, however, the courſe of his education was ſomewhat interrupted by the death of his father; an event which happened when he was in the 13th year of his age. After this he was ſent to the public ſchool at Bern, where he exhibited many ſpecimens of early and uncommon genius. He was diſtinguiſhed for his knowledge in the Greek and Latin languages; but he was chiefly remarkable for his poetical genius: and his eſſays of this kind, which were publiſhed in the German language, were read and admired throughout the whole empire. In the 16th year of his age he began the ſtudy of medicine at Tubingen, under thoſe eminent teachers Duvernoy and Camerarius; and continued there for the ſpace of two years, when the great reputation of the juſtly celebrated

Haller. lebrated Boerhaave drew him to Leyden. Nor was this diſtinguiſhed teacher the only man from whoſe ſuperior abilities he had there an opportunity of profiting. Ruyſch was ſtill alive, and Albinus was riſing into fame. Animated by ſuch examples, he ſpent all the day, and the greateſt part of the night, in the moſt intenſe ſtudy; and the proficiency which he made, gained him univerſal eſteem both from his teachers and fellow ſtudents. From Holland, in the year 1727, he came to England. Here, however, his ſtay was but ſhort; and it was rather his intention to viſit the illuſtrious men of that period, than to proſecute his ſtudies at London. He formed connexions with ſome of the moſt eminent of them. He was honoured with the friendſhip of Douglaſs and Cheſelden; and he met with a reception proportioned to his merit from Sir Hans Sloane, preſident of the Royal Society. After his viſit to Britain, he went to France; and there, under thoſe eminent maſters, Winſlow and Le Dran, with the latter of whom he reſided during his ſtay in Paris, he had opportunities of proſecuting anatomy, which he had not before enjoyed. But the zeal of our young anatomiſt was greater than the prejudices of the people at that period, even in the enlightened city of Paris, could admit of. An information being lodged againſt him to the police for diſſecting dead bodies, he was obliged to cut ſhort his anatomical inveſtigations by a precipitate retreat. Still, however, intent on the farther proſecution of his ſtudies, he went to Baſil, where he became a pupil to the celebrated Bernouilli.

Thus improved and inſtructed by the lectures of the moſt diſtinguiſhed teachers of that period, by uncommon natural abilities, and by unremitting induſtry, he returned to the place of his nativity in the 26th year of his age. Not long after this, he offered himſelf a candidate, firſt for the office of phyſician to an hoſpital, and afterwards for a profeſſorſhip. But neither the character which he had before he left his native country, nor the fame which he had acquired and ſupported while abroad, were ſufficient to combat the intereſt oppoſed to him. He was diſappointed in both; and it was even with difficulty that he obtained, in the following year, the appointment of keeper of a public library at Bern. The exerciſe of this office was indeed by no means ſuited to his great abilities: but it was agreeable to him, as it afforded him an opportunity for that extenſive reading by which he has been ſo juſtly diſtinguiſhed. The neglect of his merit which marked his firſt outſet, neither diminiſhed his ardour for medical purſuits, nor detracted from his reputation either at home or abroad. And ſoon after he was nominated a profeſſor in the univerſity of Gottingen, by King George II. The duties of this important office he diſcharged, with no leſs honour to himſelf than advantage to the public, for the ſpace of 17 years; and it afforded him an ample field for the exertion of thoſe great talents which he poſſeſſed. Extenſively acquainted with the ſentiments of others reſpecting the economy of the human body, ſtruck with the diverſity of opinions which they held, and ſenſible that the only means of inveſtigating truth was by careful and candid experiment, he undertook the arduous taſk of exploring the phenomena of human nature from the original ſource. In theſe purſuits he was no leſs induſtrious than ſucceſsful, and there was hardly any function of the body on which his experiments did not reflect either a new or a Haller. ſtronger light. Nor was it long neceſſary for him, in this arduous undertaking, to labour alone. The example of the preceptor inſpired his pupils with the ſpirit of induſtrious exertion. Zinn, Zimmerman, Caldani, and many others, animated by a generous emulation, laboured with indefatigable induſtry to proſecute and to perfect the diſcoveries of their great maſter. And the mutual exertion of the teacher and his ſtudents, not only tended to forward the progreſs of medical ſcience, but placed the philoſophy of the human body on a more ſure, and an almoſt entirely new, baſis. But the labours of Dr Haller, during his reſidence at Gottingen, were by no means confined to any one department of ſcience. He was not more anxious to be an improver himſelf, than to inſtigate others to ſimilar purſuits. To him, the Anatomical Theatre, the School of Midwifery, the Chirurgical Society, and the Royal Academy of Sciences at Gottingen, owe their origin. Such diſtinguiſhed merit could not fail to meet with a ſuitable reward from the ſovereign under whoſe protection he then taught. The king of Great Britain not only honoured him with every mark of attention which he himſelf could beſtow, but procured him alſo letters of nobility from the emperor. On the death of Dillenius, he had an offer of the profeſſorſhip of botany at Oxford; the ſtates of Holland invited him to the chair of the younger Albinus; the king of Pruſſia was anxious that he ſhould be the ſucceſſor of Maupertuis at Berlin. Marſhal Keith wrote to him in the name of his ſovereign, offering him the chancellorſhip of the univerſity of Halle, vacant by the death of the celebrated Wolff. Count Orlow invited him to Ruſſia, in the name of his miſtreſs the empreſs, offering him a diſtinguiſhed place at St Peterſburgh. The king of Sweden conferred on him an unſolicited honour, by raiſing him to the rank of knighthood of the order of the polar ſtar; and the emperor of Germany did him the honour of a perſonal viſit; during which he thought it no degradation of his character to paſs ſome time with him in the moſt familiar converſation.

Thus honoured by ſovereigns, revered by men of literature, and eſteemed by all Europe, he had it in his power to have held the higheſt rank in the republic of letters. Yet, declining all the tempting offers which were made to him, he continued at Gottingen, anxiouſly endeavouring to extend the riſing fame of that medical ſchool. But after 17 years reſidence in that univerſity, an ill ſtate of health rendering him leſs fit for the duties of the important office which he held, he ſolicited and obtained permiſſion from the regency of Hanover to return to his native city of Bern. His fellow-citizens, who might at firſt have fixed him among themſelves, with no leſs honour than advantage to their city, were now as ſenſible as others of his ſuperior merit. A penſion was ſettled upon him for life, and he was nominated at different times to fill the moſt important offices in the ſtate. Theſe occupations, however, did not diminiſh his ardour for uſeful improvements. He was the firſt preſident, as well as the greateſt promoter, of the Oeconomical Society at Bern; and he may be conſidered as the father and founder of the Orphan Hoſpital of that city. Declining health, however, reſtrained his exertions in the more active

ſcenes

Halleria, Halley.

ſcenes of life, and for many years he was confined entirely to his own houſe. Even this, however, could not put a period to his utility: for, with indefatigable induſtry, he continued his favourite employment of writing till within a few days of his death; which happened in the 70th year of his age, on the 12th of December 1777. His *Elementa Phyſiologiæ* and *Bibliotheca Medicinæ*, will afford, to lateſt poſterity, undeniable proofs of his indefatigable induſtry, penetrating genius, and ſolid judgement. But he was not more diſtinguiſhed as a philoſopher than beloved as a man; and he was not more eminent for his improvement in every department of medical ſcience, than for his piety to God, and benevolence to all mankind.

HALLERIA, a genus of plants belonging to the didynamia claſs; and in the natural method ranking under the 40th order, *Perſonatæ*. See BOTANY *Index*.

HALLEY, DR EDMUND, an eminent aſtronomer, was the only ſon of a ſoap-boiler in London, and was born in 1656. He firſt applied himſelf to the ſtudy of the languages and ſciences, but at length gave himſelf up wholly to that of aſtronomy. In 1676 he went to the iſland of St Helena to complete the catalogue of fixed ſtars, by the addition of thoſe which lie near the ſouth pole; and having delineated a planiſphere in which he laid them all down in their exact places, he returned to England in 1678. In the year 1680 he took what is called *the grand tour*, accompanied by his friend the celebrated Mr Nelſon. In the midway between Calais and Paris, Mr Halley had a ſight of a remarkable comet, as it then appeared a ſecond time that year, in its return from the ſun. He had the November before ſeen it in its deſcent; and now haſtened to complete his obſervations upon it, in viewing it from the royal obſervatory of France. His deſign in this part of his tour was, to ſettle a friendly correſpondence between the two royal aſtronomers of Greenwich and Paris; and in the mean time to improve himſelf under ſo great a maſter as Caſſini. From thence he went to Italy, where he ſpent great part of the year 1681; but his affairs calling him home, he returned to England. In 1683, he publiſhed his *Theory of the variation of the magnetical compaſs;* in which he ſuppoſes the whole globe of the earth to be a great magnet, with four magnetical poles, or points of attraction: but afterwards thinking that this theory was liable to great exceptions, he procured an application to be made to King William, who appointed him commander of the Paramour pink, with orders to ſeek by obſervations the diſcovery of the rule of variations, and to lay down the longitudes and latitudes of his majeſty's ſettlements in America.—He ſet out on this attempt on the 24th of November 1698: but having croſſed the line, his men grew ſickly; and his lieutenant mutinying, he returned home in June 1699. Having got the lieutenant tried and caſhiered, he ſet ſail a ſecond time in September following, with the ſame ſhip, and another of leſs bulk, of which he had alſo the command. He now traverſed the vaſt Atlantic ocean from one hemiſphere to the other, as far as the ice would permit him to go; and having made his obſervations at St Helena, Brazil, Cape Verd, Barbadoes, the Madeiras, the Canaries, the coaſt of Barbary, and many other latitudes, arrived in September 1700; and the next year publiſhed a general chart, ſhowing at one view the variation of the compaſs in all thoſe places. Captain Halley, as he was now called, had been at home little more than half a year, when he was ſent by the king to obſerve the courſe of the tides, with the longitude and latitude of the principal head-lands in the Britiſh channel: which having executed with his uſual expedition and accuracy, he publiſhed a large map of the Britiſh channel. Soon after, the emperor of Germany reſolving to make a convenient harbour for ſhipping in the Adriatic, Captain Halley was ſent by Queen Anne to view the two ports on the coaſt of Dalmatia. He embarked on the 22d of November 1702; paſſed over to Holland; and going through Germany to Vienna, he proceeded to Iſtria: but the Dutch oppoſing the deſign, it was laid aſide; yet the emperor made him a preſent of a rich diamond-ring from his finger, and honoured him with a letter of recommendation, written with his own hand, to Queen Anne. Preſently after his return, he was ſent again on the ſame buſineſs; when paſſing through Hanover, he ſupped with King George I. then electoral prince, and his ſiſter the queen of Pruſſia. On his arrival at Vienna, he was the ſame evening preſented to the emperor, who ſent his chief engineer to attend him to Iſtria, where they repaired and added new fortifications to thoſe of Trieſte. Mr Halley returned to England in 1703; and the ſame year was made profeſſor of geometry in the univerſity of Oxford, in the room of Dr Wallis, and had the degree of doctor of laws conferred on him by that univerſity. He is ſaid to have loſt the profeſſorſhip of aſtronomy in that city, becauſe he would not profeſs his belief of the Chriſtian religion. He was ſcarcely ſettled at Oxford, when he began to tranſlate into Latin from the Arabic, *Apollonius de ſectione rationis;* and to reſtore the two books *De ſectione ſpatii* of the ſame author, which are loſt, from the account given of them by Pappus; and he publiſhed the whole work in 1706. Afterwards he had a ſhare in preparing for the preſs Apollonius's Conics; and ventured to ſupply the whole eighth book, the original of which is alſo loſt. He likewiſe added Serenus on the ſection of the cylinder and cone, printed from the original Greek, with a Latin tranſlation, and publiſhed the whole in folio. In 1713, he was made ſecretary of the Royal Society; in 1720, he was appointed the king's aſtronomer at the royal obſervatory at Greenwich, in the room of Mr Flamſtead; and, in 1729, was choſen as a foreign member of the Academy of Sciences at Paris. He died at Greenwich in 1742. His principal works are, 1. *Catalogus ſtellarum auſtralium.* 2. *Tabulæ aſtronomicæ.* 3. An abridgement of the aſtronomy of comets, &c. We are alſo indebted to him for the publication of ſeveral of the works of the great Sir Iſaac Newton, who had a particular friendſhip for him, and to whom he frequently communicated his diſcoveries.

Halley || Halmote.

HALLEY's Quadrant. See QUADRANT.

HALLIARDS, the ropes or tackles uſually employed to hoiſt or lower any ſail upon its reſpective maſt or ſtay. See JEARS.

HALMOTE, or HALIMOTE, is the ſame with what is now called a *court-baron*, the word implying a meeting of the tenants of the ſame hall or manor. The name is ſtill retained at Luſton, and other places in Herefordſhire. See MOTE.

Halmſtadt || Halton.

HALMSTADT. See HELMSTADT.

HALO, or CORONA, in *Natural Hiſtory*, a coloured circle appearing round the body of the ſun, moon, or any of the large ſtars. See CORONA.

HALORAGUS, a genus of plants belonging to the octandria claſs. See BOTANY *Index*.

HALSTEAD, a town of Eſſex in England, ſeated on the river Coln, 45 miles from London. The town conſiſts of about 600 houſes, and the inhabitants are about 4000 in number. Here is a good manufactory of ſays, bays, callimancoes, &c. and its market is noted for corn.

HALT, in *War*, a pauſe or ſtop in the march of a military body.—Some derive the word from the Latin *halitus*, "breath; it being a frequent occaſion of halting to take breath: others from *alto*, becauſe in halting they raiſed their pikes on end, &c.

HALTER, in the manege, a head-ſtall for a horſe, of Hungary leather, mounted with one, and ſometimes two ſtraps, with a ſecond throat-band, if the horſe is apt to unhalter himſelf.

Halter-Caſt, is an excoriation of the paſtern, occaſioned by the halter's being entangled about the foot, upon the horſe's endeavouring to rub his neck with his hinder feet. For the cure of this, anoint the place, morning and evening, with equal quantities of linſeed oil and brandy, well mixed.

HALTERES, or POISERS, in *Entomology*, two ſmall round bodies, ſupported on ſtalks and attached to the inſect under the wings of dipterous flies, as in the *tipula* genus. They are ſuppoſed by ſome naturaliſts to be the rudiments of another pair of wings. See ENTOMOLOGY.

HALTERISTÆ, in antiquity, a kind of players at diſcus; denominated from a peculiar kind of diſcus, called by the Greeks ἅλτης, and by the Latins *halter*. See DISCUS.

Some take the diſcus to have been a leaden weight or ball which the vaulters bore in their hands, to ſecure and keep themſelves the more ſteady in their leaping. Others will have the halter to be a lump or maſs of lead or ſtone, with an hole or handle fixed to it, by which it might be carried; and that the halteriſtæ were thoſe who exerciſed themſelves in removing theſe maſſes from place to place.

Hier. Mercurialis, in his treatiſe *De arte gymnaſtica*, l. ii. c. 12. diſtinguiſhes two kinds of halteriſtæ; for though there was but one halter, there were two ways of applying it. The one was to throw or pitch it in a certain manner; the other only to hold it out at arm's-end, and in this poſture to give themſelves divers motions, ſwinging the hand backwards and forwards, according to the engraven figures thereof given us by Mercurialis.—The halter was of a cylindrical figure, ſmaller in the middle where it was held, by one diameter, than at the two ends. It was above a foot long, and there was one for each hand: it was either of iron, ſtone, or lead.

Galen, *De tuend. valetud.* lib. i. v. and vi. ſpeaks of this exerciſe, and ſhows of what uſe it is in purging the body of peccant humours; making it equivalent both to purgation and phlebotomy.

HALTON, or HAULTON, i. e. *High Town*, a town of Cheſhire, 186 miles from London. It ſtands on a hill, where a caſtle was built anno 1071, and is a member of the duchy of Lancaſter; which maintains a large juriſdiction in the county round it, by the name of *Halton-Fee*, or the *honour of Halton*, having a court of record, priſon, &c. within themſelves. About Michaelmas every year, the king's officers of the duchy keep a law-day at the caſtle, which ſtill remains a ſtately building. Once a fortnight a court is kept here, to determine all matters within their juriſdiction; but felons and thieves are carried to the ſeſſions at Cheſter, to receive their ſentence. By the late inland navigation, it has communication with the rivers Merſey, Dee, Ribble, Ouſe, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaſter, Weſtmoreland, Stafford, Warwick, Leiceſter, Oxford, Worceſter, &c.

Haltwhiſtle || Ham.

HALTWHISTLE, a town of Northumberland in England, ſituated in E. Long. 2. 0. N. Lat. 55. 0.

HALYMOTE, properly ſignifies a holy or eccleſiaſtical court. See HALMOTE.

There is a court held in London by this name before the lord mayor and ſheriffs, for regulating the bakers. It was anciently held on Sunday next before St Thomas's day, and for this reaſon called the *Halymote*, or *Holy-court*.

HALYS, in *Ancient Geography*, the nobleſt river of the Hither Aſia, through which it had a long courſe, was the boundary of Crœſus's kingdom to the eaſt. Running down from the foot of Mount Taurus, through Cataonia, and Cappadocia, it divided almoſt the whole of the Lower Aſia, from the ſea of Cyprus down to the Euxine, according to Herodotus; who ſeems to extends its courſe too far. According to Strabo, himſelf a Cappadocian, it had its ſprings in the Great Cappadocia. It ſeparated Paphlagonia from Cappadocia; and received its name απο του ἁλος, from ſalt, becauſe its waters were of a ſalt and bitter taſte, from the nature of the ſoil over which they flowed. It is famous for the defeat of Crœſus king of Lydia, who was miſled by the ambiguous word of this oracle:

Χροισος ἁλυν διαβας μεγαλην αρχην διαλυσει.

If Crœſus paſſes over the Halys he ſhall deſtroy a great empire.

That empire was his own. See CROESUS and LYDIA.

HALYWERCFOLK, in old writers, were perſons who enjoyed land, by the pious ſervice of repairing ſome church, or defending a ſepulchre.

This word alſo ſignified ſuch perſons in the dioceſe of Durham as held their lands to defend the corpſe of St Cuthbert, and who from thence claimed the privilege of not being forced to go out of the biſhopric.

HAM, or CHAM, in *Ancient Geography*, the country of the Zuzims (Gen. xiv. 5.), the ſituation whereof is not known.

HAM, the youngeſt ſon of Noah. He was the father of Cuſh, Mizraim, Phut, and Canaan; each whereof had the ſeveral countries peopled by them. With reſpect to Ham, it is believed that he had all Africa for his inheritance, and that he peopled it with his children. As for himſelf, it is thought by ſome that he dwelt in Egypt; but M. Baſnage is rather of opinion, that neither Ham nor Mizraim ever were in

Egypt

Ham || Hamadryades.

Egypt, but that their poſterity ſettled in this country, and called it by the name of their anceſtors. And as to Ham's being worſhipped as a god, and called *Jupiter Hammon*, he thinks people may have been led into this miſtake by the ſimilitude of names; and that Jupiter Hammon was the ſun, to which divine honours have been paid at all times in Egypt. However that may be, Africa is called the land of Ham, in ſeveral places of the pſalms, (Pſal. lxxvii. 51. civ. 23. cv. 22.) In Plutarch, Egypt is called *Chemia*; and there are ſome footſteps of the name of *Ham* or *Cham* obſerved in Pſochemmis, Pſitta-chemmis, which are cantons of Egypt.

HAM, a Saxon word uſed for "a place of dwelling;" a village or town: hence the termination of ſome of our towns, *Nottingham*, *Buckingham*, &c. Alſo a home cloſe, or little narrow meadow, is called a *ham*.

HAM, is alſo a part of the leg of an animal; being the inner or hind part of the knee, or the ply or angle in which the leg and thigh, when bent, incline to each other.

HAM, in *Commerce*, &c. is uſed for a leg or thigh of pork, dried, ſeaſoned, and prepared, to make it keep, and to give it a briſk agreeable flavour.

Weſtphalia hams, which are ſo highly eſteemed, are prepared by ſalting them with ſaltpetre, preſſing them in a preſs eight or ten days, then ſteeping them in juniper-water, and drying them in the ſmoke of juniper-wood.

A ham may be ſalted in imitation of thoſe of Weſtphalia, by ſprinkling a ham of young pork with ſalt for one day, in order to fetch out the blood; then wiping it dry, and rubbing it with a mixture of a pound of brown ſugar, a quarter of a pound of ſaltpetre, half a pint of bay ſalt, and three pints of common ſalt, well ſtirred together in an iron pan over the fire till they are moderately hot: let it lie three weeks in this ſalting, and be frequently turned, and then dry it in a chimney.

HAM, a city of Germany, in the circle of Weſtphalia, capital of the county of Mark, and ſubject to the king of Pruſſia. It is ſeated on the river Lippe, on the frontiers of Munſter. The adjacent country abounds in corn, hemp, and flax; and the inhabitants get a good deal of money by travellers. It was formerly a Hanſe-town, but it is now reduced. E. Long. 7. 50. N. Lat. 51. 36.

HAM, a town of Picardy, in France, ſeated on the river Somme, among marſhes. It has three pariſhes, and there is here a round tower whoſe walls are 36 feet thick. It was taken by the Spaniards in 1557, but reſtored by treaty. E. Long. 3. 6. N. Lat. 49. 45.

HAM, a village in Surry, about a mile from Kingſton, near which are the Ham Walks, ſo much celebrated by our admirable poet Thomſon and others.

HAM, *Weſt*, a village in Eſſex, where are the remains of an opulent abbey, founded in the year 1135. It is ſeated on the river Lea, four miles eaſt of London.

HAMADAN. See AMADAN.

HAMADRYADES (formed of ἁμα, *together*, and δρυος, *dryad*, of δρυς, *oak*), in antiquity, certain fabulous deities revered among the ancient heathens, and believed to preſide over woods and foreſts, and to be incloſed under the bark of oaks. The hamadryades were ſuppoſed to live and die with the trees they were attached to; as is obſerved by Servius on Virgil, Eclog. x. ver. 62. after Mneſimachus, the ſcholiaſt of Apollonius, &c. who mentions other traditions relating thereto. Hamah || Hamath.

The poets, however, frequently confound the Hamadryads with the Naiads, Napææ, and rural nymphs in general; witneſs Catullus, Carm. lxviii. ver. 23. Ovid, Faſt. iv. 229. Met. i. ver. 695. xiv. ver. 628. Propertius, Eleg. xx. 32. Virg. Ecl. x. ver. 64. Georg. iv. ver. 382, 383. Feſtus calls them *Querquetulanæ*, as being iſſued or ſprung from oaks. An ancient poet, Pherenicus, in Athenæus, lib. iii. calls the vine, fig-tree, and other fruit-trees, *hamadryades*, from the name of their mother the oak.

This common idea among the ancients, of nymphs or intellectual beings annexed to trees, will account for their worſhipping of trees; as we find they did, not only from their poets but their hiſtorians. Livy ſpeaks of an ambaſſador's addreſſing himſelf to an old oak, as to an intelligent perſon and a divinity, lib. iii. § 25.

HAMAH, a town of Turkey in Aſia, in Syria, ſituated in E. Long. 34. 55. N. Lat. 36. 15. By ſome travellers it is corruptly called *Amarl* and *Amant*. Some miſtake it for the ancient Apamea; but this is now called *Afamiyah*, and is ſituated a day's journey from Hamah. Hamah is ſituated among hills, and has a caſtle ſeated on a hill. It has all along been a conſiderable place, and in the 13th century had princes of its own. It is very large, and being ſeated on the aſcent of a hill, the houſes riſe above one another, and make a fine appearance. It is, however, like moſt other towns under the Turkiſh government, going to decay. Many of the houſes are half ruined; but thoſe which are ſtill ſtanding, as well as the moſques and caſtle, have their walls built of black and white ſtones, diſpoſed in ſuch a manner as to form various figures. The river Aſſi, the ancient Orontes, runs by the ſide of the caſtle, and fills the ditches round it, which are cut very deep into the rock. This river, leaving the caſtle, paſſes through the town from ſouth to north, and has a bridge over it, though it is pretty broad. In its courſe through the town it turns 18 great wheels, called by the natives *ſaki*, which raiſe great quantities of water to a conſiderable height, and throw it into canals ſupported by arches, by which means it is conveyed into the gardens and fountains. There are ſome pretty good bazars or market-places in Hamah, where there is a trade for linen, which is manufactured there, and ſent to Tripoli to be exported into Europe.

HAMAMELIS, WITCH-HAZEL; a genus of plants belonging to the tetrandria claſs; and in the natural method ranking with thoſe of which the order is doubtful. See BOTANY *Index*.

HAMAM LEEF, a town 12 miles eaſt from Tunis, noted for its hot baths, which are much reſorted to by the Tuniſeans, and are efficacious in rheumatiſm and many other complaints. Here the bey has a very fine bath, which he frequently permits the conſuls and other perſons of diſtinction to uſe.

HAMATH, a city of Syria, capital of a province of the ſame name, lying upon the Orontes. "The entering into Hamath," which is frequently ſpoken of in

Hamaxobii, Hambden.

in Scripture, (Joſh. xiii. 5. Judges iii. 3. 2 Kings xiv. 25. and 2 Chr. vii. 8.) is the narrow paſs leading from the land of Canaan through the valley which lies between Libanus and Antilibanus. This entrance into Hamath is ſet down as the northern boundary of the land of Canaan, in oppoſition to the ſouthern limits, the Nile or river of Egypt. Joſephus, and St Jerome after him, believed Hamath to be Epiphania. But Theodoret and many other good geographers maintain it to be Emeſa in Syria. Joſhua (xix. 35.) aſſigns the city of Hamath to the tribe of Naphtali. Toi king of Hamath cultivated a good underſtanding with David, (2 Sam. viii. 9.) This city was taken by the kings of Judah, and retaken from the Syrians by Jeroboam the ſecond, (2 Kings xiv. 28.) The kings of Aſſyria made themſelves maſters of it upon the declenſion of the kingdom of Iſrael, and tranſplanted the inhabitants of Hamath into Samaria, (2 Kings xvii. 24. and xviii. 34. &c.)

HAMAXOBII, HAMAXOBIANS, in the ancient geography, a people who had no houſes, but lived in carriages. The word is formed from ἁμαξα, a *carriage* or *chariot*, and βιος, *life*.

The *Hamaxobii*, called alſo *Hamaxobitæ*, were an ancient people of Sarmatia Europæa, inhabiting the ſouthern part of Muſcovy, who inſtead of houſes had a ſort of tents made of leather, and fixed on carriages to be ready for ſhifting and travel.

HAMBDEN, JOHN, a celebrated patriot, deſcended of the ancient family of Hambden in Buckinghamſhire, was born in 1594. From the univerſity he went to the inns of court, where he made conſiderable progreſs in the ſtudy of the law. He was choſen to ſerve in the parliament which began at Weſtminſter Feb. 5. 1626; and ſerved in all the ſucceeding parliaments in the reign of Charles I. In 1636 he became univerſally known, by his refuſal to pay ſhip-money, as being an illegal tax; upon which he was proſecuted. His conduct throughout this tranſaction gained him a great reputation. When the long parliament began, the eyes of all men were fixed on him as their *pater patriæ*. On January 3. 1642, the king ordered articles of high treaſon and other miſdemeanours to be prepared againſt Lord Kimbolton, Mr Hambden, and four other members of the houſe of commons, and went to that houſe to ſeize them: but they had retired. Mr Hambden afterwards made a ſpeech in the houſe to clear himſelf of the charge laid againſt him. In the beginning of the wars he commanded a regiment of foot, and did good ſervice to the parliament at the battle of Edgehill. He received a mortal wound in an engagement with Prince Rupert, in Chalgrave-field in Oxfordſhire, and died in 1643. He is ſaid to have poſſeſſed the Socratic art in a high degree, of interrogating, and under the notion of doubts, inſinuating objections, ſo that he infuſed his own opinions into thoſe from whom he pretended to learn and receive them. He was, ſay his panegyriſts, a very wiſe man and of great parts; and had the greateſt talents for popularity that were ever poſſeſſed by any man: He was maſter over all his appetites and paſſions, and had thereby a very great aſcendant over other men's: He was of an induſtry and vigilance never to be tired out, of parts not to be impoſed upon by the moſt ſubtile, and of courage equal to his beſt parts.

Hamburg.

HAMBURG, an imperial city of Germany, ſeated in E. Long. 9. 55. N. Lat. 53. 34. Its name is derived from the Old German word *Hamme*, ſignifying a wood, and *Burg*, a caſtle; and ſtands on the north ſide of the river Elbe. This river is not leſs than four miles broad oppoſite the city. It forms two ſpacious harbours, and likewiſe runs through moſt part of it in canals. It flows above Hamburg many miles; but when the tide is accompanied with north-weſt winds, a great deal of damage is done by the inundations occaſioned thereby. There are a great many bridges over the canals, which are moſtly on a level with the ſtreets, and ſome of them have houſes on both ſides. In the year 833, Ludovicus Pius erected Hamburg firſt into a biſhopric, and afterwards into an archbiſhopric; and Adolphus III. duke of Saxony, among many other great privileges, granted it the right of fiſhing in the Elbe, eight miles above and below the city. The kings of Denmark, ſince they have ſucceeded to the counts of Holſtein, have continually claimed the ſovereignty of this place, and often compelled the citizens to pay large ſums to purchaſe the confirmation of their liberties. Nay, it has more than once paid homage to the king of Denmark; who, notwithſtanding, keeps a miniſter here with credentials, which is a ſort of acknowledgment of its independency and ſovereignty. Though Hamburg has been conſtantly ſummoned to the diet of the empire ever ſince the year 1618, when it was declared a free imperial city by a decree of the aulic council; yet it waves this privilege, in order to keep fair with Denmark. By their ſituation among a number of poor princes, the Hamburghers are continually expoſed to their rapaciouſneſs, eſpecially that of the Danes, who have extorted vaſt ſums from them. The city is very populous in proportion to its bulk; for though one may walk with eaſe round the ramparts in two hours, yet it contains, excluſive of Jews, at leaſt 100,000 inhabitants. Here are a great many charitable foundations, the regulations of which are greatly admired by foreigners. All perſons found begging in the ſtreets are committed to the houſe of correction to hard labour, ſuch as the raſping of Brazil and other kinds of wood. There is an hoſpital into which unmarried women may be admitted for a ſmall ſum, and comfortably maintained during the reſidue of their lives. The number of hoſpitals in this place is greater in proportion to its bigneſs than in any other Proteſtant city in Europe. The revenue of the orphan-houſe alone is ſaid to amount to between 50 and 60,000l. There is a large ſumptuous hoſpital for receiving poor travellers that fall ſick. In one of their work-houſes or houſes of correction, thoſe who have not performed their taſk are hoiſted up in a baſket over the table in the common hall while the reſt are at dinner, that they may be tantalized with the ſight and ſmell of what they cannot taſte. The eſtabliſhed religion of Hamburg is Lutheraniſm; as for the Calviniſts and the Roman Catholics, they go to the ambaſſadors chapels to celebrate their divine ſervice and worſhip. They have here what they call *a private confeſſion*, previous to the holy communion, which differs in nothing from that of the church of England, and the abſolution is the ſame, only the pooreſt of the people here are forced to give a fee to the prieſts on theſe occaſions,

Hamburg. caſions. Their churches, which are ancient large fabrics, are open thoroughfares, and in ſome of them there are bookſellers ſhops. The pulpit of St Catherine's is of marble, curiouſly carved and adorned with figures and other ornaments of gold; and its organ, reckoned one of the beſt in Europe, has 6000 pipes. The cathedral is very ancient, and its tower leans as if juſt going to fall; yet, on account of the ſingularity and beauty of its architecture, the danger attending it has been hitherto overlooked. There is ſtill a dean and chapter belonging to this church, though ſecularized; from whoſe court there lies no appeal, but to the imperial chamber at Wetzlar. The chapter conſiſts of a provoſt, dean, 13 canons, 8 minor canons, and 30 *vicarii immunes*, beſides others who are under the juriſdiction of the city. The cathedral, with the chapter, and a number of houſes belonging to them, are under the immediate protection of his Britannic majeſty as duke of Bremen, who diſpoſes of the prebends that fall in ſix months of the year, not ſucceſſively, but alternately with the chapter. Hamburg is almoſt of a circular form, and ſix miles in compaſs. It has ſix gates, and three entrances by water, viz. two from the Elbe and one from the Alſter, being divided into the old and new, which are ſtrongly fortified with moats, ramparts, baſtions, and outworks. The ramparts are very lofty and planted with trees; and of ſuch a breadth, that ſeveral carriages may go abreaſt. In the new town, towards Altena, are ſeveral ſtreets of mean houſes inhabited by Jews. Through that entrance from the Elbe, called the *lower Baum*, paſs all ſhips going to or coming from ſea. Every morning, at the opening of it, is ſeen a multitude of boats and ſmall barks, whoſe cargoes conſiſt of milk, fruits, and all kinds of proviſions, ruſhing in at the ſame time. There are ſome fine chimes here, eſpecially thoſe of St Nicholas, which play every morning early, at one o'clock in the afternoon, and on all feſtivals and ſolemnities. The other public ſtructures in this city, beſides the churches, make no great appearance: however, the yard, arſenal, and two armories, are well worth ſeeing. There are ſeveral convents or cloiſters ſtill remaining; which having been ſecularized, are now poſſeſſed by the Lutherans. One of them holds its lands by this tenure, "That they offer a glaſs of wine to every malefactor who is carried by it for execution."

There is a fine exchange, though inferior to that of London. But it was found that the merchants could not be accommodated with every neceſſary convenience in tranſacting their buſineſs. To ſupply theſe defects a new Exchange Hall has been built. This ſtructure is ſituated near the exchange, in the ſtreet called *Bohnenſtraſſe*. The facade is in a ſtyle of great elegance, and the entrance has three arcades ſupported by pillars of the Doric order. The ſteps run the whole breadth of the arcades, the intervals between which are ornamented with genii holding garlands of fruits and flowers. The doors leading to the ground floor of the building are on the right and left of the ſteps. The porter's lodge is on the right, and the door leading to the ball and concert room in the ſecond ſtory, is on the left. The balcony is vaulted, and meaſures 22 feet in diameter. The facade is terminated by the third or attic ſtory, which is provided with a row of Doric pilaſters, above which there is a pediment.

The entrance into the hall is behind the central arcade, which is ornamented with a row of ſingle ſtatues, and meaſures 84 feet by 42. It is appropriated to the meeting of merchants and men of buſineſs. There are ſeveral other ſaloons or apartments, ſuch as the Egyptian ſaloon ſurrounded with columns of granite, between which are landſcapes in the manner of a panorama; and the underwriters have two rooms adjoining to this. The reading-room is furniſhed with all kinds of newſpapers and periodical works from every quarter of the globe. The library is to contain all books neceſſary for commerce, in every language, to collect which muſt be the work of time. There is an anti-room with embelliſhments to the left of the great ſtaircaſe.

The Hall of Arts is well adapted to the meetings of artiſts, which ought never to be wanting in eſtabliſhments of ſuch a nature. Here are five excellent pictures repreſenting poetry, painting, ſculpture, architecture, and muſic, together with the portraits of many celebrated men who have diſtinguiſhed themſelves in the arts. The ball and concert room meaſures 64 feet by 42, and the roof is 30 feet high. The gallery is ſupported by 18 pillars or columns of the Compoſite order, and the acceſs to it is by the great ſtaircaſe. The ceiling repreſents the firmament ſtudded with ſtars, and Aurora diſperſing the ſhades of night. There is alſo an Arabic, Turkiſh, and Grecian ſaloon, which the ſubſcribers are at liberty to uſe as they pleaſe. The two ſpacious dining rooms may be thrown into one, when neceſſity requires it. They are ornamented with baſſo relievos in plaſter of Paris.

The ſaloon of the muſes and the muſical ſaloon are on the third floor. A large room, in form of a rotunda, receives light from above, and may be conſidered as an academy of the imitative arts. A complete apparatus for expeditious printing alſo belongs to this magnificent fabric, under the direction of Mr Conrad Muller, an eminent printer in Hamburg, whoſe attention will be chiefly directed to the publiſhing of books on mercantile ſubjects. The whole edifice is finiſhed in a ſtyle of great elegance and taſte, and the management given to one who is fully qualified for the office.

It is the cuſtom of Hamburg, that a citizen, when he dies, muſt leave the tenth of his eſtate to the city; and foreigners, not naturalized, muſt pay a certain ſum annually for liberty to trade. The common carts here are only a long pulley laid upon an axle-tree between two wheels, and drawn not by horſes, but by men, of whom a dozen or more are ſometimes linked to theſe machines, with ſlings acroſs their ſhoulders. Such of the ſenators, principal elders, divines, regular phyſicians, and graduates in law, as aſſiſt at funerals, have a fee. The hangman's houſe is the common priſon for all malefactors; on whom ſentence is always paſſed on Friday, and on Monday they are executed. As, by their laws, no criminal is puniſhable unleſs he plead guilty, they have five different kinds of torture to extort ſuch confeſſion. The government of this city is lodged in the ſenate and three colleges of burghers. The former is veſted with almoſt every act of ſovereignty, except that of laying taxes and managing the finances, which are the prerogatives of the latter. The magiſtracy is compoſed of four burgomaſters, four ſyndics, and 24 aldermen, of whom ſome are lawyers and ſome merchants. Any perſon elected into the magiſtracy,

Hamburg.

ſtracy, and declining the office, muſt depart the place. No burgher is admitted into any of the colleges, unleſs he dwells in a houſe of his own within the city, and is poſſeſſed of 1000 rixdollars in ſpecie, over and above the ſum for which the houſe may be mortgaged; or 2000 in moveable goods, within the juriſdiction of the ſame. For the adminiſtration of juſtice, here are ſeveral inferior courts, from which an appeal lies to the Obergericht, or high court, and from that to the aulic council and other imperial colleges. For naval cauſes here is a court of admiralty, which, jointly with the city-treaſury, is alſo charged with the care of the navigation of the Elbe, from the city to the river's mouth. In conſequence of this, 100 large buoys, ſome white, others black, are kept conſtantly floating in the river in ſummer: but in winter, inſtead of ſome of them, there are machines, like thoſe called *ice-beacons*, to point out the ſhoals and flats. Subordinate to the admiralty is a company of pilots; and at the mouth of the Elbe is, or at leaſt ought to be, a veſſel always riding, with pilots ready to put on board the ſhips. At the mouth of the river alſo is a good harbour, called *Cuxhaven*, belonging to Hamburg; a light-houſe; and ſeveral beacons, ſome of them very large. For defraying the expence of theſe, certain tolls and duties were formerly granted by the emperors to the city. Beſides the Elbe, there is a canal by which a communication is opened with the Trave, and thereby with Lubeck and the Baltic, without the hazard, trouble, and expence, of going about by the Sound. The trade of Hamburg is exceeding great, in exporting all the commodities and manufactures of the ſeveral cities and ſtates of Germany, and ſupplying them with whatever they want from abroad. Its exports conſiſt of linens of ſeveral ſorts and countries; as lawns, diapers, Oſnaburgs, dowlas, &c. linen-yarn, tin-plates, iron, braſs, and ſteel-ware, clap-board, pipe-ſtaves, wainſcoat-boards, oak-plank, and timber, kid-ſkins, corn, beer in great quantities, with flax, honey, wax, aniſeed, linſeed, drugs, wine, tobacco, and metals. Its principal imports are the woollen manufactures and other goods of Great Britain, to the amount of ſeveral hundred thouſand pounds a-year; they have alſo a great trade with Spain, Portugal, and Italy, which is carried on moſtly in Engliſh bottoms, on account of their Mediterranean paſſes. Their whale-fiſhery is alſo very conſiderable, 50 or 60 ſhips being generally ſent out every year in this trade. Add to theſe a variety of manufactures, which are performed here with great ſucceſs; the chief of which are, ſugar-baking, calico-printing, the weaving of damaſks, brocades, velvets, and other rich ſilks. The inland trade of Hamburg is ſuperior to that of any in Europe, unleſs perhaps we ſhould except that of Amſterdam and London. There is a paper publiſhed here at ſtated times called the *Preiſcourant*, ſpecifying the courſe of exchange, with the price which every commodity and merchandiſe bore laſt upon the exchange. There is alſo a board of trade, erected on purpoſe for the advancing every project for the improvement of commerce. Another great advantage to the merchants is, the bank eſtabliſhed in 1619, which has a flouriſhing credit. To ſupply the poor with corn at a low price, here are public granaries, in which great quantities of grain are laid up. By charters from ſeveral emperors, the Hamburghers have a right of coinage, which they actually exerciſe. The Engliſh merchants, or *Hamburg Company*, as it is called, enjoy great privileges; for they hold a court with particular powers, and a juriſdiction among themſelves, and have a church and miniſter of their own.—This city has a diſtrict belonging to it of conſiderable extent, which abounds with excellent paſtures, intermixed with ſeveral large villages and noblemen's ſeats. A ſmall bailiwic, called *Bergedorf*, belongs to this city and Lubeck.—Though Hamburg has an undoubted right to a ſeat in the diet of the empire, yet as ſhe pays no contributions to the military cheſt in time of war, and is alſo unwilling to draw upon herſelf the reſentment of Denmark, ſhe makes no uſe of that privilege. There is a *ſchola illuſtris* or gymnaſium here, well endowed, with ſix able profeſſors, who read lectures in it as at the univerſities. There are alſo ſeveral free ſchools, and a great number of libraries, public and private. The public cellar of this town has always a prodigious ſtock and vent of old hock, which brings in a conſiderable revenue to the ſtate. Beſides the militia or trained bands, there is an eſtabliſhment of regular forces, conſiſting of 12 companies of infantry, and one troop of dragoons, under the commandant, who is uſually a foreigner, and one who has diſtinguiſhed himſelf in the ſervice. There is alſo an artillery company, and a night-guard: the laſt of which is poſted at night all over the city, and calls the hours.

Hamel || Hami.

HAMEL, JOHN BAPTISTE DU, a very learned French philoſopher and writer in the 17th century. At 18 he wrote a treatiſe, in which he explained in a very ſimple manner Theodoſius's three books of Spherics; to which he added a tract upon trigonometry, extremely perſpicuous, and deſigned as an introduction to aſtronomy. Natural philoſophy, as it was then taught, was only a collection of vague, knotty, and barren queſtions; when our author undertook to eſtabliſh it upon right principles, and publiſhed his *Aſtronomia Physica*. In 1666 Mr Colbert propoſed to Louis XIV. a ſcheme, which was approved of by his majeſty, for eſtabliſhing a royal academy of ſciences; and appointed our author ſecretary of it. He publiſhed a great many books; and died at Paris in 1706, of mere old age, being almoſt 83. He was regius profeſſor of philoſophy, in which poſt he was ſucceeded by M. Varignon. He wrote Latin with purity and elegance.

HAMELIN, a ſtrong town of Germany, in the duchy of Calemberg in Lower Saxony. It is ſituated at the extremity of the duchy of Brunſwick, to which it is the key, near the confluence of the rivers Hamel and Weſer, in E. Long. 9. 36. N. Lat. 52. 6.

HAMELLIA, a genus of plants belonging to the pentandria claſs; and in the natural method ranking with thoſe of which the order is doubtful. See BOTANY *Index*.

HAMESECKEN. Burglary, or nocturnal houſe-breaking, was by the ancient Engliſh law called *Hameſecken*, as it is in Scotland to this day.

HAMI, or HA-MI, a country of Aſia, ſubject to the Chineſe. It is ſituated to the north-eaſt of China, at the extremity of that deſert which the Chineſe call *Chamo*, and the Tartars *Cobi;* and is only 90 leagues diſtant from the moſt weſterly point of the province of Chenſi. This country was inhabited in the early ages

Hami. by a wandering people named *Iong*. About the year 950 before the Chriſtian era, they ſent deputies to pay homage to the emperor of China, and preſented ſome ſabres by way of tribute. The civil wars by which China was torn about the end of the dynaſty of Tcheou having prevented aſſiſtance from being ſent to theſe people, they fell under the dominion of the Hiong-nou, who appear to have been the ſame as the Huns, and who at that time were a formidable nation. The Chineſe ſeveral times loſt and recovered the country of Hami. In 131 (the ſixth year of the reign of Chunty, of the dynaſty of the eaſtern Han), the emperor kept an officer there in quality of governor. Under the following dynaſties, the ſame viciſſitudes were experienced: Hami was ſometimes united to the province of Chenſi, ſometimes independent of it, and ſometimes even of the whole empire. The ſituation of theſe people (ſeparated by vaſt deſerts from China, to which, beſides, they had no relation, either in language, manners, or cuſtoms) muſt have greatly contributed to facilitate theſe revolutions. All the tributary ſtates of the empire having revolted in 610, that of Hami followed their example; but it again ſubmitted to the yoke under Tai-tſong, ſecond emperor of the dynaſty of Tang, who had ſent one of his generals with an army to reduce it. This great prince paid particular attention to his new conqueſt. He divided it into three diſtricts, and connected its civil and military government in ſuch a manner to that of the province of Chenſi and other neighbouring countries, that tranquillity prevailed there during his reign and ſeveral of thoſe that followed. Through Hami all the caravans which went from the weſt to China, or from China to the weſt, were obliged to paſs. The emperors, predeceſſors of Tai-tſong, were ſatisfied with cauſing wine to be tranſported from Hami in ſkins carried by camels; but "Tai-tſong (ſays the Chineſe hiſtory) having ſubdued the kingdom of Hami, ordered ſome vine-plants of the ſpecies called *majou*, to be brought him, which he cauſed to be planted in his gardens: he, beſides, learned the manner of making wine, the uſe of which proved both ſerviceable and hurtful to him." Luxury and effeminacy having weakened the dynaſty of Tang, the Mahometans (who had made a rapid progreſs in all the countries that are ſituated between Perſia, Cobi, and the Caſpian ſea) advanced as far as Hami, which they conquered. It appears, that this country afterwards had princes of its own, but dependent on the Tartars, who ſucceſſively ruled theſe immenſe regions. The Yuen or Mogul Tartars again united the country of Hami to the province of Chenſi; and this reunion ſubſiſted until 1360, at which time the emperor formed it into a kingdom, on condition of its princes doing homage and paying tribute. The king of Hami was honoured with a new title in 1404, and obtained a golden ſeal. After a conteſt of ſeveral years for the ſucceſſion to the throne, the kingdom of Hami fell a prey to the king of Tou-eulh-fan. This yoke ſoon became uneaſy to the people of Hami: they revolted from their new maſters, and made conqueſts from them in their turn. The new king whom they made choice of did not long poſſeſs the throne: he was conquered and killed in a bloody battle which he fought with the king of Tou-eulh-fan, who alſo periſhed ſome time after. Since this epocha, the country of Hami has been ſucceſſively expoſed to anarchy, or governed by its own princes. The prince who filled the throne in 1696 acknowledged himſelf a vaſſal of the empire, and ſent as tribute to Peking camels, horſes, and ſabres. Kang-hi received his homage with the uſual ceremonies, and publiſhed a diploma, which eſtabliſhed the rank that the king of Hami ſhould hold among the tributary princes, the time when he ſhould come to render homage, the nature of the preſents neceſſary for his tribute, the number of auxiliaries he was bound to furniſh in time of war, and the manner of his appointing a ſucceſſor. All theſe regulations have ſubſiſted till this time. Hami.

The country of Hami, though ſurrounded by deſerts, is accounted one of the moſt delightful in the world. The ſoil produces abundance of grain, fruits, leguminous plants, and paſture of every kind. The rice which grows here is particularly eſteemed in China; and pomegranates, oranges, peaches, raiſins, and prunes, have a moſt exquiſite taſte; even the jujubes are ſo juicy, and have ſo delicious a flavour, that the Chineſe call them *perfumed jujubes*. There is no fruit more delicate or more in requeſt than the melons of Hami, which are carried to Peking for the emperor's table. Theſe melons are much more wholeſome than thoſe of Europe; and have this ſingular property, that they may be kept freſh during great part of the winter.—But the moſt uſeful and moſt eſteemed production of this country is its dried raiſins. Theſe are of two kinds: The firſt, which are much uſed in the Chineſe medicine, ſeem to have a perfect reſemblance to thoſe known in Europe by the name of Corinthian. The ſecond, which are in much greater requeſt for the table, are ſmaller and more delicate than thoſe of Provence. The Chineſe authors perfectly agree with Meſſrs Lemery and Geoffroy, reſpecting the virtue and qualities of theſe dried grapes or raiſins; but they attribute ſo much more efficacy to thoſe of Hami than to thoſe of China, that they preſcribe them in ſmaller doſes. They obſerve, that an infuſion of the firſt is of great ſervice in facilitating an eruption of the ſmall-pox about the fourth day, when the patient either is or ſeems to be too weak; and to promote a gentle perſpiration in ſome kinds of pleuriſies or malignant fevers. The doſe muſt be varied according to the age, habit of body, and ſtrength of the patient; great care muſt be taken to adminiſter this remedy ſeaſonably and with judgment. The emperor cauſed plants to be tranſported from Hami to Peking, which were immediately planted in his gardens. As theſe plants were cultivated with extraordinary care, under his own eyes, they have perfectly ſucceeded. The raiſins produced by them are exceedingly ſweet, and have a moſt exquiſite flavour.

Although the country of Hami (the latitude of which is 42° 53′ 20″) lies farther towards the north than ſeveral of the provinces of France, we are aſſured that its climate is more favourable to the culture of vines, and that it gives a ſuperior degree of quality to the grapes. It never rains at Hami; even dew and fogs are ſcarcely ever ſeen there; the country is watered only by the ſnow which falls in winter, and by the water of this ſnow when melted, which is collected at the bottoms of the mountains, and preſerved with great

Hami, Hamilton

great care and induſtry. The method of drying grapes in Hami is much ſimpler than that practiſed in the provinces of China. The people of Chenſi hold them over the ſteam of hot wine, and even ſometimes boil them a few ſeconds in wine in which a little clarified honey has been diluted. In the kingdom of Hami they wait until the grapes are quite ripe; they then expoſe them to the ſcorching rays of the ſun; afterwards pick them, and leave them in that manner until they are quite dry. However dry theſe grapes may be, they become ſhrivelled, without loſing any of their ſubſtance, and without growing flat: good raiſins ought to be almoſt as criſp as ſugar candy.

The kingdom of Hami contains a great number of villages and hamlets; but it has properly only one city, which is its capital, and has the ſame name. It is ſurrounded by lofty walls, which are half a league in circumference, and has two gates, one of which fronts the eaſt, and the other the weſt. Theſe gates are exceedingly beautiful, and make a fine appearance at a diſtance. The ſtreets are ſtraight, and well laid out; but the houſes (which contain only a ground-floor, and which are almoſt all conſtructed of earth) make very little ſhow: however, as this city enjoys a ſerene ſky, and is ſituated in a beautiful plain, watered by a river, and ſurrounded by mountains which ſhelter it from the north winds, it is a moſt agreeable and delightful reſidence. On whatever ſide one approaches it, gardens may be ſeen which contain every thing that a fertile and cultivated ſoil can produce in the mildeſt climates. All the ſurrounding fields are enchanting: but they do not extend far; for on ſeveral ſides they terminate in dry plains, where a number of beautiful horſes are fed, and a ſpecies of excellent ſheep, which have large flat tails that ſometimes weigh three pounds. The country of Hami appears to be very abundant in foſſils and valuable minerals: the Chineſe have for a long time procured diamonds and a great deal of gold from it; at preſent it ſupplies them with a kind of agate, on which they ſet a great value. With regard to the inhabitants of this ſmall ſtate, they are brave, capable of enduring fatigue, very dexterous in all bodily exerciſes, and make excellent ſoldiers; but they are fickle and ſoon irritated, and when in a paſſion they are extremely ferocious and ſanguinary.

HAMILTON, a town of Scotland, in Clydeſdale, ſeated on the river Clyde, eleven miles ſouth-eaſt of Glaſgow; from whence the noble family of Hamilton take their name, and title of duke. The town is ſeated in the middle of a very agreeable plain; on one ſide of which the Hamilton family has a large park, which is near ſeven miles in circumference, encloſed with a high wall, and well ſtocked with fallow deer. The rivulet called *Avon* runs through the park, and falls into the river Clyde, over which laſt there is a bridge of free-ſtone. W. Long. 4. 16. N. Lat. 55. 58. The original name of this place, or the lands about it, was *Cadzow* or *Cadyow*, a barony granted to an anceſtor of the noble owner, on the following occaſion. In the time of Edward II. lived *Sir Gilbert de Hamilton*, or *Hampton*, an Engliſhman of rank; who happening at court to ſpeak in praiſe of Robert Bruce, received on the occaſion an inſult from John de Spenſer, chamberlain to the king, whom he fought and ſlew. Dreading the reſentment of that potent family, he fled to the Scottiſh monarch; who received him with open arms, and eſtabliſhed him at the place poſſeſſed by the duke of Hamilton. In aftertimes the name was changed from *Cadzow* to *Hamilton*: and in 1445 the lands were erected into a lordſhip, and the then owner Sir James ſat in parliament as Lord Hamilton. The ſame nobleman founded the collegiate church at Hamilton in 1451, for a provoſt and ſeveral prebendaries. The endowment was ratified at Rome by the pope's bull, which he went in perſon to procure.—Hamilton houſe or palace is at the end of the town; a large heavy pile, with two deep wings at right angles with the centre: the gallery is of great extent; and furniſhed, as well as ſome other rooms, with moſt excellent paintings. Hamilton

HAMILTON, *Anthony, Count of*, was deſcended from a younger branch of the dukes of Hamilton, and born in Ireland about the year 1646. His mother was ſiſter to the duke of Ormond, then viceroy of that country. The troubles of that period compelled his family to retire to France while he was only an infant, and he was brought up in the language and religion of that country. He made different viſits to England in the reign of Charles II. but he was prevented from obtaining any public employment in conſequence of his religious opinions, to which he conſtantly adhered. He received from James II. a regiment of infantry in Ireland; but when that monarch's affairs came to be in a ruined condition, Count Hamilton accompanied him back to France, which he never afterwards quitted. On account of his wit and politeneſs he was very much admired, as well as for the many eſtimable qualities of his heart. His writings are lively, yet his converſation was ſerious, and he perhaps indulged too much his propenſity to ſatire. He died in the year 1720 in the 74th year of his age.

The works of the count in the French language were printed in 6 vols. 12mo. in 1749, which conſiſt of poems, fairy tales, and his Memoirs of Count Grammont, the beſt of all his compoſitions, of which Voltaire ſaid, "it is of all books that in which the moſt ſlender ground-work is ſet off with the gayeſt, moſt lively and agreeable ſtyle." A ſplendid edition of it, adorned with fine engravings from original portraits, was publiſhed by the late Lord Orford, at his own private preſs.

HAMILTON, *George*, earl of Orkney, and a brave warrior, was the fifth ſon of William earl of Selkirk, and early betook himſelf to the profeſſion of arms. Being made colonel in 1689-90, he diſtinguiſhed himſelf by his bravery at the battle of the Boyne; and ſoon after, at thoſe of Aghrim, Steinkirk, and Landen, and at the ſieges of Athlone, Limerick, and Namur. His eminent ſervices in Ireland and Flanders, through the whole courſe of that war, recommended him ſo highly to King William III. that, in 1696, he advanced him to the dignity of a peer of Scotland, by the title of *earl of Orkney*; and his lady, the ſiſter of Edward Viſcount Villiers, afterwards earl of Jerſey, had a grant made to her, under the great ſeal of Ireland, of almoſt all the private eſtates of the late King James, of very conſiderable value.

Upon the acceſſion of Queen Anne to the throne, he was promoted to the rank of major-general in 1702, and the next year to that of lieutenant-general, and was likewiſe made knight of the thiſtle. His lord-

ſhip,

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ſhip afterwards ſerved under the great duke of Marlborough; and contributed by his bravery and conduct to the glorious victories of Blenheim and Malplaquet, and to the taking ſeveral of the towns in Flanders.

In the beginning of 1710, his lordſhip, as one of the 16 peers of Scotland, voted for the impeachment of Dr Sacheverel; and the ſame year was ſworn of the privy-council, and made general of the foot in Flanders. In 1712, he was made colonel of the royal regiment of fuſileers, and ſerved in Flanders under the duke of Ormond. In 1714, he was appointed gentleman-extraordinary of the bed-chamber to King Geo. I. and afterwards governor of Virginia. At length he was appointed conſtable, governor, and captain of Edinburgh caſtle, lord-lieutenant of the county of Clydeſdale, and field-marſhal. He died at his houſe in Albemarle-ſtreet, in 1737.

HAMILTON, *John*, the 24th biſhop of St Andrew's, to which he was tranſlated from Dunkeld. He was natural ſon of James the firſt earl of Arran, and was in great favour at court whilſt his friends remained in power. He was one of Queen Mary's privy council, and a ſteady friend to that unfortunate princeſs. He performed the ceremony of chriſtening her ſon, and was at different times lord privy ſeal and lord treaſurer. The queen had reaſon to lament her not following the advice of this prelate, after the fatal battle of Langſide, viz. not to truſt her perſon in England. By the regent earl of Murray, he was declared a traitor, and obliged to ſeek ſhelter among his friends. He was unfortunately in the caſtle of Dumbarton when that fortreſs was taken by ſurpriſe, from whence he was carried to Stirling, where on April 1. 1570, he was hanged on a live tree. The two following ſarcaſtic verſes were written upon this occaſion:

Vive diu, felix arbor, ſemperque vireto
Frondibus, ut nobis talia poma feras.

HAMLET, HAMEL, or *Hampſel*, (from the Saxon *ham*, i. e. *domus*, and the German *let*, i. e. *membrum*), ſignifies a little village, or part of a village or pariſh; of which three words the firſt is now only uſed, though Kitchen mentions the two laſt. By Spelman there is a difference between *villam integram*, *villam dimidiam*, and *hamletam*; and Stow expounds it to be the ſeat of a freeholder. Several county-towns have hamlets, as there may be ſeveral hamlets in a pariſh; and ſome particular places may be out of a town or hamlet, though not out of the county. Hamlet.

HAMLET, a prince celebrated in the annals of Denmark; and whoſe name has been rendered familiar in this country, and his ſtory intereſting, by being the ſubject of one of the nobleſt tragedies of our immortal Shakeſpeare.—Adjoining to a royal palace, which ſtands about half a mile from that of Cronborg in Elſineur, is a garden, which, Mr Coxe informs us, is called Hamlet's Garden, and is ſaid by tradition to be the very ſpot where the murder of his father was perpetrated. The houſe is of modern date, and is ſituated at the foot of a ſandy ridge near the ſea. The garden occupies the ſide of the hill, and is laid out in terraſſes riſing one above another. Elſineur is the ſcene of Shakeſpeare's Hamlet; and the original hiſtory from which our poet derived the principal incidents of his play is founded upon facts, but ſo deeply buried in remote antiquity that it is difficult to diſcriminate truth from fable. Saxo-Grammaticus, who flouriſhed in the 12th century, is the earlieſt hiſtorian of Denmark that relates the adventures of Hamlet. His account is extracted, and much altered, by Belleforeſt a French author; an Engliſh tranſlation of whoſe romance was publiſhed under the title of the Hiſtorye of Hamblet: and from this tranſlation Shakeſpeare formed the ground-work of this play, though with many alterations and additions. The following ſhort ſketch of Hamlet's hiſtory, as recorded in the Daniſh annals, will enable the reader to compare the original character with that delineated by Shakeſpeare.

Long before the introduction of Chriſtianity into Denmark, Horwendillus, prefect or king of Jutland, was married to Geruthra, or Gertrude, daughter of Ruric king of Denmark, by whom he had a ſon called *Amlettus*, or *Hamlet*. Fengo murders his brother Horwendillus, marries Gertrude, and aſcends the throne. Hamlet, to avoid his uncle's jealouſy, counterfeits folly; and is repreſented as ſuch an abhorrer of falſehood, that though he conſtantly frames the moſt evaſive and even abſurd anſwers, yet artfully contrives never to deviate from truth. Fengo, ſuſpecting the reality of his madneſs, endeavours by various methods (A) to diſcover the real ſtate of his mind: amongſt others, he departs from Elſineur, concerts a meeting between Hamlet and Gertrude, concluding that the former would not conceal his ſentiments from his own mother; and orders a courtier to conceal himſelf, unknown to both,

(A) Among other attempts, Fengo orders his companions to leave him in a retired ſpot, and a young woman is placed in his way, with a view to extort from him a confeſſion that his folly was counterfeited. Hamlet would have fallen into the ſnare, if a friend had not ſecretly conveyed to him intelligence of this treachery. He carries the woman to a more ſecret place, and obtains her promiſe not to betray him; which ſhe readily conſents to, as ſhe had been brought up with him from her infancy. Being aſked, upon his return home, if he had indulged his paſſion, he anſwers in the affirmative; but renders himſelf not believed by the moſt artful ſubterfuges, which, though true, ſeemed evidently to mark a diſordered underſtanding, and by the poſitive denial of the woman. "Upon this woman," as Capell obſerves, "is grounded Shakeſpeare's Ophelia; and his deliverance from this ſnare by a friend ſuggeſted his Horatio:"—"the rude outlines," as Mr Malone remarks, "of thoſe characters. But in this piece there are no traits of the character of Polonius: there is indeed a counſellor, and he places himſelf in the queen's chamber behind the arras; but this is the whole. The ghoſt of the old Hamlet is likewiſe the offſpring of our author's creative imagination." See *Capell's School of Shakeſpeare*, vol. iii. p. 20.; and *Malone's Supplement*, p. 353.

Hamlet. both, for the purpoſe of overhearing their converſation. The courtier repairs to the queen's apartment, and hides himſelf under a heap of ſtraw (B). Hamlet, upon entering the cabinet, ſuſpecting the preſence of ſome ſpy, imitates, after his uſual affectation of folly, the crow of a cock, and, ſhaking his arms like wings, jumps (C) upon the heap of ſtraw; till, feeling the courtier, he draws his ſword, and inſtantly diſpatches him. He then cuts the body to pieces, boils it, and gives it to the hogs. He then avows to his mother that he only perſonated a fool, reproaches her for her inceſtuous marriage with the murderer of her huſband; and concludes his remonſtrances by ſaying, "Inſtead, therefore, of condoling my inſanity, deplore your own infamy, and learn to lament the deformity of your own mind (D)." The queen is ſilent; but is recalled to virtue by theſe admonitions. Fengo returns to Elſineur, ſends Hamlet to England under the care of two courtiers, and requeſts the king by a letter to put him to death. Hamlet diſcovers and alters the letter; ſo that, upon their arrival in England, the king orders the two courtiers to immediate execution, and betroths his daughter to Hamlet, who gives many aſtoniſhing proofs of a moſt tranſcendant underſtanding. At the end of the year he returns to Denmark, and alarms the court by his unexpected appearance; as a report of his death had been ſpread, and preparations were making for his funeral. Having re-aſſumed his affected inſanity, he purpoſely wounds his fingers in drawing his ſword, which the byſtanders immediately faſten to the ſcabbard. He afterwards invites the principal nobles to an entertainment, makes them intoxicated, and in that ſtate covers them with a large curtain, which he faſtens to the ground with wooden pegs; he then ſets fire to the palace; and the nobles, being enveloped in the curtain, periſh in the flames. During this tranſaction he repairs to Fengo's apartment; and, taking the ſword which lay by the ſide of his bed, puts his own in its place: he inſtantly awakens and informs him, that Hamlet is come to revenge the murder of his father. Fengo ſtarts from his bed, ſeizes the ſword; but, being unable to draw it, falls by the hand of Hamlet. The next morning, when the populace were aſſembled to view the ruins of the palace, Hamlet ſummons the remaining nobles; and in a maſterly ſpeech, which is too long to inſert in this place, lays open the motives of his own conduct, proves his uncle to have been the aſſaſſin of his father; and concludes in the following words: "Tread upon the aſhes of the monſter, who, polluting the wife of his murdered brother, joined inceſt to parricide; and ruled over you with the moſt oppreſſive tyranny. Receive me as the miniſter of a juſt revenge, as one who felt for the ſufferings of his father and his people. Conſider me as the perſon who has purged the diſgrace of his country; extinguiſhed the infamy of his mother; freed you from the deſpotiſm of a monſter, whoſe crimes, if he had lived, would have daily increaſed, and terminated in your deſtruction. Acknowledge my ſervices; and if I have deſerved it, preſent me with the crown. Behold in me the author of theſe advantages: no degenerate perſon, no parricide; but the rightful ſucceſſor to the throne, and the pious avenger of a father's murder. I have reſcued you from ſlavery, reſtored you to liberty, and re-eſtabliſhed your glory: I have deſtroyed a tyrant, and triumphed over an aſſaſſin. The recompenſe is in your hands: you can eſtimate the value of my ſervices, and in your virtue I reſt my hopes of reward." This Hamlet

ſpeech-

(B) The reader will recollect, that ſtraw uſed formerly to be ſpread over the floors as an article of great luxury.

(C) This part ſtands thus in the Engliſh account: "The counſellor entered ſecretly into the queene's chamber, and there hid himſelfe behind the arras, and long before the queene and Hamlet came thither: who being craftie and politique, as ſoone as he was within the chamber, doubting ſome treaſon, and fearing if he ſhould ſpeak ſeverely and wiſely to his mother touching his ſecret practiſes hee ſhould be underſtood, and by that means intercepted, uſed his ordinary manner of diſſimulation, and began to come (r. crow) like a cocke, beating with his arms (in ſuch manner as cockes uſed to ſtrike with their wings) upon the hangings of the chambers; whereby feeling ſomething ſtirring under them, he cried, *A rat! a rat!* and preſently drawing his ſworde, thruſt it into the hangings; which done, he pulled the counſellor (half deade) out by the heels, made an end of killing him; and, being ſlain, cut his body in pieces, which he cauſed to be boiled, and then caſt it into an open vault or privie." *Malone's Supplement*, vol. i. p. 357.

(D) The cloſet-ſcene, which is ſo beautiful in Shakeſpeare's Hamlet, is thus conciſely, but not leſs finely, deſcribed by the Daniſh hiſtorian: "Cumque mater magno ejulatu queſta præſentis filii ſocordiam deflere cœpiſſet; 'Quid (inquit) mulierum turpiſſima graviſſimi criminis diſſimulationem falſo lamenti genere expetis, quæ ſcorti more laſciviens nefariam ac deteſtabilem thori conditionem ſecuta viri tui interfectorem pleno inceſti ſinu amplecteris: et ei qui prolis tuæ parentem extinxerat obſcœniſſimis blandimentorum illecebris adularis. Ita nempe equæ conjugum ſuorum victoribus maritantur. Brutorum natura hæc eſt; ut in diverſa paſſim conjugia rapiantur: hoc tibi exemplo prioris mariti memoriam exoleviſſe conſtat. Ego vero non ab re ſtolidi ſpeciem gero, cum haud dubitem quin is qui fratrem oppreſſerit, in affines quoque pari crudelitate debacchaturus ſit: unde ſtoliditatis quæ induſtriæ habitum amplecti præſtat, et incolumitatis præſidium ab extrema deliramentorum ſpecie mutuari. In animo tamen paternæ ultionis ſtudium perſeverat; ſed rerum occaſiones aucupor, temporum opportunitates opperior. Non idem omnibus locus competit. Contra obſcurum immitemque animum altioribus ingenii modis uti convenit. Tibi vero ſupervacuum ſit meam lamentari deſipientiam, quæ tuam juſtius ignominiam deplorare debueras. Itaque non alienæ ſed propriæ mentis vitium defleas neceſſe eſt. Cætera ſilere memineris.' Tali convitio laceratam matrem ad excolendum virtutis habitum revocavit, præteritoſque ignes præſentibus illecebris præferre docuit."

Hammer || Hammock.

ſpeech has the deſired effect; the greater part of the aſſembly ſhed tears, and all who are preſent unanimouſly proclaim him king amid repeated acclamations.

Hamlet ſoon after his elevation ſails to England, and orders a ſhield to be made on which the principal actions of his life are repreſented. The king receives him with feigned demonſtrations of joy, falſely aſſures him that his daughter is dead, and recommends him to repair to Scotland as his ambaſſador, and to pay his addreſſes to the queen Hermetruda. He gives this inſidious advice with the hopes that Hamlet may periſh in the attempt; as the queen, who was remarkable for her chaſtity and cruelty, had ſuch an averſion to all propoſals of marriage, that not one of her ſuitors had eſcaped falling a ſacrifice to her vengeance. Hamlet, in oppoſition to all difficulties, performs the embaſſy; and, by the aſſiſtance of his ſhield, which inſpires the lady with a favourable opinion of his wiſdom and courage, obtains her in marriage, and returns with her to England. Informed by the princeſs to whom he had been betrothed, that her father meditates his aſſaſſination, Hamlet avoids his fate by wearing armour under his robe; puts to death the king of England; and ſails to Denmark with his two wives, where he is ſoon afterwards killed in a combat with Vigletus ſon of Ruric. Hamlet, adds the hiſtorian, was a prince, who, if his good fortune had been equal to his deſerts, would have rivalled the gods in ſplendour, and in his actions would have exceeded even the labours f Hercules.

HAMMER, a well known tool uſed by mechanics, conſiſting of an iron head, fixed croſſwiſe upon a handle of wood. There are ſeveral ſorts of hammers uſed by blackſmiths; as, 1. The hand-hammer, which is of ſuch weight that it may be wielded or governed with one hand at the anvil. 2. The up-hand ſledge, uſed with both hands, and ſeldom lifted above the head. 3. The about-ſledge, which is the biggeſt hammer of all, and held by both hands at the fartheſt end of the handle; and being ſwung at arms length over the head, is made to fall upon the work with as heavy a blow as poſſible. There is alſo another hammer uſed by ſmiths, called a *rivetting hammer*; which is the ſmalleſt of all, and is ſeldom uſed at the forge unleſs upon ſmall work. —Carpenters and joiners have likewiſe hammers accommodated to their ſeveral purpoſes.

HAMMERING, the act of beating or extending and faſhioning a body under the hammer. When this operation is performed on iron heated for the purpoſe, it is uſually called *forging*.

HAMMERING, in coining. A piece of money or a medal is ſaid to be hammered when ſtruck, and the impreſſion given, with a hammer and not with a mill.

HAMMERSMITH, four miles weſt from London, is a hamlet belonging to Fulham, has two charity-ſchools, a workhouſe, a Preſbyterian meeting-houſe, and a fair May 1. There are a number of handſome ſeats about it, eſpecially towards the Thames; among which the moſt remarkable is the late Lord Melcombe's, which is a very elegant houſe, and contains a marble gallery finiſhed at a very great expence.

HAMMOCK, or HAMAC, a kind of hanging bed, ſuſpended between two trees, poſts, hooks, or the like, much uſed throughout the Weſt Indies, as alſo on board of ſhips. The Indians hang their hammocks to trees, and thus ſecure themſelves from wild beaſts and inſects, which render lying on the ground there very dangerous. According to F. Plumier, who has often made uſe of the hammock in the Indies, it conſiſts of a large ſtrong coverlet or ſheet of coarſe cotton, about ſix feet ſquare: on two oppoſite ſides are loops of the ſame ſtuff, through which a ſtring is run, and thereof other loops are formed, all which are tied together with a cord; and thus is the whole faſtened to two neighbouring trees in the field, or two hooks in houſes. This kind of couch ſerves at the ſame time for bed quilts, ſheets, pillow, &c. Hammond.

The hammock uſed on board of ſhips is made of a piece of canvas ſix feet long and three feet wide, gathered or drawn together at the two ends. There are uſually from fourteen to twenty inches in breadth allowed between decks for every hammock in a ſhip of war; but this ſpace muſt in ſome meaſure depend on the number of the crew, &c. In time of battle the hammocks and bedding are firmly corded and fixed in the nettings on the quarter-deck, or wherever the men are too much expoſed to the view or fire of the enemy.

HAMMOND, HENRY, D. D. one of the moſt learned Engliſh divines in the 17th century, was born in 1605. He ſtudied at Oxford, and in 1629, entered into holy orders. In 1633 he was inducted into the rectory of Penſhurſt in Kent. In 1643 he was made archdeacon of Chicheſter. In the beginning of 1645 he was made one of the canons of Chriſt-church, Oxford, and chaplain in ordinary to King Charles I. who was then in that city; and he was alſo choſen public orator of the univerſity. In 1647 he attended the king in his confinement at Wooburn, Caveſham, Hampton-Court, and the iſle of Wight, where he continued till his majeſty's attendants were again put from him. He then returned to Oxford, where he was choſen ſub-dean; and continued there till the parliament-viſitors firſt ejected him, and then impriſoned him for ſeveral weeks in a private houſe in Oxford. During this confinement he began his Annotations on the New Teſtament. At the opening of the year 1660, when every thing viſibly tended to the reſtoration of the royal family, the doctor was deſired by the biſhops to repair to London to aſſiſt there in the compoſure of the breaches of the church, his ſtation in which was deſigned to be the biſhopric of Worceſter; but on the 4th of April he was ſeized by a fit of the ſtone, of which he died on the 25th of that month, aged 55. Beſides the above work, he wrote many others; all of which have been publiſhed together in four volumes folio.

HAMMOND, *Anthony*, Eſq. an ingenious Engliſh poet, deſcended from a good family of Somerſham Place in Huntingdonſhire, was born in 1668. After a liberal education at St John's college, Cambridge, he was choſen member of parliament, and ſoon diſtinguiſhed himſelf as a fine ſpeaker. He became a commiſſioner of the royal navy, which place he quitted in 1712. He publiſhed A Miſcellany of original Poems by the moſt eminent hands; in which himſelf, as appears by the poems marked with his own name, had no inconſiderable ſhare. He wrote the life of Walter Moyle, Eſq; prefixed to his works. He was the intimate friend of that gentleman, and died about the year 1726.

HAMMOND, *James*, known to the world by the Love-Elegies,

Hampſhire. Elegies, which ſome years after his death, were publiſhed by the earl of Cheſterfield, was the ſon of Anthony Hammond above-mentioned, and was preferred to a place about the perſon of the late prince of Wales, which he held till an unfortunate accident deprived him of his ſenſes. The cauſe of this calamity was a paſſion he entertained for a lady, who would not return it: upon which he wrote thoſe love-elegies which have been ſo much celebrated for their tenderneſs. The editor obſerves, that he compoſed them before he was 21 years of age: a period, ſays he, when fancy and imagination commonly riot at the expence of judgment and correctneſs. He was ſincere in his love as in his friendſhip; and wrote to his miſtreſs, as he ſpoke to his friends, nothing but the genuine ſentiments of his heart. Tibullus ſeems to have been the model our author judiciouſly preferred to Ovid; the former writing directly from the heart to the heart, the latter too often yielding and addreſſing himſelf to the imagination. Mr Hammond died in the year 1743, at Stow, the ſeat of Lord Cobham, who, as well as the earl of Cheſterfield, honoured him with a particular intimacy.

HAMPSHIRE, or HANTS, a county of England, bounded on the weſt by Dorſetſhire and Wiltſhire, on the north by Berkſhire, on the eaſt by Surry and Suſſex, and on the ſouth by the Engliſh channel. It extends 55 miles in length from north to ſouth, and 40 in breadth from eaſt to weſt, and is about 220 miles in circumference. It is divided into 39 hundreds; and contains 9 foreſts, 29 parks, one city, 20 market-towns, 253 pariſhes, above 36,000 houſes, and by the moſt modeſt computation 180,000 inhabitants, who elect 26 members of parliament, two for the county, two for the city of Wincheſter, and two for each of the following towns, Southampton, Portſmouth, Peterſfield, Yarmouth, Newport, Stockbridge, Andover, Whitechurch, Lymington, Chriſt church, and Newton. —The air is very pure and pleaſant, eſpecially upon the downs, on which vaſt flocks of ſheep are kept and bred. In the champaign part of the county, where it is free of wood, the ſoil is very fertile, producing all kinds of grain. The country is extremely well wooded and watered; for beſides many woods on private eſtates, in which there are vaſt quantities of well grown timber, there is the New foreſt of great extent, belonging to the crown, well ſtored with venerable oak. In theſe woods and foreſts, great numbers of hogs run at large and feed on the acorns; and hence it is that the Hampſhire bacon ſo far excels that of moſt other countries. The rivers are the Avon, Anton, Arle, Teſt, Stowre, and Itchin; beſides ſeveral ſmaller ſtreams, all abounding in fiſh, eſpecially trout. As its ſea-coaſt is of a conſiderable extent, it poſſeſſes many good ports and harbours, and is well ſupplied with ſalt-water fiſh. Much honey is produced in the country, and a great deal of mead and metheglin made. Here is alſo plenty of game, and on the downs is moſt delightful hunting. The manufacture of cloth and kerſies in this county, though not ſo extenſive as that of ſome others, is yet far from being inconſiderable, and employs great numbers of the poor, as well as contributes to the enriching of the manufacturers by what is ſent abroad. The canal in this county, from Baſingſtoke to the Wey in Surry, and from thence to the Thames, cannot but be a great advantage to the county in general, and the pariſhes it paſſes through in particular; to carry this canal into execution above 86,000l. were raiſed amongſt 150 proprietors in 1789. It extends 53 miles, and was completed in 1796. Hampſhire.

New HAMPSHIRE, a province of North America, in New England. It is bounded on the north by Quebec; north-eaſt by the province of Main; ſouth-eaſt by the Atlantic ocean; ſouth by Maſſachuſets; weſt and north-weſt by Connecticut river, which divides it from Vermont. The ſhape of New Hampſhire reſembles an open fan; Connecticut river being the curve, the ſouthern line the ſhorteſt, and the eaſtern line the longeſt ſide. It is divided into five counties, viz. Rockingham, Stafford, Hilſborough, Cheſhire, Grafton. In 1776, there were 165 ſettled townſhips in this ſtate. Since that time the number has been greatly increaſed. The chief town is PORTSMOUTH. Exeter, 15 miles ſouthweſterly from Portſmouth, is a pretty town on the ſouth ſide of Exeter river. And Concord, ſituated on the weſt ſide of Merrimak river, is a pleaſant flouriſhing town, which will probably, on account of its central ſituation, ſoon be the permanent ſeat of government. There are two great rivers, the Piſcataqua and the Merrimak. The former has four branches, Berwick, Cochechy, Exeter, and Durham, which are all navigable for ſmall veſſels and boats, ſome 15 others 20 miles from the ſea. Theſe rivers unite about eight miles from the mouth of the harbour, and form one broad, deep, rapid ſtream, navigable for ſhips of the largeſt burden. This river forms the only port of New Hampſhire. The Merrimak bears that name from its mouth to the confluence of Pemigewaſſet and Winniſipiokee rivers; the latter has its ſource in the lake of the ſame name. In its courſe, it receives numberleſs ſmall ſtreams iſſuing from ponds and ſwamps in the valleys. It tumbles over two conſiderable falls, Amaſkaeg and Pantucket great falls. From Haveril the river runs winding along, through a pleaſant rich vale of meadow, and paſſing between Newbury Port and Saliſbury, empties itſelf into the ocean. The land next to the ſea is generally low; but as you advance into the country, it riſes into hills. Some parts of the ſtate are mountainous. The White mountains are the higheſt part of a ridge which extends north-eaſt and ſouth-weſt to a length not yet aſcertained. The whole circuit of them is not leſs than 50 miles. The height of theſe mountains above an adjacent meadow, is reckoned to be about 5500 feet, and the meadow is 3500 feet above the level of the ſea. The ſnow and ice cover them nine or ten months in the year; during which time they exhibit that bright appearance from which they are denominated the *white mountains*. From this ſummit in clear weather is exhibited a noble view, extending 60 or 70 miles in every direction. Although they are more than 70 miles within land, they are ſeen many leagues off at ſea, and appear like an exceeding bright cloud in the horizon. Theſe immenſe heights, being copiouſly repleniſhed with water, afford a variety of beautiful caſcades. Three of the largeſt rivers in New England receive a great part of their waters from theſe mountains. Amanooſuck and Iſrael rivers, two principal branches of Connecticut, fall from their weſtern ſide. Peabody river, a branch of the Amariſcogen, falls from Hampſhire.

Hampſhire from the north-eaſt ſide; and almoſt the whole of the Saco deſcends from the ſouthern ſide. The higheſt ſummit of theſe mountains is about latitude 44°.

The air in New Hampſhire is ſerene and healthful. The weather is not ſo ſubject to change as in more ſouthern climates. This ſtate, emboſoming a number of very high mountains, and lying in the neighbourhood of others whoſe towering ſummits are covered with ſnow and ice three quarters of the year, is intenſely cold in the winter ſeaſon. The heat of ſummer is great, but of ſhort duration. The cold braces the conſtitution, and renders the labouring people healthful and robuſt.

On the ſea coaſt, and many places inland, the ſoil is ſandy, but affords good paſturage. The intervals at the foot of the mountains are greatly enriched by the freſhets, which bring down the ſoil upon them, forming a fine mould, and producing corn, grain, and herbage, in the moſt luxuriant plenty. The back lands which have been cultivated are generally very fertile, and produce the various kinds of grain, fruits, and vegetables, which are common to the other parts of New England. The uncultivated lands are covered with extenſive foreſts of pine, fir, cedar, oak, walnut, &c. This ſtate affords all the materials neceſſary for ſhipbuilding.

No actual cenſus of the inhabitants has been lately made. In the convention at Philadelphia, in 1787, they were reckoned at 102,000. There is no characteriſtical difference between the inhabitants of this and the other New England ſtates. The ancient inhabitants of New Hampſhire were emigrants from England. Their poſterity, mixed with emigrants from Maſſachuſets, fill the lower and middle towns. Emigrants from Connecticut compoſe the largeſt part of the inhabitants of the weſtern towns adjoining Connecticut river. There are no ſlaves. Negroes, who were never numerous in New Hampſhire, are all free by the firſt article of the bill of rights.

In the townſhip of Hanover, in the weſtern part of this ſtate, is Dartmouth College, ſituated on a beautiful plain, about half a mile eaſt of Connecticut river, in latitude 43° 33′. It was named after the right honourable William earl of Dartmouth, who was one of its principal benefactors. It was founded in 1769, for the education and inſtruction of youth, of the Indian tribes, in reading, writing, and all parts of learning which ſhould appear neceſſary and expedient for civilizing and chriſtianizing the children of Pagans, as well as in all liberal arts and ſciences, and alſo of Engliſh youths and any others. Its ſituation, in a frontier country, expoſed it during the late war to many inconveniences, which prevented its rapid progreſs. It flouriſhed, however, amidſt all its embarraſſments, and is now one of the moſt growing ſeminaries in the United States. It has in the four claſſes about 130 ſtudents, under the direction of a preſident, two profeſſors, and two tutors. It has 12 truſtees, who are a body corporate, inveſted with the powers neceſſary for ſuch a body. The library is elegant, containing a large collection of the moſt valuable books. Its apparatus conſiſts of a competent number of uſeful inſtruments, for making mathematical and philoſophical experiments. There are three buildings for the uſe of the ſtudents. Such is the ſalubrity of the air, that no inſtance of mortality has happened among the ſtudents ſince the firſt eſtabliſhment of the college.

Hampſtead, Hampton.

At Exeter there is an academy; at Portſmouth a grammar ſchool; and all the towns are bound by law to ſupport ſchools. The inhabitants of New Hampſhire are chiefly congregationaliſts. The other denominations are Preſbyterians, Baptiſts, and Epiſcopalians.

The firſt diſcovery made by the Engliſh of any part of New Hampſhire was in 1614, by Captain John Smith, who ranged the ſhore from Penobſcot to Cape Cod; and in this route diſcovered the river Piſcataqua. On his return to England, he publiſhed a deſcription of the country, with a map of the coaſt, which he preſented to Prince Charles, who gave it the name of *New England*. The firſt ſettlement was made in 1623.

New Hampſhire was for many years under the juriſdiction of the governor of Maſſachuſets, yet they had a ſeparate legiſlature. They ever bore a proportionable ſhare of the expences and levies in all enterpriſes, expeditions, and military exertions, whether planned by the colony or the crown. In every ſtage of the oppoſition that was made to the encroachments of the Britiſh parliament, the people, who ever had a high ſenſe of liberty, cheerfully bore their part.

HAMPSTEAD, a pleaſant village of Middleſex, four miles northweſt of London, ſtands in a healthy air, on a fine riſe, at the top of which is a heath of about a mile every way, that is adorned with ſeveral pretty ſeats, in a moſt irregular romantic ſituation, and has a moſt extenſive proſpect over London, into the countics all round it, viz. Bucks and Hertfordſhire, and even Northamptonſhire, Eſſex, Kent, Surry, Berks, &c. with an uninterrupted view of Shooter's Hill, Banſted Downs, and Windſor Caſtle. Its church was anciently a chapel of eaſe to Hendon, till about 1478. This village uſed to be reſorted to formerly for its mineral waters, which have lately been neglected: but the wells are ſtill frequented. It is now crowded with good buildings, even on the very ſteep of the hill, where there is no walking ſix yards together without meeting a hillock; but in the reign of Henry VIII. it was chiefly inhabited by the laundreſſes who waſhed for the Londoners. Its old ruinous church, the lord of the manor's chapel, was lately pulled down, and a new one erected in its room. There is, beſides, a handſome chapel near the wells, built by the contribution of the inhabitants, who are chiefly citizens and merchants of London.

HAMPTON, a town of Glouceſterſhire in England, ſeated on the Cotſwold hills, and had formerly a nunnery. W. Long. 2. 15. N. Lat. 51. 38.

HAMPTON, a town of Middleſex in England, ſeated on the river Thames, 12 miles weſt of London, and two from Richmond and Kingſton. It is chiefly famous for the royal palace there, which is the fineſt in Britain. It was built by Cardinal Wolſey, who had 280 ſilk beds for ſtrangers only, and furniſhed it richly with gold and ſilver plate. The buildings, gardens, and the two parks, to which William III. made conſiderable additions, are about four miles in circumference, and are watered on three ſides by the Thames. The inward court, built by King William, forms a piazza, the pillars of which are ſo low, that it looks more like a cloiſter than a palace; however, the apartments

Hamesoken || Hanau.

ments make ample amends, being extremely magnificent, and more exactly disposed than in any other palace in the world, and adorned with most elegant furniture. Since the accession of his present majesty, however, this palace hath been much neglected, as the king has generally made choice of Windsor for his summer retreat. Those inimitable paintings of Raphael Urbin, called the *cartoons*, which were placed there by King William, have been removed to the queen's palace at Westminster. For these pieces Louis XV. is said to have offered 100,000l.

HAMESOKEN, or HAMESECKEN. See HAMESECKEN.

HANAPER, or HAMPER, an office in chancery, under the direction of a master, his deputy and clerks, answering, in some measure, to the *fiscus* among the Romans.

HANAPER, *clerk of the*, sometimes styled *warden of the hanaper*, an officer who receives all money due to the king for seals of charters, patents, commissions, and writs, and attends the keeper of the seal daily in term time, and at all times of sealing, and takes into his custody all sealed charters, patents, and the like, which he receives into bags, but anciently, it is supposed, into hampers, which gave denomination to the office.

There is also an officer who is comptroller of the hanaper.

HANAU, a town of Germany, and capital of a county of the same name, is pleasantly situated on the river Kenzig near its confluence with the Mayne. The river divides it into the old and new towns, both of which are fortified. The new town, which was built at first by French and Flemish refugees, who had great privileges granted them, is regular and handsome. The castle, in which the counts used to reside, and which stands in the old town, is fortified and has a fine flower-garden with commodious apartments, but makes no great appearance. The Jews are tolerated here, and dwell in a particular quarter. The magistracy of the new town, and the disposal of all offices in it, belong to the French and Dutch congregations. Here is an university, with several manufactures, particularly that of roll tobacco, and a very considerable traffic. E. Long. 9. 0. N. Lat. 49. 56.

HANAU-Munzenberg, a county of Germany. The greatest part of it is surrounded by the electorate of Mentz, the bishopric of Fulda, the lordships of Reineck, Isenburg, and Solms; as also by the territories of Hesse-Homburg, Burg-Friedburg, and Frankfort. Its length is near 40 miles, but its greatest breadth not above 12. It is exceeding fertile in corn, wine, and fruits; yielding also salt springs, with some copper, silver, and cobalt. The chief rivers are, the Mayne, the Kenzig, and the Nidda. The prevailing religion is Calvinism, but Lutherans and Catholics are tolerated. The country is populous, and trade and manufactures flourish in it. In 1736, the whole male line of the counts of Hanau failing in John Reinard, William VIII. landgrave of Hesse Cassel, by virtue of a treaty of mutual succession between the families of Hanau and Hesse Cassel, took possession of the county, satisfaction having been first made to the house of Saxony for their claims; and in the year 1754, transferred it to Prince William, eldest son to the then hereditary prince Frederic, afterwards landgrave. The revenues of the last count, arising from this and other territories, are said to have amounted to 500,000 florins. The principal places are Hanau, Bergen, Steinau, and Glenhausen.

Hances || Hand.

HANCES, HANCHES, HAUNCHES, or HANSES, in *Architecture*, certain small intermediate parts of arches between the crown and the spring at the bottom, being probably about one-third of the arch, and placed nearer to the bottom than the top, which are likewise denominated the *spandrels*.

HAND, a part or member of the body of man, making the extremity of the arm. See ANATOMY, n° 53, &c.

The mechanism of the hand is very curious; excellently contrived to fit it for the various uses and occasions we have for it, and the great number of arts and manufactures it is to be employed in. It consists of a compages of nerves, and little bones joined into each other, which give it a great degree of strength, and at the same time an unusual flexibility, to enable it to handle adjacent bodies, lay hold of them, and grasp them, in order either to draw them toward us or thrust them off. Anaxagoras is represented by ancient authors as maintaining, that man owes all his wisdom, knowledge, and superiority over other animals, to the use of his hands. Galen represents the matter otherwise; man according to him, is not the wisest creature because he has hands; but he had hands given him because he was the wisest creature; for it was not our hands that taught us arts, but our reason. The hands are the organs of reason, &c.

In scripture, the word *hand* was variously applied. To pour water on any one's hand, signifies to serve him. To wash the hands was a ceremony made use of to denote innocency from murder or manslaughter. To kiss the hand was an act of adoration. To fill the hand signified taking possession of the priesthood, and performing its functions. To lean upon any one's hand was a mark of familiarity and superiority. To give the hand signifies to grant peace, swear friendship, promise security, or make alliance. The right hand was the place of honour and respect.—Amongst the Greeks and Romans it was customary for inferiors to walk on the left hand of superiors, that their right hand might be ready to afford protection and defence to their left side, which was, on account of the awkwardness of the left hand, more exposed to danger.

Imposition, or *laying on of* HANDS, signifies the conferring of holy orders; a ceremony wherein the hands are laid on the head of another, as a sign of a mission, or of a power given him to exercise the functions of the ministry belonging to the order.

The apostles began to appoint missionaries by the imposition of hands. See IMPOSITION.

HAND, in falconry, is used for the foot of the hawk. To have a clean, strong, slender, glutinous hand, well clawed, are some of the good qualities of a hawk or falcon.

HAND, in the manege, sometimes stands for the fore-foot of a horse. It is also used for a division of the horse into two parts with respect to the rider's hand. The fore-hand includes the head, neck, and fore-quarters; the hind-hand is all the rest of the horse.

HAND is likewise used for a measure of four inches,

Hand, Handel.

or of a clenched fiſt, by which the height of a horſe is computed.

HAND is alſo figuratively uſed in painting, ſculpture, &c. for the manner or ſtyle of this or that maſter.

HANDS are borne in coat-armour, *dexter* and *ſiniſter;* that is, right and left, expanded or open; and after other manners. A bloody hand in the centre of the eſcutcheon is the badge of a baronet of Great Britain.

HAND-Breadth, a meaſure of three inches.

HANDEL, GEORGE FREDERIC, a moſt eminent maſter and compoſer of muſic, was born at Hall, a city of Upper Saxony in Germany. His father was a phyſician and ſurgeon of that place, and was upwards of 60 years of age when Handel was born. During his infancy young Handel is ſaid to have amuſed himſelf with muſical inſtruments, and to have made conſiderable progreſs before he was ſeven years of age, without any inſtructions. His propenſity for muſic at laſt became ſo ſtrong, that his father, who deſigned him for the ſtudy of the civil law, thought proper to forbid him, even at this early period of life, to touch a muſical inſtrument, and would ſuffer none to remain in his houſe. Notwithſtanding this prohibition, however, Handel found means to get a little clavichord privately conveyed to a room in the uppermoſt ſtory of the houſe, to which room he conſtantly ſtole when the family were aſleep; and thus made ſuch advances in his art, as enabled him to play on the harpſichord. He was firſt taken notice of by the duke of Saxe Weiſenfels on the following occaſion. His father went to pay a viſit to another ſon by a former wife, who was valet de chambre to the duke, and reſided at his court. Young Handel, being then in his ſeventh year, earneſtly deſired permiſſion to go along with him; but being refuſed, he followed the chaiſe on foot, and overtook it, the carriage being probably retarded by the roughneſs of the way. His father at firſt chid him for his diſobedience, but at laſt took him into the chaiſe along with him. While he was in the duke's court, he ſtill continued to ſhow the ſame inclination for muſic: it was impoſſible to keep him from harpſichords; and he uſed ſometimes to get into the organ-loft at church, and play after ſervice was over. On one of theſe occaſions, the duke happening to go out later than uſual, found ſomething ſo uncommon in Handel's manner of playing, that he inquired of his valet who it was; and receiving for anſwer that it was his brother, he deſired to ſee him. This nobleman was ſo much taken with the muſical genius ſhown by young Handel, that he perſuaded his father to let him follow the bent of his inclination. He made the boy a preſent; and told him, that if he minded his ſtudies, no encouragement ſhould be wanting.

On his return to Hall, Handel was placed under one Zackaw, the organiſt of the cathedral church; and our young muſician was even then able to ſupply his maſter's place in his abſence. At nine years of age he began to compoſe church-ſervices for voices and inſtruments, and continued to compoſe one ſuch ſervice every week for three years ſucceſſively. At the age of 14, he far excelled his maſter, as he himſelf owned; and he was ſent to Berlin, where he had a relation in ſome place about the court, on whoſe care and fidelity his parents could rely. The opera was then in a flouriſhing condition, being encouraged by the grandfather of the late king of Pruſſia, and under the direction of many eminent perſons from Italy, among whom were Buononcini and Attilio. Buononcini, being of a haughty diſpoſition, treated Handel with contempt: but Attilio behaved to him with great kindneſs, and he profited much by his inſtructions. His abilities ſoon recommended him to the king, who frequently made him preſents, and at laſt propoſed to ſend him into Italy under his own patronage, and to take him under his immediate protection as ſoon as his ſtudies ſhould be completed. But Handel's parents not thinking proper to ſubmit their child to the caprice of the king, declined the offer; upon which it became neceſſary for him to return to Hall. Handel.

Handel having now obtained ideas in muſic far excelling every thing that could be found in Hall, continued there very unwillingly, and it was reſolved to ſend him into Italy: but as the expence of this journey could not then be ſpared, he went to Hamburgh, where the opera was little inferior to that of Berlin. Soon after his arrival in this city, his father died; and his mother being left in narrow circumſtances, her ſon thought it neceſſary to procure ſome ſcholars, and to accept a place in the orcheſtra; by which means, inſtead of being a burden, he became a great relief to her.

At this time, the firſt harpſichord in Hamburg was played by one Keſer, a man who alſo excelled in compoſition; but he, having involved himſelf in ſome debts, was obliged to abſcond. Upon this vacancy, the perſon who had been uſed to play the ſecond harpſichord claimed the firſt by right of ſucceſſion; but was oppoſed by Handel, who founded a claim to the firſt harpſichord upon his ſuperior abilities. After much diſpute, in which all who ſupported or directed the opera engaged with much vehemence, it was decided in favour of Handel; but this good ſucceſs had almoſt coſt him his life. His antagoniſt reſented the ſuppoſed affront ſo much, that, as they were coming out of the orcheſtra together, he made a puſh at Handel's breaſt with a ſword, which muſt undoubtedly have killed him, had there not fortunately been a muſic-book in the boſom of his coat.

Handel, though yet but in his 15th year, became compoſer to the houſe; and the ſucceſs of *Almeria*, his firſt opera, was ſo great, that it ran 30 nights without interruption. Within leſs than a twelvemonth after this, he ſet two others, called *Florinda* and *Norene*, which were received with the ſame applauſe. During his ſtay here, which was about four or five years, he alſo compoſed a conſiderable number of ſonatas, which are now loſt. Here his abilities procured him the acquaintance of many perſons of note, particularly the prince of Tuſcany, brother to John Gaſton de Medicis the grand duke. This prince preſſed him to go with him to Italy, where he aſſured him that no convenience would be wanting; but this offer Handel thought proper to decline, being reſolved not to give up his independency for any advantage that could be offered him.

In the 19th year of his age, Handel took a journey to Italy on his own account; where he was received with the greateſt kindneſs by the prince of Tuſcany, and had at all times acceſs to the palace of the grand duke.

Handel. duke. His Serene Highneſs was impatient to have ſomething compoſed by ſo great a maſter; and notwithſtanding the difference between the ſtyle of the Italian muſic and the German, to which Handel had hitherto been accuſtomed, he ſet an opera called *Roderigo*, which pleaſed ſo well, that he was rewarded with 100 ſequins and a ſervice of plate. After ſtaying about a year in Florence, he went to Venice, where he is ſaid to have been firſt diſcovered at a maſquerade. He was playing on a harpſichord in his viſor when Scarlatti, a famous performer, cried out, that the perſon who played could be none but the famous Saxon or the devil. But a ſtory ſimilar to this is reported of many eminent perſons whoſe abilities have been diſcovered in diſguiſe. Here he compoſed his opera called *Agrippina*, which was performed 27 nights ſucceſſively, with the moſt extravagant applauſe.

From Venice our muſician proceeded to Rome, where he became acquainted with Cardinal Ottoboni and many other dignitaries of the church, by which means he was frequently attacked on account of his religion; but Handel declared he would live and die in the religion in which he had been educated, whether it was true or falſe. Here he compoſed an oratorio called *Reſurrectione*, and 150 cantatas, beſides ſome ſonatas, and other muſic. Ottoboni alſo contrived to have a trial of ſkill between him and Dominici Scarlatti, who was conſidered as the greateſt maſter on that inſtrument in Italy. The event is differently reported. Some ſay that Scarlatti was victorious, and others give the victory to Handel; but when they came to the organ, Scarlatti himſelf aſcribed the ſuperiority to Handel.

From Rome, Handel went to Naples; after which, he paid a ſecond viſit to Florence, and at laſt, having ſpent ſix years in Italy, ſet out for his native country. In his way thither, he was introduced at the court of Hanover with ſo much advantage by the baron Kilmanſeck, that his Electoral Highneſs offered him a penſion of 1500 crowns a-year as an inducement for him to continue there. This generous offer he declined on account of his having promiſed to viſit the court of the Elector Palatine, and likewiſe to come over to England in compliance with the repeated invitations of the duke of Mancheſter. The elector, however, being made acquainted with this objection, generouſly ordered him to be told, that his acceptance of the penſion ſhould neither reſtrain him from his promiſe nor reſolution: but that he ſhould be at full liberty to be abſent a year or more if he choſe it, and to go wherever he thought fit. Soon after, the place of maſter of the chapel was beſtowed upon Handel; and our muſician having viſited his mother, who was now extremely aged and blind, and his old maſter Zackaw, and ſtaid ſome time at the court of the Elector Palatine, ſet out for England, where he arrived in 1710.

At that time operas were a new entertainment in England, and were conducted in a very abſurd manner: but Handel ſoon put them on a better footing; and ſet a drama called *Rinaldo*, which was performed with uncommon ſucceſs. Having ſtaid a year in England, he returned to Hanover; but in 1712 he again came over to England; and the peace of Utrecht being concluded a few months afterwards, he compoſed a grand *Te Deum* and *Jubilate* on the occaſion. He now found the nobility very deſirous that he ſhould reſume Handel. the direction of the opera-houſe in the Hay Market; and the queen having added her authority to their ſolicitations, and conferred on him a penſion of 200l. a year, he forgot his engagements to the elector of Hanover, and remained in Britain till the death of the queen in 1714. On the arrival of King George I. Handel, conſcious of his ill behaviour, durſt not appear at court; but he was extricated from his dilemma by the baron Kilmanſeck. Having engaged ſeveral of the Engliſh nobility in his behalf, the baron perſuaded the king to a party of pleaſure on the water. Handel was appriſed of the deſign, and ordered to prepare ſome muſic for the occaſion. This he executed with the utmoſt attention, and on the day appointed it was performed and conducted by himſelf. The king with pleaſure and ſurpriſe inquired whoſe it was, and how the entertainment came to be provided without his knowledge. The baron then produced the delinquent; and aſked leave to preſent him to his majeſty as one too ſenſible of his fault to attempt an excuſe, but ſincerely deſirous to atone for it. This interceſſion was accepted. Handel was reſtored to favour, his water muſic was honoured with the higheſt approbation, and the king added a penſion of 200l. a-year to that formerly beſtowed on him by Queen Anne; which he ſoon after increaſed to 400l. on his being appointed to teach the young princeſſes muſic.

In the year 1715, Handel compoſed his opera of *Amadige*; but from that time to the year 1720 he compoſed only *Teſeo* and *Paſtor Fido*, Buononcini and Attilio being then compoſers for the operas. About this time a project was formed by the nobility for erecting a kind of academy at the Hay Market, with a view to ſecure to themſelves a conſtant ſupply of operas to be compoſed by Handel, and performed under his direction. No leſs than 50,000l. was ſubſcribed for this ſcheme, of which the king himſelf ſubſcribed 1000l. and it was propoſed to continue the undertaking for 14 years. Handel went over to Dreſden, in order to engage ſingers, and returned with Seneſino and Duriſtanti. Buononcini and Attilio had ſtill a ſtrong party in their favour, but not equal to that of Handel; and therefore in 1720 he obtained leave to perform his opera of *Radamiſto*. The houſe was ſo crowded, that many fainted through exceſſive heat; and 40s. were offered by ſome for a ſeat in the gallery, after having in vain attempted to get one elſewhere. The contention, however, ſtill ran very high between Handel's party and that of the two Italian maſters; and at laſt it was determined that the rivals ſhould be jointly employed in making an opera, in which each ſhould take a diſtinct act, and he who by the general ſuffrage was allowed to have given the beſt proof of his abilities ſhould be put in poſſeſſion of the houſe. This opera was called *Muzio Scævola*, and Handel ſet the laſt act. It is ſaid that Handel's ſuperiority was owned even in the overture before it; but when the act came to be performed, there remained no pretence of doubt or diſpute. The academy was now therefore firmly eſtabliſhed, and Handel conducted it for nine years with great ſucceſs; but about that time an irreconcileable enmity took place between Handel himſelf and Seneſino. Seneſino accuſed Handel of tyranny, and Handel accuſed Seneſino of rebellion. The merits of the quarrel are not known;

Handel.

known: the nobility, however, became mediators for ſome time; and having failed in that good deſign, they became parties in the quarrel. Handel was reſolved to diſmiſs Seneſino, and the nobility ſeemed alſo reſolved not to permit him to do ſo. The haughtineſs of Handel's temper would not allow him to yield, and the affair ended in the total diſſolution of the academy.

Handel now found that his abilities, great as they were, could not ſupport him againſt the powerful oppoſition he met with. After the diſmiſſion of Seneſino, his audience ſenſibly dwindled away, and Handel entered into an agreement with Mr Heidegger to carry on operas in conjunction with him. New ſingers were engaged from Italy; but the offended nobility raiſed a ſubſcription againſt him, to carry on operas in the playhouſe in Lincoln's-Inn fields. Handel bore up four years againſt this oppoſition; three in partnerſhip with Heidegger, and one by himſelf: but though his muſical abilities were ſuperior to thoſe of his antagoniſts, the aſtoniſhing powers of the voice of Farinelli, whom the oppoſite party had engaged, determined the victory againſt him. At laſt Handel, having ſpent all he was worth in a fruitleſs oppoſition, thought proper to deſiſt. His diſappointment had ſuch an effect upon him, that for ſome time he was diſordered in his underſtanding, and at the ſame time his right arm was rendered uſeleſs by a ſtroke of the palſy. In this deplorable ſituation, it was thought neceſſary that he ſhould go to the baths of Aix-la-Chapelle; and from them he received ſuch extraordinary and ſudden relief, that his cure was looked upon by the nuns as miraculous.

In 1736, Handel again returned to England; and ſoon after his return his Alexander's Feaſt was performed with applauſe at Covent Garden. The ſucceſs and ſplendor of the Hay Market was by this time ſo much reduced by repeated miſmanagements, that Lord Middleſex undertook the direction of it himſelf, and once more applied to Handel for compoſition. He accordingly compoſed two operas called *Faromondo*, and *Aleſſondro Severo*, for which in 1737 he received 1000l. In 1738, he received 1500l. from a ſingle benefit, and nothing ſeemed wanting to retrieve his affairs, excepting ſuch conceſſions on his part as his opponents had a right to expect. Theſe conceſſions, however, he could not be prevailed upon to make; and that he might no longer be under obligations to act as he was directed by others, he refuſed to enter into any engagements upon ſubſcription. After having tried a few more operas at Covent Garden without ſucceſs, he introduced another ſpecies of muſic called *oratorios*, which he thought better ſuited to the native gravity of an Engliſh audience. But as the ſubjects of theſe pieces were always taken from ſacred hiſtory, it was by ſome thought to be a profanation to ſet them to muſic and perform them at a playhouſe. In conſequence of this prejudice, the oratorios met with very indifferent ſucceſs; and in 1741 Mr Handel found his affairs in ſuch a bad ſituation, that he was obliged to quit England, and go to Dublin.

He was received in Ireland in a manner ſuitable to his great merit; and his performing his oratorio called the *Meſſiah*, for the benefit of the city priſon, brought him into univerſal favour. In nine months time he had brought his affairs into a better ſituation; and on his return to England in 1742, he found the public much more favourably diſpoſed. His oratorios were now performed with great applauſe: his Meſſiah, which before had been but coldly received, became a favourite performance; and Handel, with a generous humanity, determined to perform it annually for the benefit of the foundling hoſpital, which at that time was only ſupported by private benefactions. In 1743, he had a return of his paralytic diſorder; and in 1751 became quite blind by a *gutta ſerena* in his eyes. This laſt misfortune for ſome time ſunk him into the deepeſt deſpondency; but at laſt he was obliged to acquieſce in his ſituation, after having without any relief undergone ſome very painful operations. Finding it now impoſſible to manage his oratorios alone, he was aſſiſted by Mr Smith, who at his requeſt frequently played for him, and conducted them in his ſtead; and with this aſſiſtance they were continued till within eight days of his death. During the latter part of his life, his mind was often diſordered; yet at times it appears to have reſumed its full vigour, and he compoſed ſeveral ſongs, choruſes, &c. which from their dates may be conſidered almoſt as the laſt ſounds of his dying voice. From about October 1758 his health declined very faſt; his appetite, which had been remarkably keen, and which he had gratified to a great degree, left him; and he became ſenſible of the approach of death. On the 6th of April 1759, his laſt oratorio was performed, at which he was preſent, and died on the 14th of the ſame month. On the 20th he was buried by the right reverend Dr Pearce, biſhop of Rocheſter, in Weſtminſter abbey; where, by his own order, and at his own expence, a monument was erected to his memory.

Handel.

With regard to the character of this moſt eminent muſician, he is univerſally allowed to have been a great epicure: In his temper he was very haughty, but was ſeldom or never guilty of mean actions. His pride was uniform: he was not by turns a tyrant and a ſlave. He appears to have had a moſt extravagant love for liberty and independence; inſomuch, that he would, for the ſake of liberty, do things otherwiſe the moſt prejudicial to his own intereſt. He was liberal even when poor, and remembered his former friends when he was rich. His muſical powers can perhaps be beſt expreſſed by Arbuthnot's reply to Pope, who ſeriouſly aſked his opinion of him as a muſician; "Conceive (ſaid he) the higheſt you can of his abilities, and they are much beyond any thing you can conceive."

Commemoration of HANDEL; a muſical exhibition inſtituted ſome years ago, and the grandeſt of the kind ever attempted in any nation. Of the riſe and progreſs of the deſign, together with the manner in which the firſt celebration was executed, an accurate and authentic detail is given, as might be expected, by Dr Burney in the 4th and laſt volume of his Hiſtory of Muſic, from which the following account is extracted.

"In a converſation between lord viſcount Fitzwilliam, Sir Watkin Williams Wynn, and Joah Bates, Eſq. commiſſioner of the victualling-office, the beginning of laſt year, 1783, at the houſe of the latter; after remarking that the number of eminent muſical performers of all kinds, both vocal and inſtrumental, with

Handel. with which London abounded, was far greater than in any other city of Europe, it was lamented that there was no public periodical occaſion for collecting and conſolidating them into one band; by which means a performance might be exhibited on ſo grand and magnificent a ſcale as no other part of the world could equal. The birth and death of Handel naturally occurred to three ſuch enthuſiaſtic admirers of that great maſter; and it was immediately recollected, that the next year (1784) would be a proper time for the introduction of ſuch a cuſtom, as it formed a complete century ſince his birth, and an exact quarter of a century ſince his deceaſe.

"The plan was ſoon after communicated to the governors of the Muſical Fund, who approved it, and promiſed their aſſiſtance. It was next ſubmitted to the directors of the concert of Ancient Muſic; who, with an alacrity which does honour to their zeal for the memory of the great artiſt Handel, voluntarily undertook the trouble of managing and directing the celebrity. At length, the deſign coming to the knowledge of the king, it was honoured with his majeſty's ſanction and patronage. Weſtminſter Abbey, where the bones of the great muſician were depoſited, was thought the propereſt place for the performance; and application having been made to the biſhop of Rocheſter for the uſe of it, his lordſhip finding that the ſcheme was honoured with the patronage of his majeſty, readily conſented; only requeſting, as the performance would interfere with the annual benefit for the Weſtminſter Infirmary, that part of the profits might be appropriated to that charity, as an indemnification for the loſs it would ſuſtain. To this the projectors of the plan acceded; and it was afterwards ſettled, that the profits of the firſt day's performance ſhould be equally divided between the Muſical Fund and the Weſtminſter Infirmary; and thoſe of the ſubſequent days be ſolely applied to the uſe of that fund which Handel himſelf ſo long helped to ſuſtain, and to which he not only bequeathed a thouſand pounds, but which almoſt every muſician in the capital annually contributes his money, his performance, or both, to ſupport. Application was next made to Mr James Wyatt, the architect, to furniſh plans for the neceſſary decorations of the abbey; drawings of which having been ſhown to his majeſty, were approved. The general idea was to produce the effect of a royal muſical chapel, with the orcheſtra terminating one end, and the accommodation for the royal family, the other. The arrangement of the performance of each day was next ſettled; and it was at his majeſty's inſtigation that the celebrity was extended to three days inſtead of two, which he thought would not be ſufficient for the diſplay of Handel's powers, or fulfilling the charitable purpoſes to which it was intended to devote the profits. It was originally intended to have celebrated this feſtival on the 20th, 22d, and 23d of April; and the 20th being the day of the funeral of Handel, part of the muſic was, in ſome meaſure, ſo ſelected as to apply to that incident. But, in conſequence of the ſudden diſſolution of parliament, it was thought proper to defer the feſtival to the 26th, 27th, and 29th of May, which ſeems to have been for its advantage; as many perſons of tender conſtitutions, who ventured to go to Weſtminſter Abbey in warm weather, would not have had the courage to go thither in cold. Impreſſed with a reverence for the memory of Handel, no ſooner was the project known, but moſt of the practical muſicians in the kingdom eagerly manifeſted their zeal for the enterpriſe; and many of the moſt eminent profeſſors, waving all claims to precedence in the band, offered to perform in any ſubordinate ſtation in which their talents could be moſt uſeful. Handel.

"In order to render the band as powerful and complete as poſſible, it was determined to employ every ſpecies of inſtrument that was capable of producing grand effects in a great orcheſtra and ſpacious building. Among theſe the ſacbut, or double trumpet, was ſought; but ſo many years had elapſed ſince it had been uſed in this kingdom, that neither the inſtrument, nor a performer upon it, could eaſily be found. It was, however, diſcovered, after much uſeleſs inquiry, not only here, but by letter, on the continent, that in his majeſty's military band there were ſix muſicians who played the three ſeveral ſpecies of ſacbut, tenor, baſe, and double baſe.

"The double baſſoon, which was ſo conſpicuous in the orcheſtra, and powerful in its effect, is likewiſe a tube of 16 feet. It was made, with the approbation of Mr Handel, by Stainſby the flute-maker, for the coronation of his late majeſty George II. The late ingenious Mr Lampe, author of the juſtly admired muſic of The Dragon of Wantley, was the perſon intended to perform on it; but, for want of a proper reed, or for ſome other cauſe, at preſent unknown, no uſe was made of it at that time; nor indeed, though it has been often atempted, was it ever introduced into any band in England, till now, by the ingenuity and perſeverance of Mr Aſhly of the Guards.

"The double-baſe kettle-drums were made from models of Mr Aſhbridge, of Drury Lane orcheſtra, in copper, it being impoſſible to procure plates of braſs large enough. The Tower drums, which, by permiſſion of his grace the duke of Richmond, were brought to the abbey on this occaſion, are thoſe which belong to the ordnance ſtores, and were taken by the duke of Marlborough at the battle of Malplaquet in 1709. Theſe are hemiſpherical, or a circle divided; but thoſe of Mr Aſhbridge are more cylindrical, being much longer, as well as more capacious, than the common kettle-drum; by which he accounts for the ſuperiority of their tone to that of all other drums. Theſe three ſpecies of kettle drums, which may be called *tenor*, *baſe*, and *double baſe*, were an octave below each other.

"The excellent organ, erected at the weſt end of the abbey for the commemoration performances only, is the workmanſhip of the ingenious Mr Samuel Green in Iſlington. It was fabricated for the cathedral of Canterbury; but before its departure for the place of its deſtination, it was permitted to be opened in the capital on this memorable occaſion. The keys of communication with the harpſichord, at which Mr Bates the conductor was ſeated, extended 19 feet from the body of the organ, and 20 feet 7 inches below the perpendicular of the ſet of keys by which it is uſually played. Similar keys were firſt contrived in this country for Handel himſelf at his oratorios; but to convey them

Handel. them to ſo great a diſtance from the inſtrument, without rendering the touch impracticably heavy, required uncommon ingenuity and mechanical reſources.

" In celebrating the diſpoſition, diſcipline, and effects of this moſt numerous and excellent band, the merit of the admirable architect, who furniſhed the elegant deſigns for the orcheſtra and galleries, muſt not be forgotten; as, when filled, they conſtituted one of the grandeſt and moſt magnificent ſpectacles which imagination can delineate. All the preparations for receiving their majeſties, and the firſt perſonages in the kingdom, at the eaſt end; upwards of 500 muſicians at the weſt; and the public in general, to the number of between 3000 and 4000 perſons, in the area and galleries; ſo wonderfully correſponded with the ſtyle of architecture of this venerable and beautiful ſtructure, that there was nothing viſible either for uſe or ornament, which did not harmonize with the principal tone of the building, and which may not metaphorically have been ſaid to have been in perfect tune with it. But, beſides the wonderful manner in which this conſtruction exhibited the band to the ſpectators, the orcheſtra was ſo judiciouſly contrived, that almoſt every performer, both vocal and inſtrumental, was in full view of the conductor and leader; which accounts, in ſome meaſure, for the uncommon eaſe with which the performers confeſs they executed their parts.

" At the eaſt end of the aiſle, juſt before the back of the choir-organ, ſome of the pipes of which were viſible below, a throne was erected in a beautiful Gothic ſtyle, correſponding with that of the abbey, and a centre box, richly decorated and furniſhed with crimſon ſatin, fringed with gold, for the reception of their majeſties and the royal family: on the right hand of which was a box for the biſhops, and on the left, one for the dean and chapter of Weſtminſter; immediately below theſe two boxes were two others, one on the right for the families and friends of the directors, and the other for thoſe of the prebendaries of Weſtminſter. Immediately below the king's box was placed one for the directors themſelves, who were all diſtinguiſhed by white wands tipped with gold, and gold medals, ſtruck on the occaſion, appending from white ribbands. Theſe their majeſties likewiſe condeſcended to wear at each performance. Behind, and on each ſide of the throne, there were ſeats for their majeſties ſuite, maids of honour, grooms of the bed-chamber, pages, &c.—The orcheſtra was built at the oppoſite extremity, aſcending regularly from the height of ſeven feet from the floor to upwards of forty from the baſe of the pillars, and extending from the centre to the top of the ſide aiſle.—The intermediate ſpace below was filled up with level benches, and appropriated to the early ſubſcribers. The ſaid aiſles were formed into long galleries ranging with the orcheſtra, and aſcending ſo as to contain 12 rows on each ſide; the fronts of which projected before the pillars, and were ornamented with feſtoons of crimſon morine.—At the top of the orcheſtra was placed the occaſional organ, in a Gothic frame, mounting to, and mingling with, the ſaints and martyrs repreſented in the painted glaſs on the weſt window. On each ſide of the organ, cloſe to the window, were placed the kettle-drums deſcribed above. The choral bands were principally placed in view of Mr Bates, on ſteps ſeemingly aſcending into the clouds, in each of the ſide aiſles, as their termination was inviſible to the audience. The principal ſingers were ranged in the front of the orcheſtra, as at oratorios, accompanied by the choirs of St Paul, the abbey, Windſor, and the chapel royal. Handel.

" Few circumſtances will perhaps more aſtoniſh veteran muſicians, than to be informed, that there was but one general rehearſal for each day's performance: an indiſputable proof of the high ſtate of cultivation to which practical muſic is at preſent arrived in this country; for if good performers had not been found ready made, a dozen rehearſals would not have been ſufficient to make them ſo. Indeed, Mr Bates, in examining the liſt of performers, and inquiring into their ſeveral merits, ſuggeſted the idea of what he called a *drilling rehearſal*, at Tottenham-ſtreet concert room, a week before the performance; in order to hear ſuch volunteers, particularly chorus ſingers, as were but little known to himſelf, or of whoſe abilities his aſſiſtant was unable to ſpeak with certainty. At this rehearſal, though it conſiſted of 120 performers, not more than two of that number were deſired not to attend any more.

" At the general rehearſal in the abbey, mentioned above, more than 500 perſons found means to obtain admiſſion, in ſpite of every endeavour to ſhut out all but the performers; for fear of interruption, and perhaps of failure in the firſt attempts at incorporating and conſolidating ſuch a numerous band, conſiſting not only of all the regulars, both native and foreign, which the capital could furniſh, but of all the irregulars, that is, dilettanti, and provincial muſicians of character, who could be muſtered, many of whom had never heard or ſeen each other before. This intruſion, which was very much to the diſſatisfaction of the managers and conductor, ſuggeſted the idea of turning the eagerneſs of the public to ſome profitable account for the charity, by fixing the price of admiſſion to half a guinea for each perſon.

" But, beſides the profits derived from ſubſequent rehearſals, the conſequences of the firſt were not without their uſe; for the pleaſure and aſtoniſhment of the audience, at the ſmall miſtakes, and great effects of this firſt experiment, which many had condemned by anticipation, were ſoon communicated to the lovers of muſic throughout the town, to the great increaſe of ſubſcribers and ſolicitors for tickets. For though the friends of the directors were early in ſubſcribing, perhaps from perſonal reſpect, as much as expectation of a higher muſical repaſt than uſual; yet the public in general did not manifeſt great eagerneſs in ſecuring tickets till after this rehearſal, Friday May 21. which was reported to have aſtoniſhed even the performers themſelves by its correctneſs and effects. But ſo intereſting did the undertaking become by this favourable rumour, that from the great demand of tickets it was found neceſſary to cloſe the ſubſcription.

" Many families, as well as individuals, were attracted to the capital by this celebrity; and it was never remembered to have been ſo full, except at the coronation of his preſent majeſty. Many of the performers came, unſolicited, from the remoteſt parts of the kingdom at their own expence: ſome of them, however, were afterwards reimburſed, and had a ſmall gratuity in conſideration of the time they were kept from

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from their families by the two unexpected additional performances.

"Foreigners, particularly the French, muſt be much aſtoniſhed at ſo numerous a band moving in ſuch exact meaſure, without the aſſiſtance of a coryphæus to beat the time, either with a roll of paper, or a noiſy baton or truncheon. Rouſſeau ſays, that 'the more time is beaten, the leſs it is kept;' and it is certain, that when the meaſure is broken, the fury of the muſical general or director, increaſing with the diſobedience and confuſion of his troops, he becomes more violent, and his ſtrokes and geſticulations more ridiculous, in proportion to their diſorder.

"As this commemoration is not only the firſt inſtance of a band of ſuch magnitude being aſſembled together, but of any band at all numerous, performing in a ſimilar ſituation, without the aſſiſtance of a manuductor to regulate the meaſure, the performances in Weſtminſter abbey may be ſafely pronounced no leſs remarkable for the multiplicity of voices and inſtruments employed, than for accuracy and preciſion. When all the wheels of that huge machine, the orcheſtra, were in motion, the effect reſembled clock-work in every thing but want of feeling and expreſſion. And as the power of gravity and attraction in bodies is proportioned to their maſs and denſity, ſo it ſeems as if the magnitude of this band had commanded and impelled adheſion and obedience beyond that of any other of inferior force. The pulſations in every limb, and ramifications of veins and arteries in an animal, could not be more reciprocal, iſochronous, and under the regulation of the heart, than the members of this body of muſicians under that of the conductor and leader. The totality of ſound ſeemed to proceed from one voice and one inſtrument; and its powers produced not only new and exquiſite ſenſations in judges and lovers of the art, but were felt by thoſe who never received pleaſure from muſic before. Theſe effects, which will be long remembered by the preſent public, perhaps to the diſadvantage of all other choral performances, run the riſk of being doubted by all but thoſe who heard them, and the preſent deſcription of being pronounced fabulous, if it ſhould ſurvive the preſent generation."

HANDSPIKE, or HANDSPEC, a wooden bar uſed as a lever to heave about the windlaſs, in order to draw up the anchor from the bottom, particularly in merchant ſhips. The handle is round and tapering, and the other end is ſquare, to conform to the ſhape of the holes in the windlaſs. It is alſo employed as a lever on many other occaſions, as ſtowing the anchors, proviſions, or cargo, in the ſhip's hold. The gunner's handſpike is ſhorter and flatter than the above, and armed with two claws for managing the artillery, &c.

HANG-TCHOO-FOO, the capital of the province of Tche-Kiang in China, is ſituated between the baſon of the grand canal, and the river Chen-tang-chaung, which falls into the ſea about 60 miles to the eaſtward, and in N. Lat. 30° 21′. E. Long. 120° 20′. Hang-tchoo-foo exports and receives vaſt quantities of merchandiſe to and from the ſouthern provinces by means of this river. There is no communication by water between the river and the baſon of the grand canal, in conſequence of which all goods brought by ſea into the river from the ſouthward, muſt be landed at this city, in their way to the north. Its population is immenſe, being computed to be nearly as numerous as in Pekin, which contains about 3,000,000 of inhabitants. The houſes are low, none exceeding two ſtories; and the ſtreets, the middle of which is paved with ſmooth flags, and the ſides with ſmall flat ſtones, are very narrow. The principal ſtreets contain nothing but ſhops and warehouſes, many of which are equally ſplendid with thoſe of the kind in London. Sir George Staunton informs us, that it is extremely difficult to paſs along the ſtreets, on account of the prodigious numbers of people, all engaged in their own concerns. Several men, but no women, attend in theſe ſhops behind the counters. The women are employed in the manufacture of ſilk, every part of which is done by them alone. In their dreſs they are not regulated by fancy or faſhion, but by what is conducive to health, and the ſeaſon of the year. Even among the ladies, there is little variety in their dreſs, except in the diſpoſition of the ornaments of the head. The fair ſex eſteem corpulency in a man to be a beauty, but they aim at preſerving a delicacy of ſhape as to themſelves. They allow their nails to grow, and reduce their eyebrows to an arched line.

Hang-
tchoo-foo,
Hanging.

The natural and artificial beauties of the lake of Hang-tchoo-foo, in the opinion of Barrow, far exceeded any thing which he had the opportunity of ſeeing in the vaſt empire of China. The ſurrounding mountains are highly pictureſque, and the vallies covered with trees of various kinds, among which are the *laurus camphora*, *croton ſebiferum*, and *thuya orientalis*. In the middle of the lake are two iſlands, to which company generally reſort after having amuſed themſelves with rowing, and in which a temple and ſeveral pleaſure-houſes have been built for their reception. The emperor has a ſmall palace in the neighbourhood. This city has a garriſon of 3000 Chineſe, under the command of the viceroy, and 3000 Tartars, commanded by a general of the ſame nation. It has under its juriſdiction ſeven cities of the ſecond and third claſs.

HANGING, a common name given to the method of inflicting death on criminals by ſuſpending them by the neck.—Phyſicians are not agreed as to the manner in which death is brought on by hanging. De Haen hanged three dogs, which he afterwards opened. In one, nothing remarkable appeared in the lungs. In another, from whom half an ounce of blood was taken from the jugular vein, the dura and pia mater were of the natural appearance; but the lungs were much inflamed. In the third, the meninges were ſound, and there was no effuſion of blood in the ventricles of the brain, but the left lobe of the lungs was turgid with blood. Wepfer, Littræus, Alberti, Bruhierius, and Boerhaave, affirm that hanged animals die apoplectic. Their arguments for this are chiefly drawn from the livid colour of the face; from the turgeſcency of the veſſels of the brain; the inflammation of the eyes; and from the ſparks of fire which thoſe who have ſurvived hanging allege they have ſeen before their eyes. On the contrary, Bonetus, Petit, Haller, and Lanciſi, from obſerving that death is occaſioned by any ſmall body falling into the glottis, have aſcribed it to the ſtoppage of reſpiration. Others, deeming both theſe cauſes ill-founded, have aſcribed it to a luxation of the vertebræ of the neck.—De Haen adduces the authority of many eminent authors to prove the poſſibility of recovering hanged perſons; and obſerves, in general,

Hangings || Hannibal.

neral, that with bleeding in the jugular vein, and anointing the neck with warm oil, the ſame remedies are to be employed in this caſe as for the recovery of drowned people. See DROWNING.

HANGINGS, denote any kind of drapery hung up againſt the walls or wainſcotting of a room.

Paper-Hangings. See *PAPER-Hangings.*

Wove Hangings. See TAPESTRY.

HANGCLIFF, a remarkable point of land on the eaſt coaſt of the largeſt of the Shetland iſlands. It is frequently the firſt land ſeen by ſhips in northern voyages. Captain Phipps determined its ſituation to be in W. Long. 56′ 30″. N. Lat. 60° 9′.

HANNIBAL, a famous Carthaginian general, of whoſe exploits an account is given under the articles CARTHAGE and ROME. After having had the misfortune to loſe a ſea-fight with the Rhodians, through the cowardice of Apollonius one of the admirals of Antiochus the Great, he was forced to fly into Crete, to avoid falling into the hands of the Romans. On his arrival in this iſland, he took ſanctuary among the Gortynii; but as he had brought great treaſure along with him, and knew the avarice of the Cretans, he thought proper to ſecure his riches by the following ſtratagem. He filled ſeveral veſſels with melted lead, juſt covering them over with gold and ſilver. Theſe he depoſited in the temple of Diana, in the preſence of the Gortynii, with whom, he ſaid, he truſted all his treaſure: Juſtin tells us, that he left this with them as a ſecurity for his good behaviour, and lived for ſome time very quietly in theſe parts. He took care, however, to conceal his riches in hollow ſtatues of braſs; which, according to ſome, he always carried along with him; or, as others will have it, expoſed in a public place as things of little value. At laſt he retired to the court of Pruſias king of Bithynia, where he found means to unite ſeveral of the neighbouring ſtates with that prince in a confederacy againſt Eumenes king of Pergamus, a profeſſed friend to the Romans; and during the enſuing war gave Eumenes ſeveral defeats, more through the force of his own genius than the valour of his troops. The Romans having received intelligence of the important ſervices performed by Hannibal, immediately diſpatched T. Quintius Flaminius as an ambaſſador to Pruſias, in order to procure his deſtruction. At his firſt audience, he complained of the protection given to that famous general; repreſenting him "as the moſt inveterate and implacable enemy the Romans ever had; as one who had ruined both his own country and Antiochus, by drawing them into a deſtructive war with Rome."—Pruſias, in order to ingratiate himſelf with the Romans, immediately ſent a party of ſoldiers to ſurround Hannibal's houſe, that he might find it impoſſible to make his eſcape. The Carthaginian, having before diſcovered that no confidence was to be repoſed in Pruſias, had contrived ſeven ſecret paſſages from his houſe, in order to evade the machinations of his enemies, even if they ſhould carry their point at the Bithynian court. But guards being poſted at theſe, he could not fly, though, according to Livy, he attempted it. Perceiving, therefore, no poſſibility of eſcaping, he had recourſe to poiſon, which he had long reſerved for ſuch a melancholy occaſion. Then taking it in his hand, "Let us (ſaid he) deliver the Romans from the diſquietude with which they have long been tortured, ſince they have not patience to wait for an old man's death. Flaminius will not acquire any reputation or glory by a victory gained over a betrayed and defenceleſs perſon. This ſingle day will be a laſting teſtimony of the degeneracy of the Romans. Their anceſtors gave Pyrrhus intelligence of a deſign to poiſon him, that he might guard againſt the impending danger, even when he was at the head of a powerful army in Italy; but they have deputed a perſon of conſular dignity to excite Pruſias impiouſly to murder one who has taken refuge in his dominions, in violation of the laws of hoſpitality." Then having denounced dreadful imprecations againſt Pruſias, he drunk the poiſon, and expired at the age of 70 years. Cornelius Nepos acquaints us, that he put an end to his life by a ſubtile poiſon which he carried about with him in a ring. Plutarch relates, that, according to ſome writers, he ordered a ſervant to ſtrangle him with a cloak wrapped about his neck; and others ſay, that, in imitation of Midas and Themiſtocles, he drank bull's blood. Hannibal.

With reſpect to the character of this general, it appears to have been in military affairs what Demoſthenes was in oratory, or Newton in mathematics; namely, abſolutely perfect, in which no human wiſdom could diſcover a fault, and to which no man could add a perfection. Rollin hath contraſted his character with that of Scipio Africanus. He enumerates the qualities which make a complete general; and having then given a ſummary of what hiſtorians have related concerning both commanders, is inclined to give the preference to Hannibal. "There are, however (he ſays), two difficulties which hinder him from deciding; one drawn from the characters of the generals whom Hannibal vanquiſhed; the other from the errors he committed. May it not be ſaid (continues our author), that thoſe victories which made Hannibal ſo famous, were as much owing to the imprudence and temerity of the Roman generals, as to his bravery and ſkill? When a Fabius and a Scipio were ſent againſt him, the former ſtopped his progreſs, the latter conquered him."

Theſe reaſons have been anſwered by Mr Hooke, who hath taken ſome pains to vindicate Hannibal's character, by fully and fairly comparing it with that of Scipio Africanus, and other Roman commanders. "I do not ſee (ſays he) why theſe difficulties ſhould check our author's inclination to declare in favour of the Carthaginian. That Fabius was not beaten by Hannibal, we cannot much wonder, when we remember how ſteadily the old man kept to his reſolution never to fight with him. But from Fabius's taking this method to put a ſtop to the victories of the enemy, may we not conclude that he knew no other, and thought Hannibal an overmatch for him? And why does our author forget Publius Scipio (Africanus's father), a prudent and able general, whom Hannibal vanquiſhed at the Ticin? Livy relates ſome victories of Hannibal over the celebrated Marcellus; but neither Marcellus nor any other general ever vanquiſhed Hannibal before the battle of Zama, if we may believe Polybius (lib. xv. c. 16.) Terentius Varro, indeed, is repreſented as a headſtrong raſh man; but the battle of Cannæ was not loſt by his imprudence. The order

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order in which he drew up his army is nowhere condemned; and Chevalier Folard thinks it excellent. And as to the conduct of the battle, Æmilius Paulus, a renowned captain, and a diſciple of Fabius, had a greater ſhare in it than his colleague. The imprudence with which Varro is taxed, was his venturing, contrary to his colleague's advice, with above 90,000 men, to encounter in a plain field an enemy who had only 50,000, but was ſuperior in horſe. And does not the very advice of Æmilius, and the charge of temerity on Varro for not following it, imply a confeſſion of Hannibal's ſuperiority in military ſkill over Æmilius as well as Varro? It ought likewiſe to be obſerved, that Hannibal's infantry had gained the victory over the Roman infantry, before this latter ſuffered any thing from the Carthaginian cavalry. It was otherwiſe when Scipio gained the victory at Zama. His infantry would probably have been vanquiſhed but for his cavalry. Hannibal, with only his third line of foot (his Italian army), maintained a long fight againſt Scipio's three lines of foot; and ſeems to have had the advantage over them, when Maſiniſſa and Lælius, with the horſe, came to their aſſiſtance. Polybius indeed ſays, that Hannibal's Italian forces were equal in number to all Scipio's infantry; but this is contradicted by Livy, and is not very probable. The authority of Polybius, who was an intimate friend of Scipio Æmilianus, is, I imagine, of little weight in matters where the glory of the Scipios is particularly concerned. His partiality and flattery to them are, in many inſtances, but too viſible."

Our author then proceeds to ſhow, that Hannibal was not guilty of any of the faults laid to his charge as a general; and having contraſted the moral characters of the two generals with each other, makes it evident, that as a man, as well as a general, Hannibal had greatly the advantage of his rival. See *Hooke's Roman Hiſtory*, vol. iv. p. 151. *et ſeq.*

HANNO, general of the Carthaginians, was commanded to ſail round Africa. He entered the ocean through the ſtraits of Gibraltar, and diſcovered ſeveral countries. He would have continued his navigation, had it not been for want of proviſions. He wrote an account of his voyage, which was often quoted, but not much credited. Sigiſmund Gelenius publiſhed it in Greek at Baſil, by Frobenius, in 1533. He lived, according to Pliny, when the affairs of the Carthaginians were in the moſt flouriſhing condition; but this is a very indeterminate expreſſion.

HANOVER, an electoral ſtate of Germany, of which the king of Great Britain is elector.—Though the houſe of Hanover is the laſt that has been raiſed to the electoral dignity in the empire, it may vie with any in Germany for the antiquity and nobleneſs of its family. It is likewiſe very conſiderable for the extent of its territories, which at preſent are, The duchy of Calenberg, in which are the cities of Hanover, Calenberg, Hamelen, Neuſtadt, Gottingen, &c.; the duchy of Grubenhagen, the county of Diepholt, the county of Iloga, in the biſhoprick of Hildeſheim; the bailiages of Coldingen, Luther, Badenburg, and Weſterſhoven, with the right of protection of the city of Hildeſheim; and the county of Danneberg, ceded by the dukes of Wolfenbuttle to the dukes of Lunenburg, as an equivalent for their pretenſions on the city of Brunſwic. The elector poſſeſſes likewiſe the county of Delmenhorſt, and the duchies of Bremen and Verden, ſold by the king of Denmark in 1715: the right of poſſeſſing alternately the biſhopric of Oſnabruck belongs ſolely to the electoral branch; but if it ſhall happen to fail, the dukes of Wolfenbuttle are to enjoy the ſame right. This electorate has no navy, but a conſiderable marine on the great rivers Elbe and Weſer. Hanover.

In conſideration of the great ſervices performed by Erneſt Auguſtus, duke of Brunſwic-Hanover, in the wars which the emperor Leopold had with Louis XIV. that emperor conferred the dignity of an elector of the holy Roman empire upon him and his heirs male, of which he received the inveſtiture on the 19th of December 1692. This new creation met with great oppoſition both in the electoral college and the college of princes: at laſt, by a concluſion of the three colleges on the 30th of January 1708, it was unanimouſly determined, that the electoral dignity ſhould be confirmed to the duke of Hanover and his heirs male; but it was added, that if, while that electoral dignity ſubſiſted, the Palatine electorate ſhould happen to fall into the hands of a Proteſtant prince, the firſt Catholic elector ſhould have a ſupernumerary vote.

The princes of this houſe have their ſeat in the college of princes, immediately after thoſe of the electoral houſes; each branch having a vote. The elector, beſides his ſeat in the electoral college, was inveſted with the office of arch-ſtandard-bearer of the empire; but this being diſputed with him by the duke of Wirtemberg, the elector Palatine having obtained the office of arch-ſteward, yielded that of arch-treaſurer to the elector of Hanover, who was confirmed in this dignity by a decree of the diet of the 13th of January 1710.

The ſovereign power is adminiſtered by the lords of the regency appointed by the elector. Throughout all the provinces they poſſeſs a conſiderable ſhare of freedom, the people being repreſented in the aſſemblies of the ſtates. No government can be more mild; and an air of content is ſpread over all the inhabitants. The Conſeil Intimè, the High Court of Juſtice, and the Regency, are the principal courts of juſtice; beſides which, every province has its municipal adminiſtration with the inferior diviſions into bailiwics, &c. The police is excellent, and juſtice fairly adminiſtered. The elector enjoys the right *de non appellando* in all criminal affairs, but in civil proceſſes only as far as 2000 florins.

Lutheraniſm is the eſtabliſhed religion; but all others enjoy a perfect toleration, and are publicly exerciſed. Difference in religious ſentiments here gives no interruption to that harmony which ſhould ſubſiſt among fellow citizens. There are 750 Lutheran pariſhes, 14 Reformed communities, a Romiſh college, a convent, and ſome Catholic churches.

Literature is in a very advanced ſtate throughout theſe dominions. The univerſity of Gottingen is deſervedly celebrated; and contains about 800 ſtudents of different nations, and 60 profeſſors. There are beſides ſeveral colleges, and a number of well eſtabliſhed ſchools, throughout the electorate. In general, education is much attended to.

Although there are various tracts of heath and

Hanover
&
Hanſe-towns.

marſhy ground, the ſoil in general produces abundance of corn, fruits, hemp, flax, tobacco, madder, and ſome wine. There are ſeveral large ſalt-works. A good deal of cattle are reared, and a great number of excellent horſes. Moſt metals and minerals are found here. The foreſts furniſh ſufficient timber, and large quantities of pitch and tar. The natural productions of the electorate furniſh ample materials for commerce, ſo as to prevent the balance being againſt them, although their manufactures are not ſufficient for conſumption. Cattle, horſes, ſalt, wrought iron, and fuel, are principal articles of export. Bremen is one of the greateſt commercial towns in Germany.

The elector of Hanover is deſcended from the ancient family of the Guelphs, dukes and electors of Bavaria; one of whom, Henry the Lion, in 1140, married Maude, eldeſt daughter of King Henry (Plantagenet) II. of England. Their ſon William ſucceeded to Brunſwic-Lunenburg, and his ſon Otho was created duke thereof. The dominions deſcended in a direct line to Erneſt who divided them upon his death in 1546 into two branches, that of Brunſwic-Lunenburg Wolfenbuttle, and Brunſwic-Lunenburg Zell. The poſſeſſor of the latter, Erneſt Auguſtus, was in 1692 raiſed to the dignity of an elector; before which he was head of the college of German princes. Erneſt married Sophia, daughter of Frederic elector Palatine and king of Bohemia, by Elizabeth, daughter of James I. king of England. Sophia being the next Proteſtant heir to the houſe of Stuart, the parliament fixed the crown of Great Britain upon her on Queen Anne's demiſe; and George Louis her elder ſon became king of Great Britain in conſequence thereof; ſince which the electors of Hanover have filled the Britiſh throne.

HANOVER is alſo the name of the capital of the above electorate; and is agreeably ſituated in a ſandy plain on the river Leyne, in E. Long. 10. 5. N. Lat. 52. 5. It is a large well-built town, and pretty well fortified. It has ſuffered greatly by the French, who got poſſeſſion of it in 1757, but were ſoon after driven out. It is noted for a particular kind of beer, reckoned excellent in theſe parts. This city was the reſidence of the elector before he aſcended the throne of Great Britain.

In 1803, when the war between Britain and France broke out, this capital, as well as the electorate, was ſeized by the French, and afterwards given up to Pruſſia, in whoſe poſſeſſion it now (1806) remains.

HANSE, or HANS, an ancient name for a ſociety or company of merchants; particularly that of certain cities in Germany, &c. hence called *Hanſe-towns*. See HANSE-*Towns*.—The word *hanſe* is obſolete High Dutch or Teutonic; and ſignifies "alliance, confederacy, aſſociation," &c. Some derive it from the two German words, *am-ſee*, that is, "on the ſea;" by reaſon the firſt hanſe-towns were all ſituated on the ſea-coaſt; whence the ſociety is ſaid to have been firſt called *am zee ſtenen*, that is, "cities on the ſea;" and afterwards, by abbreviation, *hanſee*, and *hanſe*.

Hanse-Towns. The hanſeatic ſociety was a league between ſeveral maritime cities of Germany, for the mutual protection of their commerce. Bremen and Amſterdam were the two firſt that formed it; whoſe trade received ſuch advantage by their fitting out two men of war in each to convoy their ſhips, that more cities continually entered into the league: even kings and princes made treaties with them, and were often glad of their aſſiſtance and protection; by which means they grew ſo powerful both by ſea and land, that they raiſed armies as well as navies, enjoyed countries in ſovereignty, and made peace or war, though always in defence of their trade, as if they had been an united ſtate or commonwealth. Hanſe-towns.

At this time alſo abundance of cities, though they had no great intereſt in trade, or intercourſe with the ocean, came into their alliance for the preſervation of their liberties: ſo that in 1200 we find no leſs than 72 cities in the liſt of the towns of the Hanſe; particularly Bremen, Amſterdam, Antwerp, Rotterdam, Dort, Bruges, Oſtend, Dunkirk, Middleburgh, Calais, Rouen, Rochelle, Bourdeaux, St Malo, Bayonne, Bilboa, Liſbon, Seville, Cadiz, Carthagena, Barcelona, Marſeilles, Leghorn, Naples, Meſſina, London, Lubec, Roſtock, Stralſund, Stetin, Wiſmar, Konigſberg, Dantzig, Elbing, Marienburg.

The alliance was now ſo powerful, that their ſhips of war were often hired by other princes to aſſiſt them againſt their enemies. They not only awed, but often defeated, all that oppoſed their commerce; and particularly in 1358, they took ſuch revenge of the Daniſh fleet in the Sound, for having interrupted their commerce, that Waldemar III. then king of Denmark, for the ſake of peace, gave them up all Schonen for 16 years; by which they commanded the paſſage of the Sound in their own right.—In 1428 they made war on Erick king of Denmark with 250 ſail, carrying on board 12,000 men. Theſe ſo ravaged the coaſt of Jutland, that the king was glad to make peace with them.

Many privileges were beſtowed upon the hanſe towns by Louis XI. Charles VIII. Louis XII. and Francis I. kings of France; as well as by the emperor Charles V. who had divers loans of money from them; and by King Henry III. who alſo incorporated them into a trading body, in acknowledgment for money which they advanced to him, as well as for the good ſervices they did him by their naval forces in 1206.

Theſe towns exerciſed a juriſdiction among themſelves; for which purpoſe they were divided into four colleges or provinces, diſtinguiſhed by the names of their four principal cities, viz. Lubec, Cologne, Brunſwick, and Dantzic, wherein were held their courts of judicature. They had a common ſtock or treaſury at Lubec, and power to call an aſſembly as often as neceſſary.—They kept magazines or warehouſes for the ſale of their merchandiſes in London, Bruges, Antwerp, Berg in Norway, Revel in Livonia, Novogorod in Muſcovy, which were exported to moſt parts of Europe, in Engliſh, Dutch, and Flemiſh bottoms. One of their principal magazines was at London, where a ſociety of German merchants was formed, called the *ſteelyard company*. To this company great privileges were granted by Edward I. but revoked by act of parliament in 1552 in the reign of Edward VI. on a complaint of the Engliſh merchants that this company had ſo engroſſed the cloth-trade, that in the preceding year they had exported 50,000 pieces, while all the Engliſh together had ſhipped off but 1100. Queen Mary, who aſcended the throne the year following, having reſolved to marry Philip the emperor's ſon,

ſuſpended

Hanſe-towns, Hanway.

ſuſpended the execution of the act for three years: but after that term, whether by reaſon of ſome new ſtatute, or in purſuance of that of King Edward, the privileges of that company were no longer regarded, and all efforts of the hanſe-towns to recover this loſs were in vain.

Another accident that happened to their mortification was while Queen Elizabeth was at war with the Spaniards. Sir Francis Drake happening to meet 60 ſhips in the Tagus, loaded with corn belonging to the hanſe-towns, took out all the corn as contraband goods, which they were forbidden to carry by their original patent. The hanſe-towns having complained of this to the diet of the empire, the queen ſent an ambaſſador thither to declare her reaſons. The king of Poland likewiſe intereſted himſelf in the affair, becauſe the city of Dantzic was under his protection. At laſt, though the queen ſtrove hard to preſerve the commerce of the Engliſh in Germany, the emperor excluded the Engliſh company of merchant-adventurers, who had conſiderable factories at Stade, Embden, Bremen, Hamburg, and Elbing, from all trade in the empire. In ſhort, the hanſe-towns, in Germany in particular, were not only in ſo flouriſhing, but in ſo formidable a ſtate, from the 14th to the 16th century, that they gave umbrage to all the neighbouring princes, who threatened a ſtrong confederacy againſt them; and, as the firſt ſtep towards it, commanded all the cities within their dominion or juriſdiction to withdraw from the union or hanſe, and be no farther concerned therein. This immediately ſeparated all the cities of England, France, and Italy, from them. The hanſe, on the other hand, prudently put themſelves under the protection of the empire: and as the cities juſt now mentioned had withdrawn from them; ſo they withdrew from ſeveral more, and made a decree among themſelves, that none ſhould be admitted into their ſociety but ſuch as ſtood within the limits of the German empire, or were dependent thereon: except Dantzic, which continued a member, though in nowiſe dependent on the empire, only it had been ſummoned formerly to the imperial diet. By this means they maintained their confederacy for the protection of their trade, as it was begun, without being any more envied by their neighbours. Hereby likewiſe they were reduced to Lubec, Bremen, Hamburgh, and Dantzic; in the firſt of which they kept their regiſter, and held aſſemblies once in three years at leaſt. But this hanſe or union has for ſome time been diſſolved; and now every one of the cities carries on a trade ſeparately for itſelf, according to the ſtipulation in ſuch treaties of peace, &c. as are made for the empire betwixt the emperor and other potentates.

HANWAY, JONAS, eminent for his benevolent deſigns and uſeful writings, was born at Portſmouth in Hampſhire on the 12th of Auguſt 1712. His father, Mr Thomas Hanway, was an officer in the naval ſervice, and for ſome years ſtore-keeper to the dockyard at that place. He was deprived of his life by an accident; and left his widow with four children, Jonas, William, Thomas, and Elizabeth, all of a very tender age. Mrs Hanway coming to London after the death of her huſband, put Jonas to ſchool, where he learned writing and accounts, and made ſome proficiency in Latin. At the age of 17 he was ſent to Liſbon, where he arrived in June 1729, and was bound apprentice to a merchant in that city. His early life, we are informed, was marked with that diſcreet attention to buſineſs, and love of neatneſs and regularity, which afterwards diſtinguiſhed his character. At Liſbon his affections were captivated by a lady, then celebrated for her beauty and mental accompliſhments; but ſhe, preferring another for her huſband, returned to England, and ſpent the latter part of her life in London with her family, on terms of friendſhip with Mr Hanway.—On the expiration of Mr Hanway's apprenticeſhip, he entered into buſineſs at Liſbon as a merchant or factor; but did not remain there long before he returned to London. Hanway.

He ſoon after connected himſelf as a partner in Mr Dingley's houſe in St Peterſburgh; where he arrived on the 10th of June 1743. The trade of the Engliſh nation over the Caſpian ſea into Perſia at this period had been entruſted to the care of Mr Elton, who, not content with the purſuit of commercial affairs, had injudiciouſly engaged in the ſervice of Nadir Shah to build ſhips on the Caſpian after the European manner. This had alarmed the merchants in the Ruſſian trade, and a reſolution was formed that one of their body ſhould make a journey into Perſia. On this occaſion Mr Hanway offered his ſervice, and was accepted. He ſet out on the 10th of September; and after experiencing a variety of hazards in that kingdom during a courſe of 12 months, returned to St Peterſburgh January 1. 1745, without being able to eſtabliſh the intended trade by the Caſpian, partly through the jealouſy of the Ruſſian court on account of Elton's connections with the Perſians, and partly by the troubles and revolutions of the latter kingdom.

Though Mr Hanway's conduct during this expedition ſeems to have been directed by the ſtricteſt rules of integrity, yet ſome difficulties aroſe in ſettling his demands on his employers. Theſe, however, in the end were referred to the determination of impartial arbitrators, who at length decided in his favour. "I obtained (he ſays) my own; and as to any other perſonal advantage, it conſiſted in exerciſing my mind in patience under trials, and increaſing my knowledge of the world." He now ſettled at St Peterſburgh; where he remained five years, with no other variations in his life than ſuch as may be ſuppoſed to occur in the dull round of a mercantile employment. During this time he intereſted himſelf greatly in the concerns of the merchants who had engaged in the Caſpian trade: but the independence he had acquired having excited a deſire to ſee his native country, he, after ſeveral diſappointments which prevented him from accompliſhing his wiſh, left St Peterſburgh on the 9th of July 1750. On his arrival in his native country, he did not immediately relinquiſh his mercantile connections, though he ſeems to have left Ruſſia with that view. He employed himſelf ſome time as a merchant; but afterwards, more beneficially to the world, as a private gentleman. In 1753 he publiſhed "An Hiſtorical Account of the Britiſh trade over the Caſpian ſea; with a Journal of Travels from London through Ruſſia into Perſia; and back again through Ruſſia, Germany, and Holland. To which are added, the Revolutions of Perſia during the preſent century, with the particular Hiſtory of the great Uſurper Nadir Kouli," 4 vols 4to; a work which was received

Hanway. ceived, as it deſerved to be, with great attention from the public. In 1754, we find Mr Hanway commending a plan offered for the advantage of Weſtminſter, and ſuggeſting hints for the further improvement of it, in "A Letter to Mr John Spranger, on his excellent Propoſal for Paving, Cleanſing, and Lighting the Streets of Weſtminſter, &c." 8vo. A few years afterwards, when a ſcheme of the like kind was carried into effect, many of Mr Hanway's ideas, thrown out in this pamphlet, were adopted. In 1756, he printed "A journal of Eight Days Journey from Portſmouth to Kingſton upon Thames, with an Eſſay upon Tea;" which was afterwards reprinted in two volumes 8vo, 1757.

At this juncture, Great Britain being on the eve of a war with France, the event of which was very important to the nation at large, and required every effort of patriotiſm and prudence to ward off the impending danger, Mr Hanway publiſhed "Thoughts on the Duty of a good Citizen with regard to War and Invaſion, in a Letter from a Citizen to his Friend," 8vo. About the ſame time, ſeveral gentlemen formed a plan, which was matured and made perfect by the aſſiduity of Mr Hanway, for providing the navy with ſailors, by furniſhing poor children with neceſſaries to equip them for the ſervice of their country. The ſucceſs and propriety of this ſcheme ſoon became apparent. Mr Hanway wrote and publiſhed three pamphlets on this occaſion; and the treaſurer of the Society, accompanied by Mr Hanway, having waited on the king, the Society received 1000l. from his majeſty, 400l. from the prince of Wales, and 200l. from the princeſs dowager. This excellent inſtitution through life was the favourite object of Mr Hanway's care, and continued to flouriſh under his auſpices greatly to the advantage of the community. In 1758 he became an advocate for another charitable inſtitution, which derived conſiderable emolument from his patronage of it. This was the Magdalen Charity; and to aſſiſt it he publiſhed "A Letter to Robert Dingley, Eſq; being a propoſal for the Relief and Employment of friendleſs Girls and repenting Proſtitutes," 4to. He alſo printed other ſmall performances on the ſame ſubject.

In 1759, Mr Hanway wrote "Reaſons for an Augmentation of at leaſt Twelve Thouſand Mariners, to be employed in the Merchants Service and Coaſting Trade, in 33 Letters to Charles Gray, Eſq; of Colcheſter, 4to." The next year he publiſhed ſeveral performances, viz. 1, "A candid hiſtorical Account of the Hoſpital for the reception of expoſed and deſerted young Children; repreſenting the preſent Plan of it as productive of many Evils, and not adapted to the Genius and Happineſs of this Nation," 8vo; which being anſwered by an anonymous Letter from Halifax in "Candid Remarks, 8vo, 1760," Mr Hanway replied to it, and the Remarker rejoined. 2. "An account of the Society for the Encouragement of the Britiſh Troops in Germany and North America, &c." 8vo. 3. "Eight Letters to ——Duke of——, on the Cuſtom of Vails giving in England," 8vo. This practice of giving vails had arrived at a very extravagant pitch, eſpecially among the ſervants of the great. It was Mr Hanway who anſwered the kind reproach of a friend in a high ſtation for not coming oftener to dine with him, by ſaying, "Indeed I cannot afford it." The Hanway. nobleman to whom the above letters were addreſſed was the duke of Newcaſtle. The letters are written in that humorous ſtyle which is moſt attractive of general notice, and was beſt adapted to the ſubject. It was Sir Timothy Waldo that firſt put Mr Hanway on this plan. Sir Timothy had dined with the duke of N——, and, on his leaving the houſe, was contributing to the ſupport and inſolence of a train of ſervants who lined the hall; and at laſt put a crown into the hand of the cook, who returned it, ſaying, "Sir, I do not take ſilver."—"Don't you indeed!" ſaid the worthy baronet, putting it in his pocket: "then I do not give gold." Among the ludicrous circumſtances in Mr Hanway's letters is one which happened to himſelf. He was paying the ſervants of a reſpectable friend for a dinner which their maſter had invited him to, one by one as they appeared; "Sir, your great coat;" a ſhilling —"Your hat;" a ſhilling—"Stick;" a ſhilling—"Umbrella;" a ſhilling——" Sir, your gloves;"—"Why, friend, you may keep the gloves; they are not worth a ſhilling." In 1761, Mr Hanway produced "Reflections, Eſſays, and Meditations on Life and Religion; with a collection of Proverbs, and 18 Letters written occaſionally on ſeveral ſubjects," in 2 vols 8vo.

The many uſeful and public-ſpirited plans which Mr Hanway had promoted for the welfare of the community, had now rendered his character moſt reſpectably popular, while his diſintereſtedneſs, and the ſincerity of his intentions, were conſpicuous to all. Five citizens of London, of whom Mr Hoare the banker was one, waited on Lord Bute, at that time the miniſter: and, in their own names, and the names of their fellow-citizens, requeſted that ſome notice might be taken of a man, who, at the expence of his own private fortune, and unremitting application, had rendered ſo many and ſuch meritorious ſervices to his country. In conſequence of this requeſt, he was in July 1762 appointed by a patent one of the commiſſioners for victualling the navy; a poſt which he held above 21 years. The next act of public beneficence in which we find him engaged is the collection of money for the ſufferers by the fire which happened at Montreal, in the province of Quebec, in May 1765, when a fourth part of the city was conſumed. On this occaſion Mr Hanway, in conjunction with two other gentleman, collected 8415l.—The very next year a dreadful fire broke out in Bridge-Town in Barbadoes, which conſumed buildings and property to the amount of near 100,000l. A ſubſcription was opened, in which Mr Hanway was a principal actor, and 14,886l. were collected, and tranſmitted to a committee appointed at Barbadoes to diſtribute it to the unfortunate ſufferers. At ſubſequent periods he continued to intereſt himſelf in various other plans for relieving the diſtreſſes, and promoting the good, of different claſſes of the community. His attention was particularly directed towards alleviating the miſeries of young chimney-ſweepers. Beſides the diſtreſſes of theſe helpleſs beings, which are open to general obſervation, ſuch as a contortion of the limbs, and the prevention of their growth, they are liable to a diſeaſe peculiar to their occupation, now known by the name of the *chimney-ſweepers cancer*. Four children have been brought together into a workhouſe, all afflicted with this dreadful

Hanway. ful and incurable diſeaſe. After much inquiry and conſideration, he publiſhed, in 1773, "The State of the Chimney-ſweepers Young Apprentices; ſhowing the wretched Condition of theſe diſtreſſed Boys; the ill Conduct of ſuch maſters as do not obſerve the Obligation of Indentures; the Neceſſity of a ſtrict Inquiry in order to ſupport the civil and religious Rights of theſe apprentices," 12mo. This ſmall pamphlet has already been productive of ſome advantage to the objects intended to be benefited by it. The ſucceeding year, 1774, he enlarged a former publication, entitled "Advice from a Farmer to his Daughter, &c." and republiſhed it under the title of "Virtue in humble Life: containing Reflections on the reciprocal Duties of the Wealthy and Indigent, the Maſter and the Servant," 2 vols 8vo; a work deſerving the particular conſideration of every magiſtrate. This edition in a few months being ſold, he reprinted it in two quarto volumes, with a dedication to Mrs Montagu.

In 1783, finding his health decline, he determined to reſign his office at the victualling board, which he did on the 2d of October that year; and immediately received a grant of his whole ſalary by way of a penſion, to continue for life. This favour he owed to the eſteem which his majeſty, to whom he was perſonally known, entertained for him; excited by his various exertions in behalf of his country and mankind.—He was now releaſed from his moſt material buſineſs, but did not think it would conduce to his happineſs to lead an idle life. He engaged again in behalf of the chimney-ſweepers boys; and promoted, by every means in his power, the eſtabliſhment of Sunday-ſchools, which are now in a fair way to be adopted in every county in England. He likewiſe promoted a ſubſcription for the relief of the many black poor people who wandered about the metropolis in extreme diſtreſs; and the lords of the treaſury ſeconded the deſign, by directing money, as far as 14l. a-head, to be iſſued to the committee, to enable them to ſend the blacks to ſuch places abroad as might be fixed on. After encountering many obſtacles, about 300 negroes were ſent, properly accommodated with proviſions and neceſſaries, to Africa, under the conduct of a perſon approved for that ſtation. The object of this plan, beſides relieving the miſery of theſe poor people, was to prevent in time the unnatural connections between black perſons and white, the diſagreeable conſequences of which make their appearance but too frequently in our ſtreets.

In the ſummer of 1786 Mr Hanway's health declined ſo viſibly that he thought it neceſſary to attend only to that. He had long felt the approach of a diſorder in the bladder, which, increaſing by degrees, cauſed a ſtrangury; and at length, on the 5th of September 1786, put a period to a life ſpent almoſt entirely in the ſervice of his fellow-creatures. On the 13th he was interred in the family-vault at Hanwell, being attended to the grave by a numerous retinue of friends; and after his death the public regard to his virtues was diſplayed by a ſubſcription of ſeveral hundred pounds towards erecting a monument to perpetuate his memory.

Mr Hanway in his perſon was of the middle ſize, of a thin ſpare habit, but well ſhaped: his limbs were faſhioned with the niceſt ſymmetry. In the latter years of his life he ſtooped very much; and when he walked, Hanway. found it conduce to eaſe to let his head incline towards one ſide: but when he went firſt to Ruſſia at the age of 30, his face was full and comely, and his perſon altogether ſuch as obtained for him the appellation of the *Handſome Engliſhman*. In his dreſs, as far as was conſiſtent with his health and eaſe, he accommodated himſelf to the prevailing faſhion. As it was frequently neceſſary for him to appear in polite circles on unexpected occaſions, he uſually wore dreſs clothes, with a large French bag. His hat, ornamented with a gold button, was of a ſize and faſhion to be worn as well under the arm as on the head. When it rained, a ſmall parapluie defended his face and wig. Thus he was always prepared to enter into any company without impropriety or the appearance of negligence. His dreſs for ſet public occaſions was a ſuit of rich dark brown; the coat and waiſtcoat lined throughout with ermine, which juſt appeared at the edges; and a ſmall gold-hilted ſword. As he was extremely ſuſceptible of cold, he wore flannel under the linings of all his clothes, and uſually three pairs of ſtockings. He was the firſt man who ventured to walk the ſtreets of London with an umbrella over his head. After carrying one near 30 years, he ſaw them come into general uſe. The precarious ſtate of his health when he arrived in England from Ruſſia, made it neceſſary for him to uſe the utmoſt caution; and his perſeverance in following the advice of the medical practitioners was remarkable. After Dr Lieberkyn phyſician to the king of Pruſſia had recommended milk as a proper diet to reſtore his ſtrength, he made it the chief part of his food for 30 years; and though it at firſt diſagreed with him, he perſiſted in trying it under every preparation that it was capable of till it agreed with his ſtomach. By this rigid attention and care, his health was eſtabliſhed; his lungs acquired ſtrength and elaſticity; and it is probable he would have lived ſeveral years longer, if the diſorder which was the immediate cauſe of his death had left him to the gradual decay of nature. His mind was the moſt active that it is poſſible to conceive; always on the wing, and never appearing to be weary. He roſe in the ſummer at four or five, and in the winter at ſeven. Having always buſineſs before him, he was every day employed till the time of retiring to reſt; and, when in health, was commonly aſleep within two minutes after his lying down in bed.

Writing was his favourite employment, or rather amuſement; and when the number of his literary works is conſidered, and that they were the produce only of thoſe hours which he was able to ſnatch from public buſineſs, an idea may be formed of his application. But by leaving his work to tranſact his ordinary buſineſs, and afterwards recurring to it with new ideas, all his literary labours are defective in the arrangement of the matter, and appear to have too much of the miſcellaneous in their compoſition. The original idea is ſometimes left for the purſuit of one newly ſtarted, and either taken up again when the mind of the reader has almoſt loſt it, or it is totally deſerted. Yet thoſe who are judges of literary compoſition ſay, that his language is well calculated to have the effect he deſired on the reader, and impreſs him with the idea that the author was a man of inflexible integrity, and wrote from the pure dictates of the heart. It is plain

and

Hanway. and unornamented, without the appearance of art or the affectation of ſingularity. Its greateſt defect (ſay they) is a want of conciſeneſs; its greateſt beauty, an unaffected and genuine ſimplicity. He ſpoke French and Portugueſe, and underſtood the Ruſs and modern Perſic imperfectly. Latin he had been taught at ſchool, but had not much occaſion to cultivate it after he entered into life.

Mr Hanway, although never married himſelf, was yet an advocate for marriage, and recommended it to all young people. He thought it the moſt effectual reſtraint on licentiouſneſs, and that an increaſe of unhappineſs was by no means the natural conſequence of an increaſe of domeſtic cares. A "local habitation," with the ſociety of a ſenſible woman, the choice of unbiaſſed affection, he eſteemed as the moſt engaging perſuaſive to the love of order and economy; without which he thought life, in whatever ſtation, muſt be diſjointed, perturbed, and unhappy. The lady who engaged his firſt affection was uncommonly handſome; and it is probable he was prevented from marrying only by his failing to obtain her, and the unſettled manner in which the firſt years of his life were ſpent: for he loved the ſociety of women; and in the parties which frequently breakfaſted at his houſe, the ladies uſually made the greater portion of the company.

In his tranſactions with the world, he was always open, candid, and ſincere. Whatever he ſaid might be depended on with implicit confidence. He adhered to the ſtrict truth, even in the manner of his relation; and no brilliancy of thought could induce him to vary from the fact: but although ſo frank in his own proceedings, he had ſeen too much of life to be eaſily deceived by others; and he did not often place a confidence that was betrayed. He did not however, think the world ſo degenerate as is commonly imagined: "And if I did (he uſed to ſay), I would not let it appear; for nothing can tend ſo effectually to make a man wicked, or to keep him ſo, as a marked ſuſpicion. Confidence is the reward of truth and fidelity, and theſe ſhould never be exerted in vain." In his department of commiſſioner for victualling the navy he was uncommonly aſſiduous and attentive; and kept the contractors and perſons who had dealings with the office at a great diſtance. He would not even accept a hare or pheaſant, or the ſmalleſt preſent, from any of them; and when any were ſent him, he always returned them, not in a moroſe manner, as if he affected the exceſs of diſintereſtedneſs, but with ſome mild anſwer; ſuch as, "Mr Hanway returns many thanks to Mr ——— for the preſent he intended him; but he has made it a rule not to accept any thing from any perſon engaged with the office: A rule which, whilſt he acknowledges Mr ——'s good intentions, he hopes he will not expect him to break through." With all this goodneſs, Mr Hanway had a certain ſingularity of thought and manners, which was perhaps the conſequence of his living the greater part of his life in foreign countries, and never having been married. He was not by any means an inattentive obſerver of the little forms of politeneſs: but as he had ſtudied them in various realms, ſelecting thoſe which he approved, his politeneſs differed from that of other people; and his converſation had an air of originality in it that was very pleaſing.

Beſides the works already mentioned in the courſe of this article, Mr Hanway was the author of a great number of others; his different publications amounting all together to between ſixty and ſeventy. A complete liſt of them is given by his biographer Mr Pugh, from whoſe grateful and well-written performance this article has been chiefly extracted. Hap, Happineſs.

HAP, or HAPP, in *Law*, ſignifies to catch or ſnatch a thing. Thus we meet with, to hap the poſſeſſion of a deed-poll. Littleton, fol. 8. alſo, to hap the rent. If partition be made between two parceners, and more land be allowed the one than the other, ſhe that hath moſt of the land charges it to the other, and happeth the rent whereon aſſize is brought.

HAPPINESS, or FELICITY, abſolutely taken, denotes the durable poſſeſſion of perfect good without any mixture of evil; or the enjoyment of pure pleaſure unalloyed with pain; or a ſtate in which all the wiſhes are ſatisfied: In which ſenſes, Happineſs is known only by name upon the earth. The word *happy*, when applied to any ſtate or condition of human life, will admit of no poſitive definition, but is merely a relative term: that is, when we call a man happy, we mean that he is happier than ſome others with whom we compare him; than the generality of others; or than he himſelf was in ſome other ſituation.

This intereſting ſubject has been treated by many eminent writers, and in a great variety of ways; but by none does it appear to have been ſet in a clearer and more definite point of view than by Archdeacon Paley in the ſixth chapter of his Principles of Philoſophy. "In ſtrictneſs (ſays that elegant writer), any condition may be denominated happy in which the amount or aggregate of pleaſure exceeds that of pain; and the degree of happineſs depends upon the quantity of this exceſs. And the greateſt quantity of it, ordinarily attainable in human life, is what we mean by happineſs, when we inquire or pronounce what human happineſs conſiſts in.

If any *poſitive* ſignification, diſtinct from what we mean by pleaſure, can be affixed to the term *happineſs*, it may be taken to denote a certain ſtate of the nervous ſyſtem in that part of the human frame in which we feel joy and grief, paſſions and affections. Whether this part be the heart, which the turn of moſt languages would lead us to believe; or the diaphragm, as Buffon, or the upper orifice of the ſtomach, as Van Helmont thought; or rather be a kind of fine network, lining the whole region of the præcordia, as others have imagined; it is poſſible not only that every painful ſenſation may violently ſhake and diſturb the fibres at the time, but that a ſeries of ſuch may at length ſo derange the very texture of the ſyſtem, as to produce a perpetual irritation, which will ſhow itſelf by fretfulneſs, reſtleſſneſs, and impatience. It is poſſible alſo, on the other hand, that a ſucceſſion of pleaſurable ſenſations may have ſuch an effect upon this ſubtle organization, as to cauſe the fibres to relax, and return into their place and order; and thereby to recover, or if not loſt to preſerve, that harmonious conformation which gives to the mind its ſenſe of complacency and ſatisfaction. This ſtate may be denominated *happineſs*: And is ſo far diſtinguiſhable from pleaſure, that it does not refer to any particular object of enjoyment, or conſiſt like pleaſure in the gratification of one or more of the ſenſes; but is rather the ſecondary

Happineſs. condary effect which ſuch objects and gratifications produce upon the nervous ſyſtem, or the ſtate in which they leave it. The comparative ſenſe, however, in which we have explained the term *happineſs*, is more popular; and in proſecuting the ſubject, we may conſider, 1. What human happineſs does not conſiſt in; and, 2. What it does conſiſt in.

I. *Firſt*, then, happineſs does not conſiſt in the pleaſures of ſenſe, in whatever profuſion or variety they be enjoyed. By the pleaſures of ſenſe are meant, as well the animal gratifications of eating, drinking, and that by which the ſpecies is continued, as the more refined pleaſures of muſic, painting, architecture, gardening, ſplendid ſhows, theatric exhibitions, and the pleaſures, laſtly, of active ſports, as of hunting, ſhooting, fiſhing, &c. For, 1. Theſe pleaſures continue but for a little while at a time. This is true of them all, eſpecially of the groſſer ſort. Laying aſide the preparation and the expectation, and computing ſtrictly the actual ſenſation, we ſhall be ſurpriſed to find how inconſiderable a portion of our time they occupy, how few hours in the four and twenty they are able to fill up. 2. By repetition, they loſe their reliſh. It is a property of the machine, for which we know no remedy, that the organs by which we perceive pleaſure are blunted and benumbed, by being frequently exerciſed in the ſame way. There is hardly any one who has not found the difference between a gratification when new and when familiar, and any pleaſure which does not become indifferent as it grows habitual. 3. The eagerneſs for high and intenſe delights takes away the reliſh from all others; and as ſuch delights fall rarely in our way, the greater part of our time becomes from this cauſe empty and uneaſy. There is hardly any deluſion by which men are greater ſufferers in their happineſs, than by their expecting too much from what is called *pleaſure*; that is, from thoſe intenſe delights which vulgarly engroſs the name of pleaſure. The very expectation ſpoils them. When they do come, we are often engaged in taking pains to perſuade ourſelves how much we are pleaſed, rather than enjoying any pleaſure which ſprings naturally out of the object. And whenever we depend upon being vaſtly delighted, we always go home ſecretly grieved at miſſing our aim. Likewiſe, as hath been obſerved juſt now, when this humour of being prodigiouſly delighted has once taken hold of the imagination, it hinders us from providing for acquieſcing in thoſe gently ſoothing engagements, the due variety and ſucceſſion of which are the only things that ſupply a continued ſtream of happineſs.

The truth ſeems to be, that there is a limit at which theſe pleaſures ſoon arrive, and from which they ever afterwards decline. They are by neceſſity of ſhort duration, as the organs cannot hold on their emotions beyond a certain length of time; and if you endeavour to compenſate for this imperfection in their nature by the frequency with which you repeat them, you loſe more than you gain by the fatigue of the faculties and the diminution of ſenſibility. We have in this account ſaid nothing of the loſs of opportunities or the decay of faculties, which whenever they happen leave the voluptuary deſtitute and deſperate; teaſed by deſires that can never be gratified, and the memory of pleaſures which muſt return no more. It will alſo be allowed by thoſe who have experienced it, and perhaps Happineſs. by thoſe alone, that pleaſure which is purchaſed by the encumbrance of our fortune is purchaſed too dear; the pleaſure never compenſating for the perpetual irritation of embarraſſed circumſtances.

Theſe pleaſures, after all, have their value: and as the young are always too eager in their purſuit of them, the old are ſometimes too remiſs; that is, too ſtudious of their eaſe to be at the pains for them which they really deſerve.

Secondly, Neither does happineſs conſiſt in an exemption from pain, labour, care, buſineſs, ſuſpenſe, moleſtation, and "thoſe evils which are without;" ſuch a ſtate being uſually attended not with eaſe, but with depreſſion of ſpirits, a taſteleſſneſs in all our ideas, imaginary anxieties, and the whole train of hypochondriacal affections. For which reaſon it ſeldom anſwers the expectations of thoſe who retire from their ſhops and counting-houſes to enjoy the remainder of their days in leiſure and tranquillity; much leſs of ſuch as in a fit of chagrin ſhut themſelves up in cloiſters and hermitages, or quit the world and their ſtations in it, for ſolitude and repoſe.

Where there exiſts a known external cauſe of uneaſineſs, the cauſe may be removed, and the uneaſineſs will ceaſe. But thoſe imaginary diſtreſſes which men feel for want of real ones (and which are equally tormenting, and ſo far equally real), as they depend upon no ſingle or aſſignable ſubject of uneaſineſs, ſo they admit oft-times of no application or relief. Hence a moderate pain, upon which the attention may faſten and ſpend itſelf, is to many a refreſhment; as a fit of the gout will ſometimes cure the ſpleen. And the ſame of any moderate agitation of the mind, as a literary controverſy, a law-ſuit, a conteſted election, and above all gaming; the paſſion for which, in men of fortune and liberal minds, is only to be accounted for on this principle.

Thirdly, Neither does happineſs conſiſt in greatneſs, rank, nor elevated ſtation.

Were it true that all ſuperiority afforded pleaſure, it would follow, that by how much we were the greater, that is, the more perſons we were ſuperior to, in the ſame proportion, ſo far as depended upon this cauſe, we ſhould be the happier; but ſo it is, that no ſuperiority yields any ſatisfaction, ſave that which we poſſeſs or obtain over thoſe with whom we immediately compare ourſelves. The ſhepherd perceives no pleaſure in his ſuperiority over his dog; the farmer in his ſuperiority over the ſhepherd; the lord in his ſuperiority over the farmer; nor the king, laſtly, in his ſuperiority over the lord. Superiority, where there is no competition, is ſeldom contemplated; what moſt men indeed are quite unconſcious of. But if the ſame ſhepherd can run, fight, or wreſtle, better than the peaſants of his village; if the farmer can ſhow better cattle, if he keeps a better horſe, or be ſuppoſed to have a longer purſe than any farmer in the hundred; if the lord have more intereſt in an election, greater favour at court, a better houſe, or larger eſtate, than any nobleman in the county; if the king poſſeſs a more extenſive territory, a more powerful fleet or army, a more ſplendid eſtabliſhment, more loyal ſubjects, or more weight and authority in adjuſting the affairs of nations, than any prince in Europe; in all theſe

Happineſs. caſes, the parties feel an actual ſatisfaction in their ſuperiority. No ſuperiority appears to be of any account but a ſuperiority over a rival. This, it is manifeſt, may exiſt wherever rivalſhips do; and rivalſhips fall out amongſt men of all ranks and degrees. The object of emulation, the dignity or magnitude of this object, makes no difference; as it is not what either poſſeſſes that conſtitutes the pleaſure, but what one poſſeſſes more than the other. Philoſophy ſmiles at the contempt with which the rich and great ſpeak of the petty ſtriſes and competitions of the poor; not reflecting that theſe ſtrifes and competitions are juſt as reaſonable as their own, and the pleaſure which ſucceſs affords the ſame.

It appears evident then, that happineſs does not conſiſt in greatneſs; ſince what are ſuppoſed to be the peculiar advantages of greatneſs, the pleaſures of ambition and ſuperiority, are in reality common to all conditions. But whether the purſuits of ambition be ever wiſe, whether they contribute more to the happineſs or miſery of the purſuers, is a different queſtion; and a queſtion concerning which we may be allowed to entertain great doubt. The pleaſure of ſucceſs is exquiſite; ſo alſo is the anxiety of the purſuit, and the pain of diſappointment; and what is the worſt part of the account, the pleaſure is ſhort-lived. We ſoon ceaſe to look back upon thoſe whom we have left behind; new conteſts are engaged in, new proſpects unfold themſelves; a ſucceſſion of ſtruggles is kept up, whilſt there is a rival left within the compaſs of our views and profeſſion; and when there is none, the pleaſure with the purſuit is at an end.

II. We have ſeen what happineſs does *not* conſiſt in. We are next to conſider in what it *does* conſiſt. In the conduct of life, the great matter is, to know before hand what will pleaſe us, and what pleaſures will hold out. So far as we know this, our choice will be juſtified by the event. And this knowledge is more rare and difficult than at firſt ſight it may ſeem to be: For ſometimes pleaſures, which are wonderfully alluring and flattering in the proſpect, turn out in the poſſeſſion extremely inſipid; or do not hold out as we expected: at other times pleaſures ſtart up, which never entered into our calculation, and which we might have miſſed of by not foreſeeing; from whence we have reaſon to believe, that we actually do miſs of many pleaſures from the ſame cauſe.

By reaſon of the original diverſity of taſte, capacity and conſtitution, obſervable in the human ſpecies, and the ſtill greater variety which habit and faſhion have introduced in theſe particulars; it is impoſſible to propoſe any plan of happineſs which will ſucceed to all, or any method of life which is univerſally eligible or practicable. All that can be ſaid is, that there remains a preſumption in favour of thoſe conditions of life in which men generally appear moſt cheerful and contented. For though the apparent happineſs of mankind be not always a true meaſure of their real happineſs, it is the beſt meaſure we have.

Upon this principle, then, happineſs appears to conſiſt,

1. In the exerciſe of the ſocial affections.—— Thoſe perſons commonly poſſeſs good ſpirits who have about them many objects of affection and endearment; as wife, children, kindred, friends: and to the want of theſe may be imputed the peeviſhneſs of monks and of ſuch as lead a monaſtic life. Of the ſame nature with the indulgence of our domeſtic affections, and equally refreſhing to the ſpirits, is the pleaſure which reſults from acts of bounty and beneficence, exerciſed either in giving money, or in imparting to thoſe who want it the aſſiſtance of our ſkill and profeſſion. Happineſs.

2. Another main article of human happineſs is, the exerciſe of our faculties, either of body or mind, in the purſuit of ſome engaging end.

It ſeems to be true, that no plenitude of preſent gratifications can make the poſſeſſor happy for a continuance, unleſs he have ſomething in reſerve, ſomething to hope for and look forward to. This may be inferred from comparing the alacrity and ſpirits of men who are engaged in any purſuit which intereſts them, with the dejection and *ennui* of almoſt all who are either born to ſo much that they want nothing more, or who have *uſed up* their ſatisfactions too ſoon and drained the ſources of them. It is this intolerable vacuity of mind which carries the rich and great to the horſe-courſe and the gaming table; and often engages them in conteſts and purſuits, of which the ſucceſs bears no proportion to the ſolicitude and expence with which it is ſought.

The queſtion now occurs, How we are to provide ourſelves with a ſucceſſion of pleaſurable engagements? This requires two things: Judgment in the choice of ends adapted to our opportunities; and a command of imagination, ſo as to be able, when the judgment has made choice of an end, to transfer a pleaſure to the *means;* after which the end may be forgotten as ſoon as we will. Hence thoſe pleaſures are moſt valuable, not which are moſt exquiſite in the fruition, but moſt productive of engagement and activity in the purſuit.

A man who is in earneſt in his endeavours after the happineſs of a future ſtate, has in this reſpect an advantage over all the world. For he has conſtantly before his eyes an object of ſupreme importance, productive of perpetual engagement and activity, and of which the purſuit (which can be ſaid of no purſuit beſides) laſts him to his life's end. Yet even he muſt have many ends beſide the far end; but then they will conduct to that, be ſubordinate, and in ſome way or other capable of being referred to that, and derive their ſatisfaction, or an addition of ſatisfaction, from that.

Engagement is every thing. The more ſignificant, however, our engagements are, the better; ſuch as the planning of laws, inſtitutions, manufactures, charities, improvements, public works, and the endeavouring by our intereſt, addreſs, ſolicitations, and activity, to carry them into effect: Or upon a ſmaller ſcale, the procuring of a maintenance and fortune for our families, by a courſe of induſtry and application to our callings, which forms and gives motion to the common occupations of life; training up a child; proſecuting a ſcheme for his future eſtabliſhment; making ourſelves maſters of a language or a ſcience; improving or managing an eſtate; labouring after a piece of preferment: And, laſtly, any engagement which is innocent is better than none; as the writing of a book, the building of a houſe, the laying out of a garden, the digging of a fiſh-pond; even the raiſing of a cucumber or a tulip. Whilſt the mind is taken up with the objects or buſineſs before it, we are commonly happy, whatever

Happineſs. whatever the object or buſineſs be: when the mind is abſent, and the thoughts are wandering to ſomething elſe than what is paſſing in the place in which we are, we are often miſerable.

3. The art in which the ſecret of human happineſs in a great meaſure conſiſts, is to ſet the habits in ſuch a manner, that every change may be a change for the better. The habits themſelves are much the ſame; for whatever is made habitual becomes ſmooth, and eaſy, and indifferent. The return to an old habit is likewiſe eaſy, whatever the habit be. Therefore the advantage is with thoſe habits which allow of indulgence in the deviation from them. The luxurious receive no greater pleaſure from their dainties than the peaſant does from his bread and cheeſe; but the peaſant whenever he goes abroad finds a feaſt, whereas the epicure muſt be well entertained to eſcape diſguſt. Thoſe who ſpend every day at cards, and thoſe who go every day to plough, paſs their time much alike; intent upon what they are about, wanting nothing, regretting nothing, they are both in a ſtate of eaſe: But then, whatever ſuſpends the occupation of the card-player diſtreſſes him; whereas to the labourer every interruption is a refreſhment: and this appears in the different effect that the Sabbath produces upon the two, which proves a day of recreation to the one, but a lamentable burden to the other. The man who has learned to live alone, feels his ſpirits enlivened whenever he enters into company, and takes his leave without regret: another, who has long been accuſtomed to a crowd or continual ſucceſſion of company, experiences in company no elevation of ſpirits, nor any greater ſatisfaction than what the man of a retired life finds in his chimney-corner. So far their conditions are equal: but let a change of place, fortune, or ſituation, ſeparate the companion from his circle, his viſitors, his club, common-room, or coffee-houſe, and the difference of advantage in the choice and conſtitution of the two habits will ſhow itſelf. Solitude comes to the one clothed with melancholy: to the other it brings liberty and quiet. You will ſee the one fretful and reſtleſs, at a loſs how to diſpoſe of his time, till the hour comes round that he can forget himſelf in bed: the other eaſy and ſatisfied, taking up his book or his pipe as ſoon as he finds himſelf alone; ready to admit any little amuſement that caſts up, or to turn his hands and attention to the firſt buſineſs that preſents itſelf; or content without either to ſit ſtill, and let his trains of thought glide indolently through his brain, without much uſe perhaps or pleaſure, but without hankering after any thing better, and without irritation. A reader who has inured himſelf to books of ſcience and argumentation, if a novel, a well-written pamphlet, an article of news, a narrative of a curious voyage, or the journal of a traveller, fall in his way, ſits down to the repaſt with reliſh, enjoys his entertainment while it laſts, and can return when it is over to his graver reading without diſtaſte. Another, with whom nothing will go down but works of humour and pleaſantry, or whoſe curioſity muſt be intereſted by perpetual novelty, will conſume a bookſeller's window in half a forenoon; during which time he is rather in ſearch of diverſion than diverted: and as books to his taſte are few and ſhort, and rapidly read over, the ſtock is ſoon exhauſted, when he is left without reſource from this principal ſupply of innocent amuſement. Happineſs || Harangue.

So far as circumſtances of fortune conduce to happineſs, it is not the income which any man poſſeſſes, but the increaſe of income that affords the pleaſure. Two perſons, of whom one begins with 100l. and advances his income to 1000l. a-year; and the other ſets off with 1000l. and dwindles down to 100l. may, in the courſe of their time, have the receipt and ſpending of the ſame ſum of money: yet their ſatisfaction, ſo far as fortune is concerned in it, will be very different: the ſeries and ſum total of their incomes being the ſame, it makes a wide difference which end they begin at.

4. Happineſs conſiſts in health; underſtanding by health, not only freedom from bodily diſtempers, but alſo that tranquillity, firmneſs, and alacrity of mind, which we call *good ſpirits*. For the ſake of health, according to this notion of it, no ſacrifices can be too great. Whether it require us to relinquiſh lucrative ſituations, to abſtain from favourite indulgencies, to controul intemperate paſſions, or undergo tedious regimens; whatever difficulties it lays us under, a man, who purſues his happineſs rationally and reſolutely, will be content to ſubmit to. When we are in perfect health and ſpirits, we feel in ourſelves a happineſs independent of any particular outward gratification whatever, and of which we can give no account. This is an enjoyment which the Deity has annexed to life; and probably conſtitutes, in a great meaſure, the happineſs of infants and brutes, eſpecially of the lower and ſedentary orders of animals, as of oyſters, periwinkles, and the like.

The above account of human happineſs will juſtify theſe two concluſions, which, although found in moſt books of morality, have ſeldom been ſupported by any ſufficient reaſons: 1. "That happineſs is pretty equally diſtributed amongſt the different orders of civil ſociety; and, 2. That vice has no advantage over virtue, even with reſpect to this world's happineſs."

HAQUE, in our old writers, a little hand-gun, prohibited to be uſed for deſtruction of game, &c. by ſtatute 33 Hen. VIII. cap. 6. and 2 and 3 Ed. VI. cap. 14. There is alſo the half-haque, or demi-haque, within the ſaid acts.

HARAM. See SERAGLIO.

HARAN, CHARRAN, or CHARRÆ in Meſopotamia, a city celebrated for having been the place where Abraham firſt retreated after he left Ur (Gen. xi. 31, 32.); and where Terah, Abraham's father, died and was buried. Thither it was likewiſe that Jacob retired to Laban when he fled from the indignation of his brother Eſau (id. xxvii. 45. xxviii. 10, &c.) Laſtly, at Haran or Charræ in Meſopotamia, Craſſus the Roman general was defeated and killed by the Parthians. Haran was ſituated between the Euphrates and the river Chebar, at a conſiderable diſtance from the place where theſe two rivers join.

HARANGUE, a modern French name for a ſpeech or oration made by an orator in public.—Menage derives the word from the Italian *arenga*, which ſignifies the ſame; formed, according to Ferrari, from *arringo*, "a juſt, or place of juſting." Others derive it from

Harangues || Harderwick.

the Latin *ara*, "altar;" by reaſon the firſt harangues were made before altars; whence the verſe of Juvenal,

Aut Lugdunenſis rhetor dicturus ad aram.

Harangues were uſually made by the generals, previous to an engagement both amongſt the Greeks and Romans. An harangue on ſuch occaſions was called *allocutio*. See ALLOCUTIO.

The word is alſo frequently uſed in an ill ſenſe, viz. for a too pompous, prolix, or unſeaſonable ſpeech or declamation.

HARBINGER, an officer of the king's houſehold, having four yeomen under him, who ride a day's journey before the court when it travels, to provide lodgings, &c.

HARBOROUGH, a town of Leiceſterſhire, 84 miles from London. It is a great thoroughfare in the road to Derby, near the ſource of the river Welland; and was famous, in Camden's time, for its beaſt fair, where the beſt horſes and colts are ſtill ſold. Its fairs are April 29. and Oct. 19. The market is on Tueſday, for the uſe of which the earl of Harborough built a neat market-houſe at his own expence. W. Long. 0. 52. N. Lat. 52. 28.

HARBOUR, a general name given to any ſea-port or haven; as alſo to any place convenient for mooring ſhipping, although at a great diſtance from the ſea. The qualities requiſite in a good harbour are, that the bottom be entirely free from rocks or ſhallows; that the opening be of ſufficient extent to admit the entrance or departure of large ſhips without difficulty; that it ſhould have good anchoring-ground, and be eaſy of acceſs; that it ſhould be well defended from the violence of the wind and ſea; that it ſhould have room and convenience to receive the ſhipping of different nations, and thoſe which are laden with different merchandiſes; that it be furniſhed with a good light-houſe, and have variety of proper rings, poſts, moorings, &c. in order to remove or ſecure the veſſels contained therein; and, finally, that it have plenty of wood, and other materials for firing, beſides hemp, iron, mariners, &c.

HARBURG, a ſmall town of Germany, in the circle of Lower Saxony, and duchy of Lunenburg, ſeated on the river Elbe oppoſite to Hamburg. It was ſurrounded with walls in 1355; and 30 years after, a ſtrong caſtle, which ſtill remains, was built by the biſhop. E. Long. 9. 41. N. Lat. 53. 51.

HARCOURT, a town of France, in the department of Calvados, about 12 miles ſouth of Caen. From it a once noble family in France, derived their ducal title; and from it alſo, it is ſaid, ſprang the noble family of the ſame name in England.

HARDBERG, a town of Germany, in the duchy of Stiria, 52 miles ſouth of Vienna. E. Long. 16. 12. N. Lat. 47. 22.

HARDENBERG, a town of Weſtphalia, in the duchy of Berg, 13 miles eaſt-north-eaſt of Duſſeldorf. E. Long. 6. 43. N. Lat. 51. 19.

HARDENING, the giving a greater degree of hardneſs to bodies than they had before.

There are ſeveral ways of hardening iron and ſteel, as by hammering them, quenching them in cold water, &c. See STEEL.

Caſe-Hardening. See *Case-Hardening*.

HARDERWICK, a town of the United Provinces, in Dutch Guelderland. It is a well-built town, and the chief of the ſea-ports of this province. It has ſeveral good buildings, particularly the great church, which is much admired. In 1648 the public ſchool here was turned into an univerſity. The French did it a great deal of damage in 1672; ſince which time it has been on the decline. E. Long. 5. 40. N. Lat. 52. 23.

Hardneſs.

HARDNESS, in bodies, a property directly oppoſite to fluidity; by which they reſiſt the impreſſion of any other ſubſtance, ſometimes in an extreme degree. As fluidity has been found to conſiſt in the motion of the particles of a body upon one another in conſequence of a certain action of the univerſal fluid or elementary fire among them; we muſt conclude that hardneſs conſiſts in the abſence of this action, or a deficiency of what is called *latent heat*. This is confirmed by obſerving, that there is an intermediate ſtate betwixt hardneſs and fluidity, in which bodies will yield to a certain force, though they ſtill make a conſiderable reſiſtance. This is principally obſerved in the metals, and is the foundation of their ductility. It appears indeed, that this laſt property, as well as fluidity, is entirely dependent on a certain quantity of latent heat abſorbed, or otherwiſe acting within the ſubſtance itſelf; for all the metals are rendered hard by hammering, and ſoft by being put again into the fire and kept there for ſome time. The former operation renders them hot as well as hard; probably, as Dr Black obſerves, becauſe the particles of metal are thus forced nearer one another, and thoſe of fire ſqueezed out from among them. By keeping them for ſome time in the fire, that element inſinuates itſelf again among the particles, and arranges them in the ſame manner as before, ſo that the ductility returns. By a ſecond hammering this property is again deſtroyed, returning on a repetition of the heating or *annealing* as it is called; and ſo on, as often as we pleaſe.

Hardneſs appears to diminiſh the coheſion of bodies in ſome degree, though their fragility does not by any means keep pace with their hardneſs. Thus, glaſs is very hard and very brittle; but flint, though ſtill harder than glaſs, is much leſs brittle. Among the metals, however, theſe two properties ſeem to be more connected, though even here the connexion is by no means complete. Steel, the hardeſt of all the metals, is indeed the moſt brittle; but lead, the ſofteſt, is not the moſt ductile. Neither is hardneſs connected with the ſpecific gravity of bodies; for a diamond, the hardeſt ſubſtance in nature, is little more than half the weight of the lighteſt metal. As little is it connected with the coldneſs, electrical properties, or any other quality with which we are acquainted; ſo that though the principle above laid down may be accepted as a general foundation for our inquiries, a great number of particulars remain yet to be diſcovered before we can offer any ſatisfactory explanation.

All bodies become harder by cold; but this is not the only means of their doing ſo, for ſome become hard by heat as well as cold. Thus, water becomes hard by cold when it is frozen, but it becomes much harder when its ſteam is paſſed over red-hot iron, and it enters the ſubſtance of the metal, by an union with which it becomes almoſt as hard as glaſs.

Dr Quiſt and others have conſtructed tables of the hardneſs

Hardneſs || Hare.

hardneſs of different ſubſtances. The method purſued in conſtructing theſe tables was by obſerving the order in which they were able to cut or make any impreſſion upon one another. The following table, extracted from M. Magellan's edition of Cronſtedt's Mineralogy, was taken from Dr Quiſt, Bergman, and Mr Kirwan. The firſt column ſhows the hardneſs, and the ſecond the ſpecific gravity.

Diamond from Ormus.	20	—	3.7
Pink diamond	19	—	3.4
Bluiſh diamond	19	—	3.3
Yellowiſh diamond	19	—	3.3
Cubic diamond	18	—	3.2
Ruby	17	—	4.2
Pale ruby from Brazil	16	—	3.5
Ruby ſpinell	13	—	3.4
Deep blue ſapphire	16	—	3.8
Ditto paler	17	—	3.8
Topaz	15	—	4.2
Whitiſh ditto	14	—	3.5
Bohemian ditto	11	—	2.8
Emerald	12	—	2.8
Garnet	12	—	4.4
Agate	12	—	2.6
Onyx	12	—	2.6
Sardonyx	12	—	2.6
Occid. amethyſt	11	—	2.7
Cryſtal	11	—	2.6
Cornelian	11	—	2.7
Green jaſper	11	—	2.7
Reddiſh yellow ditto	9	—	2.6
Schoerl	10	—	3.6
Tourmaline	10	—	3.0
Quartz	10	—	2.7
Opal	10	—	2.6
Chryſolite	10	—	3.7
Zeolite	8	—	2.1
Fluor	7	—	3.5
Calcareous ſpar	6	—	2.7
Gypſum	5	—	2.3
Chalk	3	—	2.7

HARDOUIN, JOHN, a learned French Jeſuit in the beginning of the 18th century, known by the remarkable paradoxes he advanced in his writings; this in particular, That all the works of the ancient profane writers, except Cicero's works, Virgil's Georgics, Horace's ſatires and epiſtles, and Pliny's natural hiſtory, are mere forgeries. He died at Paris in 1729, aged 83. His principal works are, 1. An edition of Pliny's natural hiſtory, with notes, which is much eſteemed. 2. An edition of the councils, which made much noiſe. 3. Chronology reſtored by medals, 4to. 4. A commentary on the New Teſtament, folio; in which he pretends that our Saviour and his apoſtles preached in Latin, &c.

HARDWICKE. See YORK.

HARE. See LEPUS, MAMMALIA *Index*.

The hare is a beaſt of venery, or of the foreſt, but peculiarly ſo termed in the ſecond year of her age. There are reckoned four ſorts of them, from the place of their abode: ſome live in the mountains, ſome in the fields, ſome in marſhes, and ſome wander about every where. The mountain-hares are the ſwifteſt, the field-hares are not ſo nimble, and thoſe of the marſhes are the ſloweſt; but the wandering hares are the moſt cunning in the paths and mazes of the fields, for, knowing the neareſt ways, they run up the hills and rocks, to the confuſion of the dogs. See HUNTING. Hare.

Hares and rabbits are very miſchievous to new planted orchards, by peeling off the bark of the young trees for food. They do alſo the ſame ſort of miſchief to nurſeries; for the prevention of which, ſome bind ropes about the trees up to a ſufficient height; ſome daub them with tar; but though this keeps off the hares, it is itſelf miſchievous to the trees; but this hurtful property of it is in ſome degree taken off by mixing any kind of fat or greaſe with it, and incorporating them well over the fire. This mixture is to be rubbed over the lower part of the trees in November, and will preſerve them till that time the next year, without any danger from theſe animals. It is only in the hard weather in the winter ſeaſon, when other food is ſcarce, that theſe creatures feed on the barks of trees.

People who have the care of warrens, pretend to make hares fat by ſtopping up their ears with wax, and rendering them deaf. The hare is ſo timorous a creature, that ſhe is continually liſtening after every noiſe, and will run a long way on the leaſt ſuſpicion of danger; ſo that ſhe always eats in terror, and runs herſelf out of fleſh continually. Theſe are both prevented by her feeding without apprehenſion.

Java HARE. See MUS, MAMMALIA *Index*.

HARES *Ear*. See BUPLEURUM, BOTANY *Index*.

HARE, *Dr Francis*, an Engliſh biſhop, of whoſe birth we have no particulars, was bred at Eton ſchool, and from that foundation became a member of King's college, Cambridge; where he had the tuition of the marquis of Blandford, only ſon of the illuſtrious duke of Marlborough, who appointed him chaplain-general to the army. He afterwards obtained the deanery of Worceſter, and from thence was promoted to the biſhopric of Chicheſter, which he held with the deanery of St Paul's to his death, which happened in 1740. He was diſmiſſed from being chaplain to George I. in 1718, by the ſtrength of party prejudices, in company with Dr Moſs and Dr Sherlock, perſons of diſtinguiſhed rank for parts and learning. About the latter end of Queen Anne's reign he publiſhed a remarkable pamphlet, intitled, The difficulties and diſcouragements which attend the ſtudy of the Scriptures, in the way of private judgment: in order to ſhow, that ſince ſuch a ſtudy of the Scriptures is an indiſpenſable duty, it concerns all Chriſtian ſocieties to remove, as much as poſſible, thoſe diſcouragements. In this work, his manner appeared to be ſo ludicrous, that the convocation fell upon him, as if he were really againſt the ſtudy of the Holy Scriptures: and Whiſton ſays, that finding this piece likely to hinder that preferment he was ſeeking for, he aimed to conceal his being the author. He publiſhed many pieces againſt Biſhop Hoadley, in the Bangorian Controverſy, as it is called; and alſo other learned works, which were collected after his death, and publiſhed in four vols 8vo. 2. An edition of Terence, with notes, in 4to. 3. The book of Pſalms in the Hebrew, put into the original poetical metre, 4to. In this laſt work, he pretends to have diſcovered the Hebrew metre, which was ſuppoſed to be irretrievably loſt. But his hypotheſis, though defend-

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Haresbury || Harleian.

ed by some, yet has been confuted by several learned men, particularly by Dr Lowth in his *Metricæ Harleianæ brevis confutatio*, annexed to his lectures *De Sacra Poesi Hebræorum*.

HARESBURY, a town of Wiltshire, on the Willy, near Warminster, 94 miles from London, is in old records called *Heightsbury*, or *Heytsbury;* and now it is written Hatchbury. It was once the seat of the empress Maud. Here are fairs on May 14th and September 15th; and it has sent members to parliament ever since Henry VI. it being an ancient borough by prescription.

HARFLEUR, an ancient town of France, in the department of the Lower Seine; but is now a poor place, on account of its fortifications being demolished, and its harbour choaked up. It was taken by the English, by assault, in the year 1415. It is seated on the river Lizarna, near the Seine, five miles from Havre de Grace, forty north-west of Rouen, and 106 north-west of Paris. E. Long. 0. 17. N. Lat. 49. 30.

HARIOT, or HERIOT, in *Law*, a due belonging to a lord at the death of his tenant, consisting of the best beast, either horse, or cow, or ox, which he had at the time of his death; and in some manors the best goods, piece of plate, &c. are called hariots.

HARIOT, *Thomas*. See HARRIOT.

HARLECH, a town of Merionethshire, in North Wales. It is seated on a rock, on the sea-shore; and is but a poor place, though the shire-town, and sends a member to parliament. It had formerly a strong handsome castle, which was a garrison for Charles I. in the civil wars, for which reason it was afterwards demolished by the parliament. W. Long. 4. 0. N. Lat. 54. 47.

HARLEIAN COLLECTION, a most valuable collection of useful and curious manuscripts, begun near the end of the 17th century, by Robert Harley of Bramton Bryan, Esq. in Herefordshire, afterwards earl of Oxford and lord high-treasurer; and which was conducted upon the plan of the great Sir Robert Cotton. He published his first considerable collection in August 1705, and in less than ten years he got together near 2500 rare and curious MSS. Soon after this, the celebrated Dr George Hicks, Mr Anstis garter king at arms, Bishop Nicolson, and many other eminent antiquaries, not only offered him their assistance in procuring MSS. but presented him with several that were very valuable. Being thus encouraged to perseverance by his success, he kept many persons employed in purchasing MSS. for him abroad, giving them written instructions for their conduct. By these means the MS. library was, in the year 1721, increased to near 6000 books, 14,000 original charters, and 500 rolls.

On the 21st of May 1724 Lord Oxford died: but his son Edward, who succeeded to his honours and estate, still farther enlarged the collection; so that when he died, June 16th 1741, it consisted of 8000 volumes, several of them containing distinct and independent treatises, besides many loose papers which have been since sorted and bound up in volumes; and above 40,000 original rolls, charters, letters patent, grants, and other deeds and instruments of great antiquity.

The principal design of making this collection was the establishment of a MS. English historical library, and the rescuing from destruction such national records as had eluded the diligence of preceding collectors: but Lord Oxford's plan was more extensive; for his collection abounds also with curious MSS. in every science. This collection is now in the British Museum; and an enumeration of its contents may be seen in the Annual Register, vi. 140, &c.

Harlem || Harley.

HARLEM, a town of the United Provinces, in Holland, situated on the river Sparren, in E. Long. 4. 38. N. Lat. 52. 24. It is a large and populous city, and stands near a lake of the same name, with which it has a communication, as well as with Amsterdam and Leyden, by means of several canals. Schemes have been often formed for draining of this lake, but were never put in execution. To the south of the town lies a wood, cut into delightful walks and vistas. The town is famous for the siege which it held out against the Spaniards for ten months in 1573; the townsmen, before they capitulated, being reduced to eat the vilest animals, and even leather and grass. The inhabitants corresponded with the prince of Orange for a considerable time by means of carrier-pigeons. Harlem, as is well known, claims the invention of printing; and in fact, the first essays of the art are indisputably to be attributed to Laurentius, a magistrate of that city. [See LAURENTIUS, and *(History of)* PRINTING.] Before the Reformation, Harlem was a bishop's see; and the Papists still greatly outnumber the Protestants. An academy of sciences was founded here in 1752. Vast quantities of linen and thread are bleached here; the waters of the lake having a peculiar quality, which renders them very fit for that purpose.—A sort of phrensy with regard to flowers, particularly tulips, once prevailed here, in consequence of which the most beautiful sorts were bought and sold at an extravagant price.

HARLEQUIN, in the Italian comedy, a buffoon, dressed in party-coloured clothes; answering much the same purpose as a merry-andrew or jack-pudding in our drolls, on mountebanks, stages, &c. We have also introduced the harlequin upon our theatres; and this is one of the standing characters in the modern grotesque or pantomime entertainments. The term took its rise from a famous Italian comedian who came to Paris under Henry III. and who frequenting the house of M. de Harlay, his companions used to call him Harlequino, q. d. little Harlay; a name which has descended to all those of the same rank and profession.

HARLEY, ROBERT, earl of Oxford and Mortimer, was the eldest son of Sir Edward Harley, and born in 1661. At the Revolution, Sir Edward and his son raised a troop of horse at their own expence; and after the accession of King William and Queen Mary, he obtained a seat in parliament. His promotions were rapid. In 1702, he was chosen speaker of the house of commons; in 1704, he was sworn of Queen Anne's privy council, and the same year made secretary of state; in 1706, he acted as one of the commissioners for the treaty of union; and in 1710 was appointed a commissioner of the treasury, and chancellor and under-treasurer of the exchequer. A daring attempt was made on his life, March 8. 1711, by the marquis of Guiscard a French Papist; who, when under an examination before a committee of the privy council, stabbed him with a penknife. Of this wound, however, he soon recover-

ed;

Harling || Harlot

ed; and was the same year created earl of Oxford, and lord high-treasurer, which office he resigned just before the queen's death. He was impeached of high treason in 1715, and committed to the tower; but was cleared by trial, and died in 1724. His character has been variously represented, but cannot be here discussed. He was not only an encourager of literature, but the greatest collector in his time of curious books and MSS. his collection of which makes a capital part of the British Museum. See *Harleian Collection.*

HARLING. See HERLING.

HARLINGEN, a sea-port town of the United Netherlands, in West Friesland. It stands on the coast of the Zuyder sea, at the mouth of a large canal, in E. Long. 5. 14. N. Lat. 53. 9. It was only a hamlet till about the year 1234, when it was destroyed by the sea; and being afterwards rebuilt, became a considerable town. In 1579, it was considerably enlarged by the care of William prince of Orange. It is now very well fortified, and is naturally strong, as the adjacent country can very easily be laid under water. The city is square; and the streets are handsome, straight, and clean, with canals in the middle of them. It has five gates; four towards the land, and one towards the sea; but though the harbour is good, yet vessels of great burden cannot get into it until they are lightened, for want of water. The admiralty college of Friesland has its seat here. The manufactures are salt, bricks, and tiles, a considerable trade is also carried on in all sorts of linen cloth, and the adjacent country yields abundance of corn and good pastures.

HARLOCH, or HARLEICH, a town of Merionethshire, in North Wales, 223 miles from London, on the sea coast, near the north-west point of the county. It is naturally strong, a garrison being kept here for the security of the coast. Its castle lies now in ruins. The town, though a corporation and governed by a mayor, makes but a very mean appearance. It has a market on Saturdays, and four fairs in the year.

HARLOT, a woman given to incontinency, or that makes a habit or a trade of prostituting her body. —The word is supposed to be used for the diminutive *whorelet*, a "little whore."—Others derive it from *Arletta*, mistress to Robert duke of Normandy, and mother to William the Conqueror: Camden derives it from one *Arlotha*, concubine to William the Conqueror: Others from the Italian *Arlotta*, "a proud whore."

Harlots were tolerated amongst Jews, Greeks, and Romans. Fornication indeed was prohibited among the Jews, under severe penalties; but those they explained as extending only to women of their own nation. The public stews were therefore stocked with foreign prostitutes, who seem to have been taken under the protection of government. Hence appears the reason why the word *strange woman* is often found to signify a harlot. Prostitutes at first wore veils or masks; but by and by their modesty was entirely put to flight, and they went abroad bare-faced. At Athens the prostitutes were generally strangers; and such as debauched an Athenian female were liable to a penalty. To frequent the public stews was not held disgraceful! The wisest of the Heathen sages allowed it! Solon permitted common whores to go publicly to the young men who had engaged them, and encouraged the youth of Athens to gratify their lust with these, rather than seduce and debauch the wives or daughters of citizens. Cato the censor was of the same sentiments; and Cicero challenges all persons to name a time when men were either reproved for this practice, or not countenanced in it. Amongst the Jews, the harlots used to ply in the highways and streets of cities; at Athens they frequented the ceramicus, sciros, and the old forum.—In some places they were distinguished by their dress from other women. Corinth was a remarkable nursery of harlots, and gave birth to the noted Laïs. Their accomplishments were oftentimes great, in all the polite and elegant parts of female education, viz. philosophy, dancing, singing, rhetoric, &c. Aspasia, the mistress of Pericles, was admired by Socrates for her learning. The more accomplished prostitutes frequently amassed large fortunes: a remarkable instance of which we have in Phryne, who offered to rebuild the walls of Thebes, when destroyed by Alexander, on condition that they would perpetuate her memory and profession by an inscription. Prostitutes at Rome were obliged to fix a bill over their doors, indicating their character and profession. It was also customary for them to change their names, after they had signified to the prætor their intention of leading such a dissolute life: this they did, because their trade was unbecoming their birth and condition; but they reassumed their family names when they quitted their infamous mode of living. Women whose grandfather, father, or husband, had been a Roman knight, were forbidden by the laws to make a public profession of lewdness.

Harmattan

HARMATTAN, the name of a remarkable periodical wind which blows from the interior parts of Africa towards the Atlantic ocean. Of this wind we have the following account in the Phil. Trans. vol. lxxi. furnished by Mr Norris, a gentleman who had frequent opportunities of observing its singular properties and effects.

On that part of the coast of Africa which lies between Cape Verd and Cape Lopez, an easterly wind prevails during the months of December, January, and February, which by the Fantees, a nation on the Gold coast, is called the *Harmattan*. Cape Verd is in 15° N. Lat. and Cape Lopez in 1° S. Lat.; and the coast between these two capes runs, in an oblique direction, nearly from W. S. W. to E. S. E. forming a range of upwards of 2100 miles. At the isles de Los, which are a little to the northward of Sierra Leone, and to the southward of Cape Verd, it blows from the E. S. E. on the Gold coast from the N. E. and at Cape Lopez, and the river Gabon, from the N. N. E. This wind is by the French and Portuguese, who frequent the Gold coast, called simply the north-east wind, the quarter from which it blows. The English, who sometimes borrow words and phrases from the Fantee language, which is less guttural and more harmonious than that of their neighbours, adopt the Fantee word Harmattan.

The harmattan comes on indiscriminately at any hour of the day, at any time of the tide, or at any period of the moon, and continues sometimes only a day or two, sometimes five or six days, and it has been known to last fifteen or sixteen days. There are generally three or four returns of it every season. It blows with a moderate force, not quite so strong as the sea-

breeze

Harmattan. breeze (which every day ſets in during the fair ſeaſon from the W., W. S. W., and S. W.); but ſomewhat ſtronger than the land wind at night from the N. and N. N. W.

1. A fog or haze is one of the peculiarities which always accompanies the harmattan. The gloom occaſioned by this fog is ſo great, as ſometimes to make even near objects obſcure. The Engliſh fort at Whydah ſtands about the midway between the French and Portugueſe forts, and not quite a quarter of a mile from either, yet very often from thence neither of the other forts can be diſcovered. The ſun, concealed the greateſt part of the day, appears only a few hours about noon, and then of a mild red, exciting no painful ſenſation on the eye.

2. Extreme dryneſs makes another extraordinary property of this wind. No dew falls during the continuance of the harmattan; nor is there the leaſt appearance of moiſture in the atmoſphere. Vegetables of every kind are very much injured; all tender plants, and moſt of the productions of the garden, are deſtroyed; the graſs withers, and becomes dry like hay; the vigorous evergreens likewiſe feel its pernicious influence; the branches of the lemon, orange, and lime trees droop, the leaves become flaccid, wither, and if the harmattan continues to blow for 10 or 12 days, are ſo parched, as to be eaſily rubbed to duſt between the fingers: the fruit of theſe trees, deprived of its nouriſhment, and ſtinted in its growth, only appears to ripen, for it becomes yellow and dry, without acquiring half the uſual ſize. The natives take this opportunity of the extreme dryneſs of the graſs and young trees to ſet fire to them, eſpecially near their roads, not only to keep thoſe roads open to travellers, but to deſtroy the ſhelter which long graſs, and thickets of young trees, would afford to ſkulking parties of their enemies. A fire thus lighted flies with ſuch rapidity, as to endanger thoſe who travel: in that ſituation, a common method of eſcape is, on diſcovering a fire to windward, to ſet the graſs on fire to leeward, and then follow your own fire. There are other extraordinary effects produced by the extreme dryneſs of the harmattan.

The parching effects of this wind are likewiſe evident on the external parts of the body. The eyes, noſtrils, lips, and palate, are rendered dry and uneaſy, and drink is often required, not ſo much to quench thirſt, as to remove a painful aridity in the fauces. The lips and noſe become ſore, and even chapped; and though the air be cool, yet there is a troubleſome ſenſation of prickling heat on the ſkin. If the harmattan continues four or five days, the ſcarf ſkin peels off, firſt from the hands and face, and afterwards from the other parts of the body if it continues a day or two longer. Mr Norris obſerved, that when ſweat was excited by exerciſe on thoſe parts which were covered by his clothes from the weather, it was peculiarly acrid, and taſted, on applying his tongue to his arm, ſomething like ſpirits of hartſhorn diluted with water.

3. Salubrity forms a third peculiarity of the harmattan. Though this wind is ſo very prejudicial to vegetable life, and occaſions ſuch diſagreeable parching effects on the human ſpecies, yet it is highly conducive to health. Thoſe labouring under fluxes and intermitting fevers generally recover in an harmattan. Thoſe weakened by fevers, and ſinking under evacuations for the cure of them, particularly bleeding, which is often injudiciouſly repeated, have their lives ſaved, and vigour reſtored, in ſpite of the doctor. It ſtops the progreſs of epidemics; the ſmallpox, remittent fevers, &c. not only diſappear, but thoſe labouring under theſe diſeaſes, when an harmattan comes on, are almoſt certain of a ſpeedy recovery. Infection appears not then to be eaſily communicated even by art. In the year 1770, there were on board the Unity, at Whydah, above 300 ſlaves; the ſmallpox broke out among them, and it was determined to inoculate; thoſe who were inoculated before the harmattan came on, got very well through the diſeaſe. About 70 were inoculated a day or two after the harmattan ſet in, but no one of them had either ſickneſs or eruption. It was imagined that the infection was effectually diſperſed, and the ſhip clear of the diſorder; but in a very few weeks it began to appear among thoſe ſeventy. About 50 of them were inoculated the ſecond time; the others had the diſeaſe in a natural way: an harmattan came on, and they all recovered, excepting one girl, who had an ugly ulcer on the inoculated part, and died ſome time afterwards of a locked jaw. Harmattan || Harmonia.

This account differs remarkably from that given by Dr Lind, who calls the harmattan a malignant and fatal wind: (See his *Diſeaſes of Hot Climates.*) As to the nature of the ſoil over which it blows, it appears that, excepting a few rivers and ſome lakes, the country about and beyond Whydah is covered for 400 miles back with verdure, open plains of graſs, clumps of trees, and ſome woods of no conſiderable extent. The ſurface is ſandy, and below that a rich reddiſh earth. It riſes with a gentle aſcent for 150 miles from the ſea, before there is the appearance of a hill, without affording a ſtone of the ſize of a walnut. Beyond theſe hills there is no account of any great ranges of mountains.

HARMODIUS, a friend of Ariſtogiton, who delivered his country from the tyranny of the Piſiſtratidæ. (See ARISTOGITON.) The Athenians, to reward the patriotiſm of theſe illuſtrious citizens, made a law that no one ſhould ever after bear the name of Ariſtogiton or Harmodius.

HARMONIA, in fabulous hiſtory, the wife of Cadmus, both of whom were turned into ſerpents. See CADMUS.

Though many of the ancient authors make Harmonia a princeſs of divine origin, there is a paſſage in Athenæus from Euhemerus, the Vanini of his time, which tells us, that ſhe was by profeſſion a player on the flute, and in the ſervice of the prince of Zidon previous to her departure with Cadmus. This circumſtance, however, might encourage the belief, that as Cadmus brought letters into Greece, his wife brought *harmony* thither; as the word ἁρμονια, *harmonia*, has been ſaid to have no other derivation than from her name: which makes it very difficult to aſcertain the ſenſe in which the Greeks made uſe of it in their muſic *; for it has no roots by which it can be decompounded, in order to deduce from them its etymology. The common account of the word, however, that is given by lexicographers, and generally adopted by the

* See *Harmony.*

Harmonic, Harmonica

the learned, does not confirm this opinion. It is generally derived from ἁρμονζω, and this from the old verb Αρω, *apto*, to *fit* or *join*.

HARMONIC. As an adjective it signifies in general any thing belonging to harmony; though in our language the adjective is more properly written *harmonical*. In this case it may be applied to the *harmonical* divisions or a monochord; or, in a word, to consonances in general. As a substantive neuter, it imports all the concomitant or accessary sounds which, upon the principles resulting from the experiments made on sonorous bodies, attend any given sound whatever, and render it appretiable. Thus all the aliquot parts of a musical string produce *harmonical* sounds, or *harmonics*.

HARMONICA. This word, when originally appropriated by Dr Franklin to that peculiar form or mode of musical glasses, which he himself, after a number of happy experiments, had constituted, was written *Armonica*. In this place, however, we have ventured to restore it to its native plenitude of sound, as we have no antipathy against the moderate use of aspirations. It is derived from the Greek word ἁρμονια. The radical word is ἁρειν, *to suit* or *fit one thing to another*. By the word ἁρμονια the Greeks expressed *aptitudes* of various kinds; and from the use which they made of that expression, we have reason to conclude, that it was intended to import the highest degree of refinement and delicacy in those relations which it was meant to signify. Relations or aptitudes of sound, in particular, were understood by it; and in this view, Dr Franklin could not have selected a name more expressive of its nature and genius, for the instrument which we are now to describe; as, perhaps, no musical tones can possibly be finer, nor consequently susceptible of juster concords, than those which it produces.

In an old English book, whose title we cannot at present recollect, and in which a number of various amusements were described, we remember to have seen the elements or first approaches to music by glasses. That author enjoins his pupil to choose half a dozen of such as are used in drinking; to fill each of them with water in proportion to the gravity or acuteness of the sound which he intended it should produce; and having thus adjusted them one to another, he might entertain the company with a church-tune. These, perhaps were the rude and barbarous hints which Mr Puckeridge afterwards improved. But, for a farther account of him, of the state in which he left the instrument, and of the state to which it has afterwards been carried, we must refer our readers to the following extracts from Dr Franklin's letters, and from others who have written upon the same subject.

The Doctor, in his letter to Father Beccaria, has given a minute and elegant account of the Harmonica. Nor does it appear that his successors have either more sensibly improved, or more accurately delineated, that angelic instrument. The detail of his own improvements, therefore, shall be given in his own words.

"Perhaps (says he) it may be agreeable to you, as you live in a musical country, to have an account of the new instrument lately added here to the great number that charming science was possessed of before. As it is an instrument that seems peculiarly adapted to Italian music, especially that of the soft and plaintive kind, I will endeavour to give you such a description of it, and of the manner of constructing it, that you or any of your friends may be enabled to imitate it, if you incline so to do, without being at the expence and trouble of the many experiments I have made in endeavouring to bring it to its present perfection. Harmonica

"You have doubtless heard the sweet tone that is drawn from a drinking-glass, by pressing a wet finger round its brim. One Mr Puckeridge, a gentleman from Ireland, was the first who thought of playing tunes formed of these tones. He collected a number of glasses of different sizes; fixed them near each other on a table; and tuned them, by putting into them water, more or less as each note required. The tones were brought out by pressing his fingers round their brims. He was unfortunately burnt here, with his instrument, in a fire which consumed the house he lived in. Mr E. Delaval, a most ingenious member of our Royal Society, made one in imitation of it with a better choice and form of glasses, which was the first I saw or heard. Being charmed with the sweetness of its tones, and the music he produced from it, I wished to see the glasses disposed in a more convenient form, and brought together in a narrower compass, so as to admit of a greater number of tones, and all within reach of hand to a person sitting before the instrument; which I accomplished, after various intermediate trials, and less commodious forms, both of glasses and construction, in the following manner.

"The glasses are blown as near as possible in the form of hemispheres, having each an open neck or socket in the middle. The thickness of the glass near the brim is about the tenth of an inch, or hardly quite so much, but thicker as it comes nearer the neck; which in the largest glasses is about an inch deep, and an inch and a half wide within; these dimensions lessening as the glasses themselves diminish in size, except that the neck of the smallest ought not to be shorter than half an inch. The largest glass is nine inches diameter, and the smallest three inches. Between these there are 23 different sizes, differing from each other a quarter of an inch in diameter. To make a single instrument there should be at least six glasses blown of each size; and out of this number one may probably pick 37 glasses (which are sufficient for three octaves with all the semitones) that will be each either the note one wants, or a little sharper than that note, and all fitting so well into each other as to taper pretty regularly from the largest to the smallest. It is true there are not 37 sizes; but it often happens that two of the same size differ a note or half a note in tone, by reason of a difference in thickness, and these may be placed one in the other without sensibly hurting the regularity of the taper form.

"The glasses being chosen, and every one marked with a diamond the note you intend it for, they are to be tuned by diminishing the thickness of those that are too sharp. This is done by grinding them round from the neck towards the brim, the breadth of one or two inches as may be required; often trying the glass by a well tuned harpsichord, comparing the note drawn from the glass by your finger with the note you want, as sounded by that string of the harpsichord,

Harmonica. ſichord. When you come near the matter, be careful to wipe the glaſs clean and dry before each trial, becauſe the tone is ſomething flatter when the glaſs is wet than it will be when dry;—and grinding a very little between each trial, you will thereby tune to great exactneſs. The more care is neceſſary in this, becauſe if you go below your required tone, there is no ſharpening it again but by grinding ſomewhat off the brim, which will afterwards require poliſhing, and thus increaſe the trouble.

"The glaſſes being thus tuned, you are to be provided with a caſe for them, and a ſpindle on which they are to be fixed. My caſe is about three feet long, eleven inches every way wide within at the biggeſt end, and five inches at the ſmalleſt end; for it tapers all the way, to adapt it better to the conical figure of the ſet of glaſſes. This caſe opens in the middle of its height, and the upper part turns up by hinges fixed behind. The ſpindle is of hard iron, lies horizontally from end to end of the box within, exactly in the middle, and is made to turn on braſs gudgeons at each end. It is round, an inch diameter at the thickeſt end, and tapering to a quarter of a inch at the ſmalleſt. —A ſquare ſhank comes from its upper end through the box, on which ſhank a wheel is fixed by a ſcrew. This wheel ſerves as a fly to make the motion equable, when the ſpindle, with the glaſſes, is turned by the foot like a ſpinning-wheel. My wheel is of mahogany, 18 inches diameter, and pretty thick, ſo as to conceal near its circumference about 25lb. of lead.—An ivory pin is fixed in the face of this wheel, about four inches from the axis. Over the neck of this pin is put the loop of the ſtring that comes up from the moveable ſtep to give it motion. The caſe ſtands on a neat frame with four legs.

"To fix the glaſſes on the ſpindle, a cork is firſt to be fitted in each neck pretty tight, and projecting a little without the neck, that the neck of one may not touch the inſide of another when put together, for that would make a jarring. Theſe corks are to be perforated with holes of different diameters, ſo as to ſuit that part of the ſpindle on which they are to be fixed. When a glaſs is put on, by holding it ſtiffly between both hands, while another turns the ſpindle, it may be gradually brought to its place. But care muſt be taken that the hole be not too ſmall, leſt in forcing it up, the neck ſhould ſplit; nor too large, leſt the glaſs, not being firmly fixed, ſhould turn or move on the ſpindle, ſo as to touch or jar againſt its neighbouring glaſs. The glaſſes thus are placed one in another; the largeſt on the biggeſt end of the ſpindle, which is to the left hand: the neck of this glaſs is towards the wheel; and the next goes into it in the ſame poſition, only about an inch of its brim appearing beyond the brim of the firſt; thus proceeding, every glaſs when fixed ſhows about an inch of its brim (or three quarters of an inch, or half an inch, as they grow ſmaller) beyond the brim of the glaſs that contains it; and it is from theſe expoſed parts of each glaſs that the tone is drawn, by laying a finger on one of them as the ſpindle and glaſſes turn round.

"My largeſt glaſs is G a little below the reach of a common voice, and my higheſt G, including three complete octaves.—To diſtinguiſh the glaſſes more readily to the eye, I have painted the apparent parts of the glaſſes within-ſide, every ſemitone white, and the other notes of the octave with the ſeven priſmatic colours: viz. C, red; D, orange; E, yellow; F, green; G, blue; A, indigo; B, purple; and G, red again;—ſo that the glaſſes of the ſame colour (the white excepted) are always octaves to each other. Harmonica.

"This inſtrument is played upon by ſitting before the middle of the ſet of glaſſes, as before the keys of a harpſichord, turning them with the foot, and wetting them now and then with a ſponge and clean water. The fingers ſhould be firſt a little ſoaked in water, and quite free from all greaſineſs; a little fine chalk upon them is ſometimes uſeful, to make them catch the glaſs and bring out the tone more readily. Both hands are uſed, by which means different parts are played together. Obſerve, that the tones are beſt drawn out when the glaſſes turn *from* the ends of the fingers, not when they turn *to* them.

"The advantages of this inſtrument are, that its tones are incomparably ſweet beyond thoſe of any other; that they may be ſwelled and ſoftened at pleaſure by ſtronger or weaker preſſures of the finger, and continued to any length; and that the inſtrument, being once well tuned, never again wants tuning."

Such was the ſtate in which this learned and ingenious author found, and ſuch the perfection to which he carried, that celeſtial inſtrument of which we now treat. We call it *celeſtial;* becauſe, in compariſon with any other inſtrument which we know, the ſounds that it produces are indeed heavenly. Some of them, however, are ſtill conſtructed in the ſame imperfect manner as the inſtrument of Mr Puckeridge. They are contained in an oblong cheſt; their poſitions are either exactly or nearly rectilineal; the artificial ſemitones by which the full notes are divided form another parallel line; but the diſtances between each of them are much greater than thoſe between the notes of the natural ſcale, as they take their places, not directly oppoſite to the notes which they are intended to heighten or depreſs, but in a ſituation between the higheſt and loweſt, to ſhow, that in aſcending they are ſharps to the one, and in deſcending flats to the other. This ſtructure, however, is doubly inconvenient; for it not only increaſes the labour and difficulty of the performer, but renders ſome muſical operations impracticable, which upon the *Harmonica*, as conſtituted by Dr Franklin, may be executed with eaſe and pleaſure. In this fabric, if properly formed and accurately tuned, the inſtrument is equally adapted to harmony and melody. But as no material ſtructure could ever yet be brought to the perfection even of human ideas, this inſtrument ſtill in ſome meaſure retains the perverſe nature of its original ſtamina. Hence it is not without the utmoſt difficulty that the glaſſes can be tuned by grinding; and the leaſt conceivable redundancy or defect renders the diſcord upon this inſtrument more conſpicuous and intolerable than upon any other. Hence likewiſe that inexpreſſible delicacy to be obſerved in the manner of the friction by which the ſound is produced: for if the touch be too gentle, it cannot extort the tone; and if too ſtrong, beſides the mellow and delicate ſound which ought to be heard, we likewiſe perceive the finger jarring upon the glaſs, which, mingled with thoſe ſofter ſounds by which the ſenſes had been ſoothed, gives a feeling ſimilar to iron grating upon iron,

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iron, but more diſagreeable. In wind-inſtruments the operation of the tongue, in harpſichords the ſtroke of the quill, and on the violin the motion of the bow, gives the ſtrong and ſenſible interruption of ſound which may be called *articulation*, and which renders the rhythmus or meaſure of an air more perceptible; but upon the glaſſes, the touch of the finger is too ſoft to divide the notes with ſo much force; ſo that, unleſs the mind be ſteadily attentive, they ſeem to melt one into another, by which means the idea of rhythmus is almoſt loſt. There is no way of performing a ſlur but by forbearing to ſtop the firſt ſound, when that which is immediately ſubſequent commences. Thus, when the ſlur is of any length, and regularly deſcends or riſes by the interval of a ſecond, all the notes in the ſlur muſt be heard together, and produce no diſagreeable diſſonance; yet if it riſes or deſcends by perfect chords, the effect is pleaſing. The open ſhake, or trill, is another unhappy operation upon muſical glaſſes; which can only be performed by the alternate pulſations of two continued ſounds, differing from each other only by a note or ſemitone. But as theſe pulſations thus managed cannot be diſtinct, the reſult is far from being pleaſant; nor is there any ſuccedaneum for the cloſe ſhake, which in the violin is performed by alternately depreſſing the ſtring to the finger-board, and ſuffering it to riſe without entirely removing the finger from it, and which, by giving the note that tremulous ſound produced by the human voice affected with grief, is a grace peculiarly adapted to pathetic and plaintive airs.

We proceed, however, to a farther account of the ſame inſtrument, extracted from the Annual Regiſter, vol. iv. p. 149.

"Beſides thoſe tones, (ſays the author of that account) which every elaſtic ſtring produces by a vibration of all its parts, it is capable of another ſet of tones in which only a part of the ſtring is ſuppoſed to vibrate. Theſe ſounds are produced by the lighteſt touches, either by air, as in Oſwald's lyre, or by rubbing the bow in the ſofteſt manner on the ſtring of a fiddle.

"Analogous to theſe ſounds are thoſe produced by bells: in theſe laſt, beſides thoſe tones produced by their elliptical vibrations, there are a ſet of tones which may be brought by gently rubbing their edges, and in which the whole inſtrument does not appear to vibrate in all its parts as before.

"Take, for inſtance, a bell finely poliſhed at the edges; or, what will perhaps be more convenient, a drinking-glaſs: let the edges be as free from any thing oily as poſſible; then, by moiſtening the finger in water (I have found alum-water to be beſt), and rubbing it circularly round the edge of the glaſs, you will at length bring out the tone referred to.

"This note is poſſeſſed of infinite ſweetneſs; it has all the excellencies of the tone of a bell without its defects. It is loud, has a ſufficient body, is capable of being ſwelled and continued at pleaſure; and, beſides, has naturally that vibratory ſoftening which muſicians endeavour to imitate by mixing with the note to be played a quarter-tone from below.

"To vary theſe tones, nothing more is required than to procure ſeveral bells or glaſſes of different tones, tuned as nearly as poſſible, which may be done by thinning the edges of either: or, for immediate ſatisfaction, the glaſſes may be tuned by pouring in water: the more water is poured in, the graver the tone will be. Harmonica.

"Let us ſuppoſe then a double octave of thoſe glaſſes, thus tuned, to be procured. Any common tune may be executed by the fingers rubbing upon each glaſs ſucceſſively; and this I have frequently done without the leaſt difficulty, only chooſing thoſe tunes which are ſlow and eaſy. Here then are numbers of delicate tones, with which muſicians have been till very lately unacquainted; and the only defect is, that they cannot be made to follow each other with that celerity and eaſe which is requiſite for melody. In order to remedy this, I took a large drinking-glaſs, and by means of a wheel and gut, as in the electrical machine, made it to turn upon its axis with a moderately quick but equable motion; then moiſtening the finger as before, nothing more was required than merely to touch the glaſs at the edge, without any other motion, in order to bring out the tone.

"Inſtead of one glaſs only turning in this manner, if the whole number of glaſſes were ſo fixed as to keep continually turning by means of a wheel, it follows, that upon every touch of the finger a note would be expreſſed; and thus, by touching ſeveral glaſſes at once, an harmony of notes might be produced, as in an harpſichord.

"As I write rather to excite than ſatisfy the curious, I ſhall not pretend to direct the various ways this number of glaſſes may be contrived to turn; it may be ſufficient to ſay, that if the glaſſes are placed in the ſegment of a circle, and then a ſtrap, as in a cutler's wheel, be ſuppoſed to go round them all, the whole number will by this means be made to turn by means of a wheel.

"Inſtead of the finger, I have applied moiſtened leather to the edge of the glaſs, in order to bring out the tone: but, for want of a proper elaſticity, this did not ſucceed. I tried cork, and this anſwered every purpoſe of the finger; but made the tone much louder than the finger could do. Inſtead, therefore, of the finger, if a number of corks were ſo contrived as to fall with a proper degree of preſſure on the edge of the glaſs, by means of keys like the jacks of an organ, it is evident, that in ſuch a caſe a new and tolerably perfect inſtrument would be produced; not ſo loud indeed as ſome, but infinitely more melodious than any.

"The mouths of the glaſſes or bells uſed in this experiment ſhould not reſemble the mouth of a trumpet, but ſhould rather come forward with a perpendicular edge. The corks uſed in this caſe ſhould be ſmooth, even free from thoſe blemiſhes which are uſually found in them, and at the ſame time the more elaſtic the better."

In the two accounts here given ſeems to be comprehended every thing valuable which has been ſaid upon the ſubject. It remains, however, our permanent opinion, that the form and ſtructure deſigned and conſtituted by Dr Franklin is by much the moſt eligible; nor can we admit, that a cork, however ſucceſsfully applied, will produce the ſame mellowneſs and equality of tone in general with the finger. It appears to us, that, by this kind of voluntary attrition, a note may be

Harmonica. ſunk or ſwelled with much more art and propriety than by the ſubſtitution of any thing elſe extrinſic to the hand; and when chords are long protracted, that degree of friction, which renders every ſound in the chord ſenſible to the ear, without harſhneſs, muſt be the moſt agreeable. For this reaſon, likewiſe, we ſhould recommend alum-water in preference to chalk.

From what has already been ſaid, it will eaſily be perceived, that this inſtrument requires to be tuned with the niceſt degree of delicacy which the laws of temperament will poſſibly admit. For theſe laws the reader will naturally have recourſe to the article MUSIC *, in this Dictionary; where, from M. D'Alembert, is given a plain and ſatisfactory account, both of the method propoſed by Rameau, and of that eſtabliſhed in common practice, without anticipating the experience and taſte of the reader, by dictating which of theſe plans is preferable. To thoſe who have occaſion to tune the inſtrument, it may likewiſe be uſeful to peruſe the detached article TEMPERAMENT in this Work. Without recapitulating the different rules of alteration preſcribed in theſe accounts, we ſhall preſuppoſe the reader acquainted with them; and proceed to deſcribe how, under their influence, the *Harmonica* may be tuned. But it is previouſly expedient to obſerve, that the ſame rules which conduct the proceſs of tuning a harpſichord, will be equally effectual in tuning the *Harmonica*; with this only difference, that greater delicacy in adjuſting the chords ſhould, if practicable, be attempted.

* Chap. vii. art. 64.

There are different notes from whence the procedure of tuning may commence. *La* or A, which is the key that pretty nearly divides the harpſichord, is choſen by ſome; this *la* in common ſpinets is 24 natural keys from the bottom, and 13 from the top; and the *ut* above it, or ſecond C upon the G cliff, by others. This laſt we ſhould rather adviſe, becauſe we imagine thoſe intervals which we have called *ſeconds major* to be more juſt through the whole octave, when the courſe of tuning is begun by a natural ſemitone. The initiate, therefore, may begin by tuning the ſecond *ut* of his *Harmonica*, or C above the treble cliff, uniſon with its correſpondent C upon the harpſichord or any other inſtrument in concert-pitch; then, deſcending to its octave below, adjuſt it with the *ut* above, till every pulſation if poſſible be loſt, and the ſounds rendered ſcarcely diſtinguiſhable when ſimultaneouſly heard. To the loweſt note of this octave he muſt tune the *ſol* or G immediately above it by a fifth, ſtill obſerving the laws of temperament: To this G, the *re*, or D immediately above it, by the ſame chord: To the *re*, or D above, its octave below: To this, by a fifth, the *la* or A immediately above it: To *la*, the *mi* or E aſcending in the ſame proportion: To *mi*, its octave below: To this, the *ſi* or B immediately above it by a fifth: To the firſt *ut*, or C, which was tuned, the *fa* or F immediately below by the ſame chord.

That the practitioner may be ſtill more ſecure in the juſtice and propriety of his procedure, he may try the thirds of the notes already adjuſted, and alter, as much as is conſiſtent with the fifths and octaves, ſuch among theſe thirds as may ſeem grating and diſagreeable to his ear. Thus far having accompliſhed his operation, he may tune all the other natural notes whether above or below by octaves. His next concern is with the ſemitones. And here it will be ſuggeſted by common ſenſe, that as in all inſtruments with fixed ſcales, the ſharp of a lower muſt likewiſe anſwer for the flat of a higher tone, the ſemitone ought as nearly as poſſible to divide the interval. He may begin with *la* or A ſharp; which *la* in its natural ſtate is a third minor beneath the *ut* or C, from whence he began in the natural ſcale. This ſemitone ſhould correſpond with the F natural immediately above by a fifth. To it may be tuned the *re* or D ſharp immediately below by a ſimilar chord: To D ſharp, its octave above: To *ſi* or B natural, immediately above the *la* or A firſt mentioned, may be adjuſted the F or *fa* ſharp immediately above it: To this its octave below: To that octave, the C or *ut* ſharp above by a fifth: To the C ſharp, its octave below: To this, by a fifth, the G or *ſol* ſharp above. Between this G ſharp and the D ſharp immediately above it, the fifth will probably be too ſharp; but if the others are juſtly tuned, that diſcord will not be extremely offenſive; and it is a neceſſary conſequence of temperament. The reſt of the ſharps and flats, like their naturals, whether aſcending or deſcending, may be tuned by their octaves.

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The notes, with their chords, may be expreſſed by letters and figures, thus; where, however, it muſt be obſerved, that the higher notes of any chord are marked with larger capitals. It ſhould likewiſe be remarked, that the figures are not expreſſive of the different ratios which the notes bear to one another, conſidered with reſpect to their vibrations; but only ſignificant of their nominal diſtances, according to the received denominations of the intervals. $C_{8}^{5}\,c_{5}^{8}\,G\ c_{5}^{8}\,D\ D_{5}^{8}\,D\ A_{5}^{8}\,E\ E_{5}^{8}\,E\ B_{5}\,C\ F$. The ſharps and flats thus, $A_{5}^{8}\,\sharp\,F\,\flat$, $A_{5}^{8}\,\sharp\,D\,\sharp$, $D_{5}^{8}\,\sharp\,D\,\sharp$, $B\,\flat\,F\,\sharp$, $F\,\sharp\,F\,\sharp$. $F\,\sharp\,C_{5}^{8}\,\sharp$, $C\,\sharp\,c\,\sharp$, $c\,\sharp\,G\,\sharp$. In running over the ſharps and flats as the naturals, it will likewiſe be neceſſary to try the thirds, and to alter ſuch as may offend the ear; which, if cautiouſly done, will not ſenſibly injure the other chords.

—Though this article has been protracted to a length which we did not originally intend, we have however the ſatisfaction to find, that it comprehends every thing eſſential; ſo that any perſon who underſtands the nature of chords, and the practical principles of muſic as univerſally taught, may not only be able to tune his inſtrument, but to acquire its whole manœuvre, without the leaſt aſſiſtance from a maſter. On Plate CCL. is repreſented an inſtrument of this kind.

Though this topic appeared in itſelf complete in the former edition of this extenſive work, yet having ſince received from Dr Edmund Cullen of Dublin the following obſervations, and reflecting that men of muſical talents have not only different taſtes, but different powers of mechanical operation, we have thought it proper to ſubmit to the choice of our readers, either Dr Franklin's form and arrangement of the glaſſes, or that which was adopted by Dr Cullen; but in either caſe, we would recommend it to the initiate in this inſtrument, to diſtinguiſh by colours, according to Dr Franklin, the notes and ſemitones.—We likewiſe cannot forbear to think, that the complete baſs practicable on the harmonica, is by many degrees preferable to the chords with which Dr Cullen propoſed to grace every

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emphatic note, with which, from the ſtructure and arrangement of his inſtrument, he was under the neceſſity of deluding inſtead of ſatisfying the ear, with the full effect of the regular procedure of the treble and baſs upon the ſame inſtrument.

This inſtrument the doctor deſcribes as conſiſting "of 35 glaſſes of different ſizes, anſwering to ſo many diſtinct ſounds, and ranged in the manner hereafter to be deſcribed. They are exactly of the form of a cocoa nut when the uſual quantity of the top is cut off; or the ſugar-bowls made of cocoa-nut ſhells ſo much in uſe will give a preciſe idea of their figure. They are blown with plain long ſtalks, which are fitted to wooden feet ſcrewed on a board at proper diſtances, in ſuch a manner that the circular tops of all may be in the ſame horizontal plane, at the diſtance of about an inch aſunder. Of theſe 35, 10 only are allotted for half tones; there remain therefore 25 for the diatonic ſcale. The loweſt note correſponds to G in the baſs cliff; hence it extends upward to the octave above C in alt. For uniformity, take the glaſſes which are choſen gradually and regularly diminiſhing in ſize as they aſcend in tone. This, however, is not abſolutely neceſſary, as the tone of the glaſs does not entirely depend upon its ſize, but in a great meaſure upon the proportion of its different parts to one another: hence the glaſs correſponding to one note may be ſmaller than a glaſs correſponding to a note three or four times higher: however, where it is practicable, they ſhould always be choſen gradually diminiſhing as they aſcend, both on account of the elegance of appearance, and that an equality in point of loudneſs may be preſerved; for, as every body knows, an inſtrument may be liable to great inequality in point of ſtrength, though perfectly in tune. This muſt have a very bad effect; and therefore we find performers on the violin and other inſtruments of that kind very ſolicitous about the proportional thickneſs of their ſtrings. The glaſſes being choſen in the beſt manner circumſtances will permit, we proceed to arrange them. Here let me obſerve, that in general the diameter of the largeſt glaſs at its mouth is about ſeven inches, and its ſolid contents about five Engliſh pints, while the higheſt is of about one-fourth of an inch, and its contents about one-third of a gill: this, however, is arbitrary, and depends upon the pitch of the inſtrument. In arranging the glaſſes, we ſhall, to avoid confuſion, take the diatonic ſcale firſt, and afterwards the half tones will be eaſily underſtood. The wooden feet before mentioned are to be ſcrewed on a ſtrong board of a proper ſize, and they are diſpoſed at convenient intervals in rows perpendicular to the longeſt ſides of the rectangular board on which they ſtand. In theſe feet the glaſſes are diſpoſed in the following manner: Beginning with the loweſt note G, we fix that on the foot which ſtands in the neareſt angle of the board on the left hand, A in the next bottom in the ſame perpendicular line, B in the third: when we come to C, however, we do not place it in the ſame perpendicular line, but in the neareſt bottom of the ſecond perpendicular row to the left hand, D in the ſecond of the ſame row, E in the third; F again in the neareſt bottom of the third row, G in the ſecond of the ſame row, A in the third; B again in the neareſt bottom of the fourth row, C in the ſecond of the ſame, and ſo on. By this contrivance, it is eaſy to ſee an immenſe compaſs is obtained: ſo great a one indeed, that if the glaſſes were diſpoſed according to the old method, regularly aſcending in a line parallel to the front of the inſtrument, to take in the ſame compaſs, it muſt ſtretch to a conſiderable length, no leſs than a length equal to the ſum of all the perpendiculars we before ſpoke of, which in ordinary ſize of the glaſſes would amount to upwards of 16 feet; the inconvenience of which it is unneceſſary to dwell upon. As to the half tones, perhaps a more judicious and convenient arrangement may be thought of for them: but the preſent mode is far from inconvenient, except in ſome keys; and it is ſufficiently commodious for performing ſuch airs as are beſt ſuited to the nature and deſign of the inſtrument. After explaining the arrangement, we ſhall ſpeak ſomewhat more exactly of them. E♭ on the firſt line of the treble ſtave ſtands in the fourth bottom of the firſt perpendicular row to the left hand; F♮ on the firſt ſpace ſtands in the fourth place of the ſecond row, G♮ on the ſecond line of the treble ſtave ſtands in the fourth of the third row, C♮ on the third ſpace of the ſame ſtave ſtands in the ſame manner in the fourth row, and ſo on, aſcending F♮ in the fifth row, G♮ in the ſixth, A♮ in the ſeventh, C♮ in the eighth. In the ninth perpendicular row, that is, the laſt to the right hand in the diatonic ſcale, ſtands C alone; but immediately behind is placed B♭ of the middle line of the treble ſtave, and again behind it D♮ of the fourth line of the treble ſtave, which finiſhes the whole. There is ſomething ſingular, and perhaps whimſical, in the diſtribution of the half tones: but it is found ſufficiently convenient; and if a better is thought of, it may eaſily be adopted. In the mean time I muſt obſerve, that two of them, viz. C♮ and F♮, ſtanding immediately behind the D and G reſpectively above them, are ſingularly well fitted for performing running paſſages either up or down in the key of G. Ex gr. let us ſuppoſe that we have that very common A, G, F♮, E, ſemiquavers. Here the performer touches A, which is in the firſt place of the ſixth row, with his left hand, G with the fore-finger of his right, F♮ with the middle, and E again with the left hand; in the ſame manner may E, D, C♮, and B, be played, or upwards by inverting the motion: Thus we can with the utmoſt eaſe run either up or down two very frequent paſſages, in a key which might naturally be ſuppoſed difficult upon this inſtrument, and that with any given rapidity. I wiſh as much could be ſaid of all the other half tones, of which, by the bye, ſome are altogether wanting: it is obvious, however, that they may eaſily be added, if we can find convenient places; and I apprehend even that very practicable. Be that as it may, notwithſtanding the ſeemingly inconvenient ſituation of ſome half tones, and the total want of others, pieces may be performed on this inſtrument of conſiderable rapidity. I myſelf, though very far from being an accompliſhed player, can with great eaſe go through all the parts of Fiſher's celebrated rondeau; nay, I have heard the fifth concerto of Vivaldi played upon it with as much diſtinctneſs as upon a violin. The glaſſes are not neceſſarily choſen perfectly in tune, but are tuned by the help of a quantity of water. Here, however, two cautions are neceſſary: 1ſt, By no means to take a glaſs which is, when without water, flatter than the note you intend; as in that caſe you cannot remedy it, the water

Harmonica

making

Harmonica. making the tone ſtill flatter: rather let it be ſomewhat ſharper, and you may tune it to the utmoſt nicety by a little water. The ſecond caution is, not to chooſe a glaſs which is very much ſharper than the note required; as in that caſe, ſo large a quantity of water will be required to tune it as will entirely ſmother the tone.

"This inſtrument is to be played ſomewhat in the manner of the harmonica, viz. the fingers are to be well wetted; and by the application of them to the ſide, aſſiſted by a proper motion, the ſound is produced. And here I would obſerve, that the proper motion is, to make the fingers follow the thumb, not the thumb follow the fingers, in going round the glaſs: it is neceſſary alſo to preſerve the circular motion very exactly, as the leaſt deviation from it produces the moſt horrible ſound that can be conceived. It is likewiſe to be obſerved, that you muſt touch the ſmaller glaſſes upon the very top of the brim; and for that purpoſe the palm of the hand muſt be nearly parallel to the top of the glaſs: but in coming to the larger glaſſes, it is abſolutely neceſſary to make the fingers touch the ſide, not the top of the glaſs; and the larger the glaſs, the more diſtant from the top muſt they be touched. Practice alone can determine this matter.

"From this diſpoſition of the glaſſes, it is eaſy to ſee that the perfect chord of C is always moſt completely in our power, namely, by uſing different fingers to the different notes at the ſame time: and although a full baſs cannot be executed upon this inſtrument, we have always a great number of accompaniments which can eaſily be introduced; more perhaps than upon any inſtrument, the organ and others of that ſpecies excepted. The thirds or fifths occaſionally can be introduced; and when done with taſte and judgment, will ſcarcely yield to a middling baſs. If to this is added the thrilling ſoftneſs of the tones, inimitable by any other ſubſtance, it will readily appear to be an inſtrument more in the true ſtyle of muſic, of that muſic which the heart acknowledges, than any that either chance or ingenuity has hitherto produced. It is indeed incapable of that whimſical ſubdiviſion to which the taſte of modern compoſers, that ſworn enemy to harmony and real muſic, leads; which ſerves no end but to exhibit the wonderful executions of a favourite performer, and to overwhelm his hearers with ſtupid admiration. This is not muſic; and upon theſe occaſions, though I acknowledge the difficulty of doing what I ſee done, I lament that the honeſt man has taken ſo much pains to ſo little purpoſe. Our inſtrument is not capable of this (at leaſt not in ſo exquiſite a degree as the harpſichord, violin, and a few others): yet if the true and original intent of muſic is not to aſtoniſh but to pleaſe, if that inſtrument which moſt readily and pleaſingly ſeizes the heart through the ears is the beſt, I have not a moment's heſitation in ſetting it down the firſt of all muſical inſtruments. There is but one which will in any degree bear the compariſon, or rather they are the ſame inſtrument, I mean Dr Franklin's harmonica: but I am inclined to think that the inſtrument we have been ſpeaking of has ſome ſuperiority over the harmonica. The firſt ſtriking difference is in the impracticability of executing quick paſſages on the latter; whereas it is in moſt caſes extremely eaſy on the other. Again, the very long continued vibration of the glaſs, inevitably muſt produce horrible diſcord, or at leaſt confuſion, except the piece played be ſo ſlow that the vibration of one glaſs be nearly over before the other is heard. Now, in our inſtrument, this may be remedied by laying pieces of ſponge lightly between the glaſſes, ſo as to allow them only the proper extent of vibration. This, however, is an exceptionable method: and it is much better done by the touch of the performer's finger, which inſtantly ſtops the vibration; and the uſe of this may be learned by a very little practice, the motion here being entirely voluntary: But in the harmonica, the motion being partly mechanical, v. g. the rotation of the glaſſes, this cannot be done; and for the ſame reaſon, in the execution of the creſcendo the harmonica is not ſo perfect as this inſtrument. Beſides, the inconvenience of tuning the half tones, as ſharps or flats, ſeparately, is as great in the harmonica as in the harpſichord. This is a very great imperfection; as half tones, being tuned at the medium, are falſe both as ſharps and as flats. The learned Dr Smith ſays, there is no leſs than one fifth of the interval difference between the ſharp of one note and the flat of the next above; and for this purpoſe propoſes to have an harpſichord conſtructed with a ſtop, ſo as to direct the jacks to the ſharps or flats according to the prevalence of either in the piece to be played: but in our inſtrument, from its very conſtruction, this inconvenience is avoided. As to matters of convenience, the harmonica is exceedingly apt to be out of order; the glaſſes frequently break, plainly on account of the great ſtrain upon them where they join the ſpindle, and are thus with much difficulty renewed; whereas with us the loſs of a glaſs is nothing. Add to all this, that the harmonica, in point of original expence, is about five times as high as the other: although I apprehend it poſſeſſes no one advantage, except that the performer may ſit at it; whereas with our inſtrument it is convenient, if not neceſſary, to ſtand; but he muſt be a lazy muſician that gives himſelf much concern about that; And if he will ſit at our inſtrument, he may, though at the expence of much eaſe in point of execution.

"Let us now conſider ſome objections that have been made to this inſtrument. One is, that neceſſity of ſtanding, in order to do any thing capital upon it. But is not that the caſe in all inſtruments, except where the performer ſits of neceſſity? Did ever any one ſee Giardini or Fiſher play a ſolo ſitting? But for the ſatisfaction of theſe torpid gentlemen, I can faithfully aſſure them, I knew a lady who performed on this inſtrument perfectly well, though ſhe had loſt the uſe of both her legs. A more ſerious and important objection lies both to this and the harmonica, viz. the want of a ſhake. How this is ſupplied upon the harmonica, I cannot ſay, as I never ſaw it even attempted: but on our inſtrument, although a very perfect ſhake can ſcarcely be produced, ſomething ſo like it may be done as will fairly excuſe the want; and that is, by whirling the two ſtands round the note concerned with the ſhake with the utmoſt velocity, beginning the lower note a little ſooner than the other. By this means, except in very large glaſſes where the vibrations are too diſtant in time, ſuch an intermixture of the two ſounds is produced, as extremely well imitates a fine ſhake, and the dexterous performer will make the beat in a turned ſhake with a ſpare finger. This operation requires ſome dexterity;

Harmony. dexterity; but this is a charge common to all muſical inſtruments; and I queſtion not but that the Highland bagpipe itſelf requires ſome ſort of ſkill.

"Upon the whole, I am clearly of opinion, that the harmonica, and more eſpecially this inſtrument which has yet got no name, is the moſt exquiſite and noble preſent that the lovers of true harmony have ever yet received; and it is with much aſtoniſhment I find this invaluable treaſure almoſt entirely confined to Ireland, a country not very remarkable for muſical taſte or talents: But I hope ſoon to ſee this elegant ſpecies of muſic very generally known and practiſed over all Europe."

HARMONY. The ſenſe which the Greeks gave to this word in their muſic, is ſo much leſs eaſy to be determined, becauſe, the word itſelf being originally a ſubſtantive proper, it has no radical words by which we might analyſe it, to diſcover its etymology. In the ancient treatiſes which remain to us, *harmony* appears to be that department whoſe object is the agreeable ſucceſſion of ſounds, merely conſidered as high or low; in oppoſition to the two others called *rhythmica* and *metrica*, which have their principle in time and meaſure. This leaves our ideas concerning that aptitude of ſound vague and undetermined; nor can we fix them without ſtudying for that purpoſe all the rules of the art; and even after we have done ſo, it will be very difficult to diſtinguiſh harmony from melody, unleſs we add to the laſt the ideas of rhythmus and meaſure; without which, in reality, no melody can have a diſtinguiſhing character: whereas harmony is characteriſed by its own nature, independent of all other quantities except the chords or intervals which compoſe it.

It appears by a paſſage of Nicomachus, and by others, that they likewiſe gave the name of *harmony* to the chord of an octave, and to concerts of voices and inſtruments, which performed in the diſtance of an octave one from the other, and which is more commonly called *antiphone*.

Harmony, according to the moderns, is a ſucceſſion of chords agreeable to the laws of modulation. For a long time this harmony had no other principle but ſuch rules as were almoſt arbitrary, or ſolely founded on the approbation of a practiſed ear, which decided concerning the agreeable or diſagreeable ſucceſſion of chords, and whoſe determinations were at laſt reduced to calculation. But Father Merſenne and M. Saveur having found that every ſound, however ſimple in appearance, was always accompanied with other ſounds leſs ſenſible, which conſtitute with itſelf a perfect chord-major; with this experiment M. Rameau ſet out, and upon it formed the baſis of his harmonic ſyſtem, which he has extended to a great many volumes, and which at laſt M. D'Alembert has taken the trouble of explaining to the public.

Signior Tartini, taking his route from an experiment which is newer and more delicate, yet no leſs certain, has reached concluſions ſimilar enough to thoſe of Rameau, by purſuing a path whoſe direction ſeems quite oppoſite. According to M. Rameau, the treble is generated by the baſs; Signior Tartini makes the baſs reſult from the treble. One deduces harmony from melody, and the other ſuppoſes quite the contrary. To determine from which of the two ſchools the beſt performances are likely to proceed, no more is neceſſary than to inveſtigate the end of the compoſer, and diſcover whether the air is made for the accompaniments, or the accompaniments for the air. At the word SYSTEM in Rouſſeau's Muſical Dictionary, is given a delineation of that publiſhed by Signior Tartini. Here he continues to ſpeak of M. Rameau, whom he has followed through this whole work, as the artiſt of greateſt authority in the country where he writes. Harmony.

He thinks himſelf obliged, however, to declare, That this ſyſtem, however ingenious it may be, is far from being founded upon nature; an affirmation which he inceſſantly repeats: "That it is only eſtabliſhed upon analogies and congruities, which a man of invention may overturn to-morrow, by ſubſtituting others more natural: that, in ſhort, of the experiments from whence he deduces it, one is detected fallacious, and the other will not yield him the conſequences which he would extort from it. In reality, when this author took it in his head to dignify with the title of *demonſtration* the reaſoning upon which he eſtabliſhed his theory, every one turned the arrogant pretence into ridicule. The Academy of Sciences loudly diſapproved a title ſo ill founded, and ſo gratuitouſly aſſumed; and M. Eſtive, of the Royal Society at Montpelier, has ſhown him, that even to begin with this propoſition, That according to the law of nature, ſounds are repreſented by their octaves, and that the octaves may be ſubſtituted for them, there was not any one thing demonſtrated, or even firmly eſtabliſhed, in his pretended demonſtration." He returns to his ſyſtem.

"The mechanical principle of reſonance preſents us with nothing but independent and ſolitary chords; it neither preſcribes nor eſtabliſhes their ſucceſſion. Yet a regular ſucceſſion is neceſſary; a dictionary of ſelected words is not an oration, nor a collection of legitimate chords a piece of muſic: there muſt be a meaning, there muſt be connections in muſic as well as in language: it is neceſſary that what has preceded ſhould tranſmit ſomething of its nature to what is ſubſequent, ſo that all the parts conjoined may form a whole, and be ſtamped with the genuine character of unity.

"Now, the complex ſenſation which reſults from a perfect chord muſt be reſolved into the ſimple ſenſation of each particular ſound which compoſes it, and into the ſenſation of each particular interval which forms it, aſcertained by compariſon one with another. Beyond this there is nothing ſenſible in any chord; from whence it follows, that it is only by the relation between ſounds, and by the analogy between intervals, that the connexion now in queſtion can be eſtabliſhed; and this is the genuine, the only ſource, from whence flow all the laws of harmony and modulation. If, then, the whole of harmony were only formed by a ſucceſſion of perfect chords-major, it would be ſufficient to proceed by intervals ſimilar to thoſe which compoſe ſuch a chord; for then ſome one or more ſounds of the preceding chord being neceſſarily protracted in that which is ſubſequent, all the chords would be found ſufficiently connected; and the harmony would, at leaſt in this ſenſe, be one.

"But beſides that theſe ſucceſſions muſt exclude all melody by excluding the diatonic ſeries which forms its foundation,

Harmony. foundation, it would not arrive at the real end of the art; becauſe, as muſic is a ſyſtem of meanings like a diſcourſe, it ought, like a diſcourſe, to have its periods, its phraſes, its ſuſpenſes, its cadences, its punctuation of every kind; and becauſe the uniformity of a harmonical procedure implies nothing of all this, diatonic procedures require that major and minor chords ſhould be intermixed; and the neceſſity of diſſonances has been felt in order to diſtinguiſh the phraſes, and render the cadences ſenſible. Now, a connected ſeries of perfect chords-major can neither be productive of perfect chords-minor nor of diſſonances, nor can ſenſibly mark any muſical phraſe, and the punctuation muſt there be found entirely defective.

"M. Rameau being abſolutely determined, in his ſyſtem, to deduce from nature all the harmony practiſed among us, had recourſe, for this effect, to another experiment of his own invention, of which I have formerly ſpoken, and which by a different arrangement is taken from the firſt. He pretended, that any ſimple ſound whatever afforded in it multiplies a perfect minor or flat chord, of which it was the dominant or fifth, as it furniſhed a perfect chord-major by the vibration of its aliquot parts, of which it is the tonic or fundamental ſound. He has affirmed as a certain fact, that a vocal ſtring cauſed two others lower than itſelf to vibrate through their whole extent, yet without making them produce any ſound, one to its twelfth major and the other to its ſeventeenth; and from this joined to the former fact, he has very ingeniouſly deduced not only the application of the minor mode and of diſſonances in harmony, but the rules of harmonic phraſes and of all modulation, ſuch as they are found at the words *Chord*, *Accompaniment*, *Fundamental Baſs*, *Cadence*, *Diſſonance*, *Modulation*.

"But firſt (continues Rouſſeau), the experiment is falſe. It is diſcovered, that the ſtrings tuned beneath the fundamental ſound do not entirely vibrate when this fundamental ſound is given; but that they are divided in ſuch a manner as to return its uniſon alone, which of conſequence can have no harmonics below. It is moreover diſcovered, that the property of ſtrings in dividing themſelves, is not peculiar to thoſe which are tuned by a twelfth and ſeventeenth below the principal ſound; but that oſcillations are likewiſe produced in the lower ſtrings by all its multiples. Whence it follows, that, the intervals of the twelfth and ſeventeenth below not being ſingular phenomena of their kind, nothing can be concluded in favour of the perfect minor chord which they repreſent.

"Though the truth of this experiment were granted, even this would by no means remove the difficulty. If, as M. Rameau alleges, all harmony is derived from the reſonance of ſonorous bodies, it cannot then be derived only from the vibrations of ſuch bodies as do not reſound. In reality, it is an extraordinary theory, to deduce from bodies that do not reſound the principles of harmony; and it is a poſition in natural philoſophy no leſs ſtrange, that a ſonorous body ſhould vibrate without reſounding, as if ſound itſelf were any thing elſe but the air impelled by theſe vibrations. Moreover, ſonorous bodies do not only produce, beſides the principal ſound, the other tones which with itſelf compoſe a perfect chord; but an infinite number of other ſounds, formed by all the aliquot parts of the bodies in vibration, which do not enter into that perfect harmony. Why then ſhould the former ſounds produce conſonances, and why ſhould the latter not produce them, ſince all of them equally reſult from nature? Harmony.

"Every ſound exhibits a chord truly perfect, ſince it is compoſed of all its harmonics, and ſince it is by them that it becomes a ſound. Yet theſe harmonics are not heard, and nothing is diſtinguiſhed but a ſimple ſound, unleſs it be exceedingly ſtrong: whence it follows, that the only good harmony is an uniſon; and that, as ſoon as the conſonances can be diſtinguiſhed, the natural proportion being altered, the harmony has loſt its purity.

"That alteration is in this caſe produced two different ways. Firſt, by cauſing certain harmonics to reſound, and not the others, the proportion of force which ought to prevail in all of them is altered, for producing the ſenſation of a ſingle ſound; whence the unity of nature is deſtroyed. By doubling theſe harmonics, an effect is exhibited ſimilar to that which would be produced by ſuppreſſing all the others; for in that caſe we cannot doubt, but that, along with the generating ſound, the tones of the other harmonics which were permitted to ſound would be heard: whereas, in leaving all of them to their natural operations, they deſtroy one another, and conſpire together in forming and ſtrengthening the ſimple ſenſation of the principal ſound. It is the ſame effect which the full ſound of a ſtop in the organ produces, when, by ſucceſſively removing the ſtopper or regiſter, the third and fifth are permitted to ſound with the principal; for then that fifth and third, which remained abſorbed in the other ſounds, are ſeparately and diſagreeably diſtinguiſhed by the ear.

"Moreover, the harmonics which we cauſe to ſound have other harmonics pertaining to themſelves, which cannot be ſuch to the fundamental ſound. It is by theſe additional harmonics that the ſounds which produce them are diſtinguiſhed with a more ſenſible degree of harſhneſs; and theſe very harmonics which thus render the chord perceptible, do not enter into its harmony. This is the reaſon why the moſt perfect chords are naturally diſpleaſing to ears whoſe reliſh for harmony is not ſufficiently formed; and I have no heſitation in thinking, that even the octave itſelf might be diſpleaſing, if the mixture of male and female voices did not inure us to that interval from our infancy.

"With diſſonance it is ſtill worſe, becauſe, not only the harmonics of the ſound by which the diſcord is produced, but even the ſound itſelf, is excluded from the natural harmony of the fundamental; which is the cauſe why diſcord is always diſtinguiſhed amongſt all the other ſounds in a manner ſhocking to the ſenſe.

"Every key of an organ, with the ſtop fully opened, gives a perfect chord with its third major, which are not diſtinguiſhed from the fundamental ſound, if the hearer is not extremely attentive, and if he does not ſound the whole ſtop in ſucceſſion; but theſe harmonic ſounds are never obſerved in the fundamental, but on account of the prodigious noiſe, and by ſuch a ſituation of the regiſters as may cauſe the pipes which produce the fundamental ſound to conceal by their force the other ſounds which produce theſe harmonics. Now,

no

Harmony. no perſon obſerves, nor can obſerve, this continual proportion in a concert; ſince, by the manner of inverting the harmony, its greateſt force muſt in every inſtant be transferred from one part to another; which is not practicable, and would deſtroy the whole melody.

"When we play upon the organ, every key in the baſs cauſes to reſound the perfect chord-major; but becauſe that baſs is not always fundamental, and becauſe the muſic is often modulated in a perfect minor chord, this perfect chord-major is rarely ſtruck with the right hand; ſo that we hear the third minor with the major, the fifth with the triton, the ſeventh redundant with the octave, and a thouſand other cacophonies, which, however, do not much diſguſt our ears, becauſe habit renders them tractable: but it is not to be imagined that an ear naturally juſt would prove ſo patient of diſcords, when firſt expoſed to the teſt of this harmony.

"M. Ramcau prefends, that trebles compoſed with a certain degree of ſimplicity naturally ſuggeſt their own baſſes; and that any man having a juſt, though unpractiſed ear, would ſpontaneouſly ſing that baſs. This is the prejudice of a muſician, refuted by univerſal experience. Not only would he, who has never heard either baſs or harmony, be of himſelf incapable of finding either the baſs or the harmony of M. Rameau, but they would be diſpleaſing to him if he heard them, and he would greatly prefer the ſimple uniſon.

"When we conſider, that, of all the people upon earth, who have all of them ſome kind of muſic and melody, the Europeans are the only people who have a harmony conſiſting of chords, and who are pleaſed with this mixture of ſounds: when we conſider that the world has endured for ſo many ages, whilſt, of all the nations which cultivated the fine arts, not one has found out this harmony; that not one animal, not one bird, not one being in nature, produces any other chord but the uniſon, nor any other muſic but melody; that the eaſtern languages, ſo ſonorous, ſo muſical; that the ears of the Greeks, ſo delicate, ſo ſenſible, practiſed and cultivated with ſo much art, have never conducted this people, luxurious and enamoured of pleaſure as they were, towards this harmony which we imagined ſo natural; that without it their muſic produced ſuch aſtoniſhing effects; that with it ours is ſo impotent; that, in ſhort, it was reſerved for the people of the north, whoſe groſs and callous organs of ſenſation are more affected with the noiſe and clamour of voices, than with the ſweetneſs of accents and the melody of inflections, to make this grand diſcovery, and to vend it as the eſſential principle upon which all the rules of the art were founded; when, in ſhort, attention is paid to all theſe obſervations, it is very difficult not to ſuſpect that all our harmony is nothing but a Gothic and barbarous invention, which would never have entered into our minds, had we been truly ſenſible to the genuine beauties of art, and of that muſic which is unqueſtionably natural.

"M. Rameau aſſerts, however, that harmony is the ſource of the moſt powerful charms in muſic. But this notion is contradictory both to reaſon and to matter of fact. To fact it is contradictory, becauſe, ſince the invention of counter-point, all the wonderful effects of muſic have ceaſed, and it has loſt its whole force and energy. To which may be added, that ſuch Harmony. beauties as purely reſult from harmony are only perceived by the learned; that they affect none with tranſport but ſuch as are deeply converſant in the art; whereas the real beauties of muſic, reſulting from nature, ought to be, and certainly are, equally obvious to the adept and the novice. To reaſon it is contradictory; ſince harmony affords us no principle of imitation by which muſic, in forming images and expreſſing ſentiments, can riſe above its native excellence till it becomes in ſome meaſure dramatic or imitative, which is the higheſt pitch of elevation and energy to which the art can aſpire; ſince all the pleaſures which we can receive from the mere mechanical influence of ſounds are extremely limited, and have very little power over the human heart."

Thus far we have heard M. Rouſſeau, in his obſervations on harmony, with patience; and we readily grant, that the *ſyſtem of harmony* by M. Rameau is neither demonſtrated, nor capable of demonſtration. But it will not follow, that any man of invention can ſo eaſily and ſo quickly ſubvert thoſe aptitudes and analogies on which the ſyſtem is founded. Every hypotheſis is admitted to poſſeſs a degree of probability proportioned to the number of phenomena for which it offers a ſatisfactory ſolution. The firſt experiment of M. Rameau is, that every ſonorous body, together with its principal ſound and its octave, gives likewiſe its twelfth and ſeventeenth major above; which being approximated as much as poſſible, even to the chords immediately repreſented by them, return to the third, fifth, and octave, or, in other words, produce perfect harmony. This is what nature, when ſolicited, ſpontaneouſly gives; this is what the human ear, unprepared and uncultivated, imbibes with ineffable avidity and pleaſure. Could any thing which claims a right to our attention, and acceptance from nature, be impreſſed with more genuine or more legible ſignatures of her ſanction than this? We do not contend for the truth of M. Rameau's ſecond experiment. Nor is it neceſſary we ſhould. The firſt, expanded and carried into all its conſequences, reſolves the phenomena of harmony in a manner ſufficient to eſtabliſh its authenticity and influence. The difficulties for which it affords no ſolution are too few and too trivial either to merit the regard of an artiſt, or a philoſopher, as M. D'Alembert in his elements has clearly ſhown. The facts with which M. Rouſſeau confronts this principle, the armies of multiplied harmonics generated *in infinitum*, which he draws up in formidable array againſt it, only ſhow the thin partitions which ſometimes may divide philoſophy from whim. For, as bodies are infinitely diviſible, according to the philoſophy now eſtabliſhed, or as, according to every philoſophy, they muſt be indefinitely diviſible, each infiniteſimal of any given maſs, which are only harmonics to other principal ſounds, muſt have fundamental tones and harmonics peculiar to themſelves; ſo that, if the reaſoning of Rouſſeau has any force againſt M. Rameau's experiment, the ear muſt be continually diſtracted with a chaos of inappretiable harmonics, and melody itſelf muſt be loſt in the confuſion. But the truth of the matter is, that, by the wiſe inſtitution of nature, there is ſuch a conformity eſtabliſhed between our ſenſes and their proper objects, as muſt prevent all theſe diſagree

Harmony. able effects. Rouſſeau and his opponent are agreed in this, that the harmonics conſpire to form one predominant ſound; and are not to be detected but by the niceſt organs, applied with the deepeſt attention. It is equally obvious, that, in an artificial harmony, by a proper management of this wiſe precaution of nature, diſſonances themſelves may be either entirely concealed or conſiderably ſoftened. So that, ſince by nature ſonorous bodies in actual vibration are prediſpoſed to exhibit perfect harmony; and ſince the human ear is, by the ſame wiſe regulation, fabricated in ſuch a manner as to perceive it; the harmonical chaos of M. Rouſſeau may be left to operate on his own brain, where it will probably meet with the warmeſt reception it can expect to find*. Nor does it avail him to pretend, that before the harmonics can be diſtinguiſhed, ſonorous bodies muſt be impelled with a force which alters the chords, and deſtroys the purity of the harmony; for this poſition is equally falſe both in theory and practice. In theory, becauſe an impulſe, however forcible, muſt proportionally operate on all the parts of any ſonorous body, ſo far as it extends: in practice, becauſe the human ear actually perceives the harmony to be pure. What effects his various manœuvres upon the organ may have, we leave to ſuch as have leiſure and curioſity enough to try the experiments; but it is apprehended, that when tried, their reſults will leave the ſyſtem of Rameau, particularly as remodelled by D'Alembert, in its full force.

* *M. Rouſſeau was alive when this article was written.*

Of all the whims and paradoxes maintained by this philoſopher, none is more extravagant than his aſſertion, that every chord, except the ſimple uniſon, is diſpleaſing to the human ear; nay, that we are only reconciled to octaves themſelves by being inured to hear them from our infancy. Strange, that nature ſhould have fixed this invariable proportion between male and female voices, whilſt at the ſame time ſhe inſpired the hearers with ſuch violent prepoſſeſſions againſt it as were invincible but by long and confirmed habit! The tranſlator of *D'Alembert's Elements*, as given under the article Music in this Dictionary, has been at peculiar pains to inveſtigate his earlieſt recollections upon this ſubject; and has had ſuch opportunities, both of attending to his original perceptions, and of recogniſing the fidelity of his memory, as are not common. He can remember, even from a period of early childhood, to have been pleaſed with the ſimpleſt kinds of artificial harmony; to have diſtinguiſhed the harmonics of ſonorous bodies with delight; and to have been ſtruck with horror at the ſound of ſuch bodies as, by their ſtructure, or by the coheſion of their parts, exhibited theſe harmonics falſe. This is the chief, if not the only cauſe, of the tremendous and diſagreeable ſenſation which we feel from the ſound of the Chineſe ghong. The ſame horrible cacophony is frequently, in ſome degree, produced by a drum unequally braced: from this ſound the tranſlator often remembers to have ſtarted and ſcreamed, when carried through the ſtreets of the town in which he was born in the arms of his nurſery-maid; and as he is conſcious, that the acouſtic organs of many are as exquiſite as his own, he cannot doubt but they may have had the ſame ſenſations, though perhaps they do not recollect the facts. So early and ſo nicely may the ſenſations of harmony and diſcord be diſtinguiſhed. But after all, it ſeems that harmony is no more than a modern invention, and even at this late period only known to the Europeans. We ſhould, however, be glad to know, from what oracle our philoſopher learned that harmony was not known to antiquity. From what remains of their works, no proof of his poſition can be derived; and we have at leaſt mentioned one probability againſt it in our notes to the Preliminary Diſcourſe to the article Music, (ſee Note B.) But though Rouſſeau's mighty objections were granted, that harmony can only be endured by ſuch ears as are habitually formed and cultivated; that the period of its prevalence has been ſhort, and the extent of its empire limited to Europe; ſtill his concluſion, that it is a Gothic and barbarous invention, is not fairly deducible even from theſe premiſes. Muſt we affirm, that epic poetry has no foundation in nature, becauſe, during the long interval which happened from the beginning of the world to the deſtruction of Troy, no epic poem ſeems to have appeared? Or becauſe a natural and melliſluous verſification is leſs reliſhed by an unpoliſhed taſte, than the uncouth rhymes of a common ballad, ſhall we infer, that the power of numbers is merely ſuppoſititious and arbitrary? On the contrary, we will venture to affirm, that though harmony cannot, as Rameau ſuppoſes, be mathematically demonſtrated from the nature and vibrations of ſonorous bodies; yet the idea of its conſtituent parts, and of their coaleſcence, is no leſs eſtabliſhed, no leſs preciſe and definite, than any mode or property of ſpace or quantity to be inveſtigated by geometrical reſearches or algebraical calculations. It is certain, that the mimetic or imitative power of muſic chiefly conſiſts in melody; but from this truth, however evident, it cannot be fairly deduced, that harmony is abſolutely unſuſceptible of imitation. Perhaps every muſical ſound, even to the moſt ſimple, and all modulations of ſound, are more or leſs remotely connected with ſome ſentiment or paſſion of the human heart. We know, that there are inſtinctive expreſſions of pain or pleaſure in their various modes and degrees, which, when uttered by any ſenſitive, and perceived by any conſcious being, excite in the mind of the percipient a feeling ſympathetic with that by which they are prompted. We likewiſe know from experience, that all artificial ſounds modulated in the ſame manner, have ſimilar, though not equal, effects. We have ſeen that, in order to render harmony compatible with itſelf, the melody of each part muſt be congenial; and, for that reaſon, one kindred melody reſults from the whole. So far, therefore, as any compoſer has it in his power to render the general melody homogeneous, ſo far the imitation may be preſerved, and even heightened: for ſuch objects as are majeſtic and auguſt, or the feelings which they excite, are more aptly expreſſed by a compoſition of kindred ſounds, than by any ſimple tone whatever. They who ſuppoſe the mimetic powers of muſic to be conſummated in the imitation of mere unmeaning ſounds or degrees of motion, muſt entertain limited and unworthy ideas of its province. It is naturally a repreſentative almoſt of every ſentiment or affection of the ſoul; and, when this end is gained, the art muſt have reached its higheſt perfection, and produced its nobleſt effects. But theſe effects, however ſenſible among the ancients, may in us be ſuperſeded by other cauſes which remain yet unexplored. Harmony.

Harmony || Harneſs. explored. Theatrical performances are likewiſe, by them, ſaid to have produced the moſt wonderful effects; yet theſe we do not recogniſe amongſt ourſelves, though we have dramatic entertainments perhaps not inferior to theirs.

Rouſſeau proceeds to tell us, that among the ancients the *enharmonic* ſpecies of muſic was ſometimes called *harmony*.

Direct HARMONY, is that in which the baſs is fundamental, and in which the upper parts preſerve among themſelves, and with that fundamental baſs, the natural and original order which ought to ſubſiſt in each of the chords that compoſe this harmony.

Inverted HARMONY, is that in which the fundamental or generating ſound is placed in ſome of the upper parts, and when ſome other ſound of the chords is tranſferred to the baſs beneath the others.

Harmony of the Spheres, or *Celeſtial Harmony*, a ſort of muſic much talked of by many of the ancient philoſophers and fathers, ſuppoſed to be produced by the ſweetly tuned motions of the ſtars and planets. This harmony they attributed to the various proportionate impreſſions of the heavenly globes upon one another, acting at proper intervals. It is impoſſible, according to them, that ſuch prodigious large bodies, moving with ſo much rapidity, ſhould be ſilent: on the contrary, the atmoſphere, continually impelled by them, muſt yield a ſet of ſounds proportionate to the impreſſion it receives; conſequently, as they do not all run the ſame circuit, nor with one and the ſame velocity, the different tones ariſing from the diverſity of motions, directed by the hand of the Almighty, muſt form an admirable ſymphony or concert.

They therefore ſuppoſed, that the moon, as being the loweſt of the planets, correſponded to *mi*; Mercury, to *fa*; Venus, to *ſol*; the Sun, to *la*; Mars, to *fi*; Jupiter, to *ut*; Saturn, to *re*; and the orb of the fixed ſtars, as being the higheſt of all, to *mi*, or the octave.

HARMOSTES, or HARMOSTA, in antiquity, a ſort of magiſtrate among the Spartans, whereof there were ſeveral, whoſe buſineſs was to look to the building of citadels, and repairing the forts and fortifications of the cities.—The word is ἁρμοστης, formed of ἁρμοζω, *apto, concino*, "I adapt, concert," &c.

HARMOSYNIANS, ἁρμοσυνοι, in antiquity, were magiſtrates among the Spartans, who, after the death of Lycurgus, were appointed to enforce the obſervance of that law of the Spartan legiſlator which required married women to wear a veil when they appeared in the ſtreets, whereby they were diſtinguiſhed from ſingle females, who were allowed to appear abroad with their faces uncovered.

HARNESS, a complete armour, or the whole equipage and accoutrements of a cavalier heavily armed; as caſque, cuiraſs, &c. The word is formed of the French *harnois*; which ſome derive from the Greek αρναξ, "a lamb's ſkin," becauſe they anciently covered themſelves therewith. Du Cange obſerves, that the word *harneſium* is uſed in the corrupt Latin in the ſame ſenſe, and that it comes from the High Dutch *harnas* or *harniſch*. Others derive it from the Italian *arneſe*; others from the Celtic *harnes*, "a cuiraſs."

Under King Richard II. it was expreſsly forbidden all men to ride in harneſs with launcegays. *Vide* ſtat. 7. Richard II. cap. 13. In the ſtatute 2 Hen. VI. cap. 14. harneſs ſeems to include all kinds of furniture for offence as well as defence, both of men and horſe; as ſwords, buckles for belts, girdles, &c. Harneſs || Harp.

HARNESS is alſo uſed for the furniture put on a horſe to draw in a coach or waggon, or other carriage; ſuch as collars, leathers, traces, &c.

HARO, a ſmall town of Spain in Old Caſtile, on the Ebro, ſurrounded with walls. W. Long. 2. 23. N. Lat. 42. 40.

HAROU, *Harou*, or *Harol*, in the Norman cuſtoms. —*Clamour de haro* is a cry or formula of invoking the aſſiſtance of juſtice againſt the violence of ſome offender, who upon hearing the word *haro* is obliged to deſiſt, on pain of being ſeverely puniſhed for his outrage, and to go with the party before the judge.

The word is commonly derived of *ha* and *roul*, as being ſuppoſed an invocation of the ſovereign power, to aſſiſt the weak againſt the ſtrong, on occaſion of Raoul firſt duke of Normandy, about the year 912, who rendered himſelf venerable to his ſubjects by the ſeverity of his juſtice; ſo that they called on him even after his death when they ſuffered any oppreſſion. Some derive it from Harola king of Denmark, who in the year 826 was made grand conſervator of juſtice at Mentz. Others from the Daniſh *aa rau*, q. d. "help me;" a cry raiſed by the Nomans in flying from a king of Denmark named Roux, who made himſelf duke of Normandy. The letters of the French chancery have uſually this clauſe, *Nonobſtant clameur de haro*, &c.

The haro had anciently ſuch vaſt power, that a poor man of the city of Caen named Aſſelin, in virtue hereof, arreſted the corpſe of William the Conqueror, in the middle of the funeral proceſſion, till ſuch time as his ſon Henry had paid the value of the land in queſtion, which was that on which the chapel was built in which he was interred.

HAROLD, the name of two Engliſh kings. See ENGLAND, N° 77, 83.

HARONIA, a town of Turkey, in the Arabian Irak, 45 miles north of Bagdad.

HAROUE, a town of France, in the department of Meurthe, 13½ miles ſouth-weſt of Luneville.

HARP, a muſical inſtrument of the ſtringed kind, of a triangular figure, and held upright between the legs of the performer.

Papias, and Du Cange after him, will have the harp to have taken its name from the Arpii, a people of Italy, who were ſuppoſed the firſt that invented it; and from whom, they ſay, it was borrowed by other nations. Menage, &c. derive the word from the Latin *harpa*, and that from the German *herp* or *harp*. Others bring it from the Latin *carpo*, becauſe touched or thrummed with the fingers. Dr Hickes derives it from *harpa* or *hearpa*, which ſignify the ſame thing; the firſt in the language of the Cimbri, the ſecond in that of the Anglo Saxons. The Engliſh prieſt who wrote the life of St Dunſtan, and who lived with him in the tenth century, ſays, cap. ii. n. 12. *Sumpſit ſecum ex more citharam ſuam, quam paterna lingua* hearpam *vocamus*; which intimates the word to be Anglo-Saxon.

The harp was the favourite muſical inſtrument of the Britons and other northern nations in the middle ages; as is evident from their laws, and from every

Harp. passage in their history, in which there is the least allusion to music. By the laws of Wales, a harp was one of the three things that were necessary to constitute a gentleman, i. e. a freeman; and none could pretend to that character who had not one of these favourite instruments, or could not play upon it. By the same laws, to prevent slaves from pretending to be gentlemen, it was expressly forbidden to teach, or to permit, them to play upon the harp; and none but the king, the king's musicians, and gentlemen, were allowed to have harps in their possession. A gentleman's harp was not liable to be seized for debt; because the want of it would have degraded him from his rank, and reduced him to a slave. The harp was in no less estimation and universal use among the Saxons and Danes. Those who played upon this instrument were declared gentlemen by law; their persons were esteemed inviolable, and secured from injuries by very severe penalties; they were readily admitted into the highest company, and treated with distinguished marks of respect wherever they appeared.

There is some diversity in the structure of harps. That called the *triple harp* has 97 strings or chords in three rows, extending from C in the tenor cliff to double G in alt, which make five octaves: the middle row is for the semitones, and the two outside rows are perfect unisons. On the bass side, which is played with the right hand, there are 36 strings: on the treble side, 26; and in the middle row, 35 strings. There are two rows of pins or screws on the right side, serving to keep the strings tight in their holes, which are fastened at the other end to three rows of pins on the upper side. The harp, within the last 40 years, has been in some degree improved by the addition of eight strings to the unison, viz. from E to double F in alt. This instrument is struck with the finger and thumb of both hands. Its music is much like that of the spinet, all its strings going from semitone to semitone; whence some call it an *inverted spinet*. It is capable of a much greater degree of perfection than the lute.

There are among us two sorts of this instrument, viz. the *Welch harp*, being that just described; and the *Irish harp*. Plate CCL. N° 1. represents the harp of Brian Boiromh, king of all Ireland, slain in battle with the Danes A. D. 1014, at Clontarf. His son Donagh having murdered his brother Teige, A. D. 1023, and being deposed by his nephew, retired to Rome, and carried with him the crown, harp, and other regalia of his father, which he presented to the Pope in order to obtain absolution. Adrian IV. surnamed Breakspear, alleged this circumstance as one of the principal titles he claimed to this kingdom in his bull transferring it to Henry II. These regalia were kept in the Vatican till the Pope sent the harp to Henry VIII. with the title of Defender of the Faith; but kept the crown, which was of massive gold. Henry gave the harp to the first earl of Clanricard, in whose family it remained till the beginning of the 18th century, when it came by a lady of the De Burgh family into that of Mac Mahon of Clenagh in the county of Clare, after whose death it passed into the possession of Commissioner Mac Namara of Limerick. In 1782 it was presented to the right honourable William Conyngham, who deposited it in Trinity college library. It is 32 inches high, and of extraordinary good workmanship; the sounding-board is of oak, the arms of red sally; the extremity of the uppermost arm in part is capt with silver, extremely well wrought and chiseled. It contains a large crystal set in silver, and under it was another stone now lost. The buttons or ornamental knobs at the sides of this arm are of silver. On the front arm are the arms chased in silver of the O'Brien family, the bloody hand supported by lions. On the sides of the front arm within two circles are two Irish wolf dogs cut in the wood. The holes of the sounding board where the strings entered are neatly ornamented with escutcheons of brass carved and gilt; the larger sounding-holes have been ornamented, probably with silver, as they have been the object of theft. This harp has 28 keys, and as many string-holes, consequently there were as many strings. The foot piece or rest is broken off, and the parts round which it was joined are very rotten. The whole bears evidence of an expert artist. Harp

King David is usually painted with a harp in his hands; but we have no testimony in all antiquity that the Hebrew harp called *chinnor*, was any thing like ours. On a Hebrew medal of Simon Maccabæus we see two sorts of musical instruments; but they are both of them very different from our harp, and only consist of three or four strings. All authors agree, that our harp is very different from the lyra, cithara, or barbiton, of the Romans. Fortunatus, lib. vii. carm. 8. witnesses, that it was an instrument of the barbarians:

Romanusque lyra, plaudat tibi barbarus harpa,
Græcus Achilliacha, crotta Britanna canat.

Of ancient harps, two are represented on the same plate.—N° 2. is a *trigonum* or triangular harp. It is taken from an ancient painting in the museum of the king of Naples, in which it is placed on the shoulder of a little dancing Cupid, who supports the instrument with his left hand and plays upon it with his right. The trigonum is mentioned by Athenæus, lib. iv. and by Julius Pollux, lib. iv. cap. 9. According to Athenæus, Sophocles calls it a *Phrygian instrument;* and one of his dipnosophists tells us, that a certain musician, named *Alexander Alexandrinus*, was such an admirable performer upon it, and had given such proofs of his abilities at Rome, that he made the inhabitants μησομανιεν, "musically mad." N° 3. and 4. are varieties of the same instrument. N° 5. is the Theban harp, according to a drawing made from an ancient painting in one of the sepulchral grottoes of the first kings of Thebes, and communicated by Mr Bruce to Dr Burney *. The performer is clad in a habit made like a shirt, such as the women still wear in Abyssinia, and the men in Nubia. It reaches down to his ancles; his feet are without sandals, and bare; his neck and arms are also bare; his loose white sleeves are gathered above his elbows; and his head is close shaved. His left hand seems employed in the upper part of the instrument among the notes in *alto*, as if in an arpeggio; while, stooping forwards, he seems with his right hand to be beginning with the lowest string, and promising to ascend with the most rapid execution: this action, so obviously rendered by an indifferent artist, shows that it was a common one in his time; or, in other words, that great hands were then frequent, and consequently that music was well understood and diligently followed.

* Vid. *Burney's Hist. of Music*, p. 224.

On this instrument Dr Burney makes the following observations:

Harp. observations: "The number of ſtrings, the ſize and form of this inſtrument, and the elegance of its ornaments, awaken reflections, which to indulge would lead us too far from our purpoſe, and indeed out of our depth. The mind is wholly loſt in the immenſe antiquity of the painting in which it is repreſented. Indeed the time when it was executed is ſo remote, as to encourage a belief, that arts, after having been brought to great perfection, were again loſt and again invented long after this period.—With reſpect to the number of ſtrings upon this harp, if conjectures may be allowed concerning the method of tuning them, two might be offered to the reader's choice. The firſt idea that preſented itſelf at the ſight of 13 ſtrings was, that they would furniſh all the ſemitones to be found in modern inſtruments within the compaſs of an octave, as from C to *c*, D to *d*, or E to *e*. The ſecond idea is more Grecian, and conformable to antiquity; which is, that if the longeſt ſtring repreſented *proſlambanomenos*, or D, the remaining 12 ſtrings would ſupply all the tones, ſemitones and quarter-tones, of the diatonic, chromatic, and enharmonic genera of the ancients, within the compaſs of an octave: but for my part, I would rather incline to the firſt arrangement, as it is more natural, and more conformable to the ſtructure of our organs, than the ſecond. For with reſpect to the genera of the Greeks, though no hiſtoric teſtimony can be produced concerning the invention of the diatonic and chromatic, yet ancient writers are unanimous in aſcribing to Olympus the Phrygian the firſt uſe of the enharmonic: and though in the beginning the melody of this genus was ſo ſimple and natural as to reſemble the wild notes and rude eſſays of a people not quite emerged from barbariſm; yet in after-times it became overcharged with finical fopperies and fanciful beauties, ariſing from ſuch minute diviſions of the ſcale as had no other merit than the great difficulty of forming them. It ſeems a matter of great wonder, with ſuch a model before their eyes as the Theban harp, that the form and manner of uſing ſuch an inſtrument ſhould not have been perpetuated by poſterity; but that, many ages after, another of an inferior kind, with fewer ſtrings, ſhould take place of it. Yet if we conſider how little we are acquainted with the uſe and even conſtruction of the inſtruments which afforded the greateſt delight to the Greeks and Romans, or even with others in common uſe in a neighbouring part of Europe, only a few centuries ago, our wonder will ceaſe; eſpecially if we reflect upon the ignorance and barbariſm into which it is poſſible for an ingenious people to be plunged by the tyranny and devaſtation of a powerful and cruel invader."

Bell-Harp, a muſical inſtrument of the ſtring kind, thus called from the common players on it ſwinging it about, as a bell on its baſis.

It is about three feet long; its ſtrings, which are of no determinate number, are of braſs or ſteel wire, fixed at one end, and ſtretched acroſs the ſound board by ſcrews fixed at the other. It takes in four octaves, according to the number of the ſtrings, which are ſtruck only with the thumbs, the right hand playing the treble and the left hand the baſs: and in order to draw the ſound the clearer, the thumbs are armed with a little wire pin. This may perhaps be the lyra or cythara of the ancients; but we find no mention made of it under the name it now bears, which muſt be allowed to be modern.

Harp || Harpies.

Harp of Æolus. See Acoustics, p. 149.

HARPAGINES, in antiquity, were hooks of iron, hanging on the top of a pole, which, being ſecured with chains to the maſts of ſhips, and then let down with great velocity into the enemy's veſſels, caught them up into the air. By way of defence againſt theſe machines, they covered their ſhips with hides, which broke and blunted the force of the iron. The harpagines, by the Greeks called ἁρπαγες, owe their invention to Anacharſis the Scythian philoſopher.

HARPAGIUS. See Arpagius.

HARPALUS, a Greek aſtronomer, who flouriſhed about 480 B. C. corrected the cycle of eight years invented by Cleoſtratus; and propoſed a new one of nine years, in which he imagined the ſun and moon returned to the ſame point. But Harpalus's cycle was afterwards altered by Meton, who added ten full years to it. See Chronology, N° 27.

HARPIES (ΑΡΠΥΙΑΙ, Harpyiæ), in antiquity, a rapacious impure ſort of monſters of the bird kind, mentioned among the poets. They are repreſented * with wings, ears like bears, bodies like vultures, faces like women, and feet and hands hooked like the talons of birds of prey.

* *Virg. Æn.* iii.

The ancients looked on the harpies as a ſort of genii or demons. Some make them the daughters of Tellus and Oceanus, the *earth* and *ocean*; whence, ſays Servius, it is, that they inhabit an iſland, half on land and half in water. Valerius Flaccus makes them the daughters of Typhon.

There were three harpies, Aello, Ocypete, and Celæno, which laſt Homer calls *Podarge*. Heſiod, in his Theogony, ver. 267. only reckons two, Aello and Ocypete, and makes them the daughters of Thaumas and Electra, affirming that they had wings, and went with the rapidity of the wind. Zephyrus begat of them Balius and Xanthus, Achilles's horſes. Pherecydes relates, that the Boreades expelled them from the Ægean and Sicilian ſeas, and purſued them as far as the iſlands which he calls *Plotæ* and Homer *Calynæ*; and which have ſince been called the *Strophades*.

Voſſius, De Idol. lib. iii. cap. 99. p. 63. thinks, that what the ancients have related of the harpies, agrees to no other birds ſo well as the bats found in the territories of Darien in South America. Theſe animals kill not only birds, but dogs and cats, and prove very troubleſome to men by their peckings. But the ancients, as the ſame Voſſius obſerves, knew nothing of theſe birds. By the harpies, therefore, he thinks, they could mean nothing elſe but the winds; and that it was on this account they were made daughters of Electra, the daughter of Oceanus. Such is the opinion of the ſcholiaſts of Apollonius, Heſiod, and Euſtathius. Their names, Aello, Ocypete, Celæno, are ſuppoſed to ſuggeſt a farther argument of this.

Mr Bryant ſuppoſes that the harpies were a college of prieſts in Bithynia, who on account of their repeated acts of violence and cruelty, were driven out of the country: their temple was called *Arpi*, and the environs *Arpiai*, whence the Grecians formed Αρπυιαι; and he obſerves farther, that *Harpya*, Αρπυια, was certainly of old the name of a place.

HARPING

Harping ‖ Harpoon.

HARPING IRON. See HARPOON.

HARPINGS, the fore-parts of the wales which encompaſs the bow of a ſhip, and are faſtened to the ſtem, being thicker than the after part of the wales, in order to reinforce the ſhip in this place, where ſhe ſuſtains the greateſt ſhock of reſiſtance in plunging into the ſea, or dividing it, under a great preſſure of ſail.

HARPOCRATES, in *Mythology*, the ſon of Iſis and Oſiris. This is an Egyptian deity, whoſe diſtinguiſhing attribute is, that he is repreſented with his fingers applied to his mouth, denoting that he is the god of ſilence. The ſtatue of this idol was fixed in the entrance of moſt of the Egyptian temples, and he was commonly exhibited under the figure of a young man naked, crowned with an Egyptian mitre, holding in one hand a cornucopia, and in the other the flower of lotus, and ſometimes bearing a quiver.

HARPOCRATION, VALERIUS, a celebrated ancient rhetorician of Alexandria, who has left us an excellent *Lexicon upon the ten orators of Greece*. Aldus firſt publiſhed this lexicon in the Greek at Venice in 1603. Many learned men have laboured upon it; but the beſt edition was given by James Gronovius at Leyden in 1696.

HARPOON or HARPING-IRON, a ſpear or javelin uſed to ſtrike the whales in the Greenland fiſhery.

The harpoon, which is ſometimes called the *harping-iron*, is furniſhed with a long ſtaff, having at one end a broad and flat triangular head, ſharpened at both edges, ſo as to penetrate the whale with facility: to the head of this weapon is faſtened a long cord, called the *whale-line*, which lies carefully *coiled* in the boat, in ſuch a manner as to run out without being interrupted or entangled. See WHALE-FISHERY, CETOLOGY *Index*.

Gun-HARPOON, a kind of fire-arm for diſcharging harpoons at whales, and thereby killing them more eaſily and expeditiouſly than formerly when the harpoons were thrown by the hand. Though this method was projected a good many years ago, it has but lately come into uſe; and premiums have been annually offered by the ſociety for encouraging arts, &c. to the perſons who firſt ſtruck a fiſh in this manner. In the Tranſactions of that Society for 1786, we have an account of the firſt fiſh ſtruck in this manner in 1784. The gun was of the blunderbuſs conſtruction, loaded with four common tobacco pipes full of glazed powder; the fiſh was ſhot at the diſtance of ten fathoms, the harpoon going into her back up to the ring; and ſhe was killed in about an hour. In 1785 three whales were killed in this manner; four in 1786, and three in 1787. Since that time the gun-harpoon has come more into uſe, and will probably ſoon ſuperſede the other method entirely. In the Tranſactions of the Society for 1789, we have accounts of a number of whales killed in this manner. The inſtrument appears to be extremely uſeful in calm ſtill weather, as the whale, though a timorous creature, will frequently allow a boat to approach it to the diſtance of 20, 15, or even 10 fathoms, all of which diſtances are within reach of the gun-harpoon, though not within the reach of that thrown by the hand. The greateſt inconvenience was in caſe of rain or ſnow, by which the lock was apt to get wet. To remedy this, a caſe of leather was made to fit round the gun and over the lock, lined with tin, and big enough to fire the gun when it was on. The fiſh ſtruck with an harpoon diſcharged in this manner are ſoon killed by reaſon of its penetrating their bodies to a great depth, not leſs than five or ſix feet, which no man's ſtrength would be able to accompliſh. In the volume juſt quoted, we have an account of one which was ſhot through the tail. The harpoon broke in the ſlit, but five fathoms of line went through the tail. The fiſh was killed in eight hours, which is perhaps the only inſtance of a fiſh ſtruck in that part being caught. In another, the harpoon carried ſix feet of line into its body; the creature died in ten minutes. Others were killed in 15 minutes or half an hour, and one had a rib broken by the violence of the ſtroke. In the Tranſactions of the Society for 1790, there are other accounts ſimilar to the foregoing, and all agreeing as to the great uſefulneſs of the inſtrument both for ſtriking the fiſh at a conſiderable diſtance, and for killing them in a very ſhort time.

Harpſichord ‖ Harrington.

HARPSICHORD, the moſt harmonious of all the muſical inſtruments of the ſtring kind. It is played on after the manner of the organ, and is furniſhed with a ſet, and ſometimes with two ſets of keys; the touching or ſtriking of theſe keys moves a kind of little jacks, which alſo move a double row of chords or ſtrings, of braſs or iron, ſtretched over four bridges on the table of the inſtrument.

HARQUEBUSS, a piece of fire-arms, of the length of a muſket, uſually cocked with a wheel. It carried a ball that weighed one ounce ſeven-eighths.

There was alſo a larger ſort, called the great harquebuſs, uſed for the defence of ſtrong places, which carried a ball of about three ounces and a half: but they are now but little uſed, except in ſome old caſtles, and by the French in ſome of their garriſons.

HARRIER, a kind of hound, endowed with an admirable gift of ſmelling, and very bold in the purſuit of his game. See CANIS.

HARRINGTON, SIR JOHN, an ingenious Engliſh poet, was the ſon of John Harrington, Eſq; who was committed to the Tower by Queen Mary for holding a correſpondence with her ſiſter Elizabeth; who, when ſhe came to the crown, ſtood godmother to this ſon. Before he was 30, he publiſhed a tranſlation of Arioſto's Orlando Furioſo, a work by which he was principally known; for though he afterwards publiſhed ſome epigrams, his talent did not ſeem to have lain that way. He was created knight of the bath by James I.; and preſented a MS. to Prince Henry, levelled chiefly at the married biſhops. He is ſuppoſed to have died about the latter end of James's reign.

HARRINGTON, *James*, a moſt eminent Engliſh writer in the 17th century, bred at Oxford, travelled into Holland, France, Denmark, and Germany, and learned the languages of thoſe countries. Upon his return to England, he was admitted one of the privy-chamber extraordinary to King Charles I. He ſerved the king with great fidelity, and made uſe of his intereſt with his friends in parliament to procure matters to be accommodated with all parties. The king loved his company except when the converſation happened to turn upon commonwealths. He found means to ſee the king at St James's; and attended him on the ſcaffold,

Harriot. scaffold, where, or a little before, he received a token of his majesty's affection. After the death of King Charles, he wrote his *Oceana;* a kind of political romance, in imitation of Plato's Commonwealth, which he dedicated to Oliver Cromwell. It is said, that when Oliver perused it, he declared, that "the gentleman had wrote very well, but must not think to cheat him out of his power and authority; for that what he had won by the sword, he would not suffer himself to be scribbled out of." This work was attacked by several writers, against whom he defended it. Beside his writings to promote republican principles, he instituted likewise a nightly meeting of several ingenious men in the New Palace-Yard, Westminster; which club was called the *Rota*, and continued till the secluded members of parliament were restored by General Monk. In 1661, he was committed to the Tower for treasonable designs and practices; and Chancellor Hyde, at a conference with the lords and commons, charged him with being concerned in a plot. But a committee of lords and commons could make nothing of that plot. He was conveyed to St Nicholas's island, and from thence to Plymouth, where he fell into an uncommon disorder of the imagination. Having obtained his liberty by means of the earl of Bath, he was carried to London, and died in 1677. He published, besides the above works, several others, which were first collected by Toland, in one volume folio, in 1700: but a more complete edition was published in 1737, by the reverend Dr Birch.

HARRIOT, THOMAS, a celebrated algebraist, was born at Oxford in 1560, where he was also educated. In 1579 he completed his bachelor's degree; and, being already distinguished for his mathematical learning, was soon after recommended to Sir Walter Raleigh, as a proper person to instruct him in that science. He was accordingly received into the family of that gentleman; who, in 1585, sent him with the colony, under Sir Richard Granville, to Virginia; of which country, having remained there about a year, he afterwards published a topographical description. About the year 1588, Mr Harriot was introduced by his patron Sir Walter Raleigh, to Henry Percy earl of Northumberland, who allowed him a pension of 120l. per annum. He spent many years of his life in Sion college; where he died in July 1621, of a cancer in his lip, and was buried in the church of St Christopher, where a handsome monument was erected to his memory. Anthony Wood tells us, he was a deist, and that the divines looked upon his death as a judgment. Be his religious opinions what they might, he was doubtless one of the first mathematicians of the age in which he lived, and will always be remembered as the inventor of the present improved method of algebraical calculation. His improvements in algebra were adopted by Des Cartes, and for a considerable time imposed upon the French nation as his own invention; but the theft was at last detected, and exposed by Dr Wallis, in his History of Algebra, where the reader will find our author's invention accurately specified. His works are, 1. A brief and true report of the new-found land of Virginia; of the commodities there found, and to be raised. &c. 2. *Artis analyticæ praxis ad æquationes algebraicas nova expedita, et generali methodo resolvendas, è posthumis Thomæ Harrioti*, &c. 3. *Ephemeris chyrometrica.* Manuscript, in the library of Sion college. He is said to have left several other manuscripts, which are probably lost. Harris.

Dr Zach, who fully established the truth of Des Cartes having pilfered from the *Artis analyticæ praxis*, &c. of Harriot, and given it to the world as his own, speaks thus of our celebrated mathematician and algebraist: "It is remarkable, that the fame and the honour of this truly great man, were constantly attacked by the French mathematicians, who could not endure that Harriot should in any way diminish the fame of their Vieta and Des Cartes, especially the latter, who was openly accused of plagiarism from our author.

"Des Cartes published his Geometry six years after Harriot's work appeared, viz. in the year 1637. Sir Charles Cavendish, then ambassador at the French court, observed to the famous geometrician Roverval, that these improvements in analysis had been already made these six years in England; and shewed him afterwards *Harriot's Artis Analyticæ Praxis;* which, as Roverval was looking over, at every page he cried out, yes! yes! he has seen it! Des Cartes had also been in England before Harriot's death, and had heard of his new improvements and inventions in analysis.

"I found likewise (says Dr Zach) among the papers of Harriot a large set of observations on the satellites of Jupiter, with drawings of them, their positions, and calculations of their revolutions and periods. His first observation of these discovered satellites, I find to be of January 16. 1610, and they go till February 26. 1612. Galileo pretends to have discovered them January 7. 1610; so that it is not improbable that Harriot was likewise the first discoverer of these attendants of Jupiter."

HARRIS, JAMES, Esq. an English gentleman of very uncommon parts and learning, was the son of James Harris, Esq. by a sister of Lord Shaftesbury author of The Characteristics. He was born in the Close at Salisbury 1709; and educated at the grammar-school there. In 1726, he was removed to Wadham-college in Oxford, but took no degree. He cultivated letters, however, most attentively; and also music, in the theory and practice of which he is said to have had few equals. He was member for Christchurch, Hants, which he represented in several successive parliaments. In 1763, he was appointed one of the lords commissioners of the admiralty, and soon after removed to the board of treasury. In 1774 he was made secretary and comptroller to the queen, which post he held until his death. He died Dec. 21. 1780, in his 72d year, after a long illness, which he bore with calmness and resignation.—He is the author of some valuable works. 1. Three Treatises, concerning Art; Music, Painting, and Poetry; and Happiness, 1745, 8vo. 2. Hermes; or, A Philosophical Enquiry concerning Universal Grammar. 3. Philosophical Arrangements. 4. Philological Inquiries, 1782, 2 vols 8vo, finished just before his death, and published since. These Inquiries show much ingenuity and learning; but being the amusement of his old age rather than an exertion of genius, they have not the philosophic tone of his former productions.

HARRIS, one of the Hebrides or Western Islands of

Harriſon. of Scotland. It is about 25 miles in length, and from 6 to 8 in breadth. Upon the eaſt ſide it is moſtly rock; but on the weſt there are ſome tolerable farms, and the number of people amounts to 2500. It has Lewis on the north, and North Uiſt on the ſouth, from which it is ſeparated by a channel of four miles in width, called the *Sound of Harris*. This channel is navigable for veſſels of burden, but it requires a ſkilful pilot. It is the only paſſage between the Butt of the Lewis and Bara for veſſels of burden paſſing to and from the weſt ſide of the Long Iſland. The ſound is generally encumbered with rocks and iſlands, ſome of which are conſiderable, as Bernera, Pabbay, Enſay, Killegray. Theſe, with Scalpay, Taranſay, and Scarp, compoſe the inhabited iſlands on the coaſt of Harris. Some of them produce good crops of grain, and all of them good paſture. Harris and its iſlands ſell from 400 to 500 tons of kelp annually; it abounds on the eaſt ſide in excellent lochs or bays, and its ſhores on both ſides form one continued fiſhery. The fiſh on this coaſt, and along the whole ſhores of the Long Iſland, are more numerous, and of larger dimenſions, than thoſe on the oppoſite continent; on which account, two royal fiſhing ſtations were begun in the reign of Charles I. one in Loch Maddie, and the other in the Sound of Harris.

HARRISON, WILLIAM, a writer much eſteemed and patroniſed by the literati of his time, was fellow of New-college, Oxford, and had no other income than 40l. a-year as tutor to one of the duke of Queenſberry's ſons. In this employment he fortunately attracted the favour of Dr Swift, whoſe ſolicitations with Mr St John obtained for him the reputable employment of ſecretary to Lord Raby, ambaſſador at the Hague, and afterwards earl of Strafford. A letter of his whilſt at Utrecht, dated Dec. 16. 1712, is printed in the Dean's works. Mr Harriſon, who did not long enjoy his riſing fortune, was diſpatched to London with the Barrier treaty; and died Feb. 14. 1712-13. See the Journal to Stella, of that and the following day; where Dr Swift laments his loſs with the moſt unaffected ſincerity. Mr Tickel has mentioned him with reſpect in his Proſpect of Peace; in Engliſh Poets, vol. xxvi. p. 113; and Dr Young in the beautiful cloſe of an Epiſtle to Lord Lanſdowne, vol. lii. p. 185, moſt pathetically bewails his loſs. Dr Birch, who has given a curious note on Mr Harriſon's Letter to Swift, has confounded him with *Thomas* Harriſon, M. A. of Queen's-college. In Nichols's Select Collection are ſome pleaſing ſpecimens of his poetry; which, with Woodſtock-Park in Dodſley's Collection, and an Ode to the duke of Marlborough, 1707, in Duncombe's Horace, are all the poetical writings that are known of this excellent young man; who figured both as an humoriſt and a politician in the fifth volume of the Tatler, of which (under the patronage of Bolingbroke, Henley, and Swift) he was profeſſedly the editor. See the Supplement to Swift.—There was another *William* Harriſon, author of The Pilgrim, or the happy Convert, a Paſtoral Tragedy, 1709.

HARRISON, *John*, a moſt accurate mechanic, the celebrated inventor of the famous *time-keeper* for aſcertaining the longitude at ſea, and alſo of the compound, or, as it is commonly called, the *gridiron pendulum*; was born at Foulby, in the pariſh of Wragby, near Pontefract in Yorkſhire, in 1693. The vigour of his natural abilities, if not even ſtrengthened by the want of education, which confined his attention to few objects, at leaſt amply compenſated the deficiencies of it; as fully appeared from the aſtoniſhing progreſs he made in that branch of mechanics to which he devoted himſelf. His father was a carpenter, in which profeſſion the ſon aſſiſted; occaſionally alſo, according to the miſcellaneous practice of country artiſts, ſurveying land, and repairing clocks and watches. He was, from his early childhood, attached to any machinery moving by wheels, as appeared while he lay ſick of the ſmall-pox about the ſixth year of his age, when he had a watch placed open upon his pillow to amuſe himſelf by contemplating the movement. In 1700, he removed with his father to Barrow in Lincolnſhire; where though his opportunities of acquiring knowledge were very few, he eagerly improved every incident from which he might collect information; frequently employing all or great part of his nights in writing or drawing: and he always acknowledged his obligations to a clergyman who came every Sunday to officiate in the neighbourhood, who lent him a MS. copy of Profeſſor Saunderſon's Lectures; which he carefully and neatly tranſcribed, with all the diagrams. His native genius exerted itſelf ſuperior to theſe ſolitary diſadvantages; for in the year 1726, he had conſtructed two clocks, moſtly of wood, in which he applied the eſcapement and compound pendulum of his own invention: theſe ſurpaſſed every thing then made, ſcarcely erring a ſecond in a month. In 1728, he came up to London with the drawings of a machine for determining the longitude at ſea, in expectation of being enabled to execute one by the board of longitude. Upon application to Dr Halley, he referred him to Mr George Graham; who, diſcovering he had uncommon merit, adviſed him to make his machine before he applied to the board of longitude. He returned home to perform this taſk; and in 1735 came to London again with his firſt machine; with which he was ſent to Liſbon the next year for a trial of its properties. In this ſhort voyage, he corrected the dead reckoning about a degree and a half; a ſucceſs that proved the means of his receiving both public and private encouragement. About the year 1739, he completed his ſecond machine, of a conſtruction much more ſimple than the former, and which anſwered much better; this, though not ſent to ſea, recommended Mr Harriſon yet ſtronger to the patronage of his private friends and of the public. His third machine, which he produced in 1749, was ſtill leſs complicated than the ſecond, and ſuperior in accuracy, as erring only three or four ſeconds in a week. This he conceived to be the *ne plus ultra* of his attempts; but in an endeavour to improve pocket-watches, he found the principles he applied to ſurpaſs his expectations ſo much, as to encourage him to make his fourth time-keeper, which is in the form of a pocket watch, about ſix inches diameter. With this time-keeper his ſon made two voyages, the one to Jamaica, and the other to Barbadoes: in both which experiments it corrected the longitude within the neareſt limits required by the act of the 12th of Queen Anne; and the inventor therefore, at different times, though not without infinite trouble, received the

Harriſon, Harrogate.

the propoſed reward of 20,000l. Theſe four machines were given up to the board of longitude. The three former were not of any uſe, as all the advantages gained by making them were comprehended in the laſt; they were worthy, however, of being carefully preſerved as mechanical curioſities, in which might be traced the gradations of ingenuity executed with the moſt delicate workmanſhip; whereas they now lie totally neglected in the royal obſervatory at Greenwich. The fourth machine, emphatically diſtinguiſhed by the name of *the time-keeper*, has been copied by the ingenious Mr Kendal; and that duplicate, during a three years circumnavigation of the globe in the ſouthern hemiſphere by Captain Cook, anſwered as well as the original. The latter part of Mr Harriſon's life was employed in making a fifth improved time-keeper on the ſame principles with the preceding one; which, at the end of a ten weeks trial, in 1772, at the king's private obſervatory at Richmond, erred only $4\frac{1}{2}$ ſeconds. Within a few years of his death, his conſtitution viſibly declined; and he had frequent fits of the gout, a diſorder that never attacked him before his 77th year: he died at his houſe in Red-Lion ſquare, in 1776, aged 83. The recluſe manner of his life in the unremitted purſuit of his favourite object, was by no means calculated to qualify him as a man of the world; and the many diſcouragements he encountered in ſoliciting the legal reward of his labours, ſtill leſs diſpoſed him to accommodate himſelf to the humours of mankind. In converſing on his profeſſion, he was clear, diſtinct, and modeſt; yet, like many other mere mechanics, found a difficulty in delivering his meaning by writing; in which he adhered to a peculiar and uncouth phraſeology. This was but too evident in his *Deſcription concerning ſuch mechaniſm as will afford a nice or true menſuration of time*, &c. 8vo. 1775; which his well-known mechanical talents will induce the public to account for from his unacquaintance with letters, from his advanced age, and attendant mental infirmities, among which may be reckoned his obſtinate refuſal to accept of any aſſiſtance whatever in this publication. This ſmall work includes alſo an account of his new muſical ſcale, or mechanical diviſion of the octave, according to the proportion which the radius and diameter of a circle have reſpectively to the circumference. He had in his youth been the leader of a diſtinguiſhed band of church-ſingers; had a very delicate ear for muſic; and his experiments on ſound, with a moſt curious monochord of his own improvement, are reported to have been not leſs accurate than thoſe he was engaged in for the menſuration of time.

HARROGATE, a village in the weſt riding of Yorkſhire, in the pariſh of Knareſborough, remarkable for its medicinal ſprings. Theſe are three in number, all different in their qualities, notwithſtanding their contiguity. 1. The Tewet water or Sweet Spa, a vitriolic ſpring of a ſort of milky taſte uſed in gravelly caſes, was diſcovered by Mr Slingſby in 1638. 2. The ſtinking or ſulphur ſpring, uſeful in dropſical, ſcorbutic, and gouty caſes, riſes in the town, and is received in four baſons under four different buildings; at one it is drunk, at the others uſed for hot or cold baths. It is perfectly clear; but the taſte and ſmell a compoſition of rotten eggs, ſea-water, and ſulphur, and extremely ſalt. Bathing is the moſt general method of uſing it. It is the ſtrongeſt ſulphur water in Great Britain; and from the ſuperior ſtrength of the impregnating ſulphur, it does not loſe the ſulphureous ſmell even when expoſed to a ſcalding and almoſt boiling heat; and in diſtilling it, when three pints had been taken off from a gallon of it, the laſt was as ſtrong as the firſt, and ſtunk intolerably. It is diſcutient and attenuating; and a warm bath of it is of great benefit in pains and aches, ſtrains and lameneſs, diſſolving hard ſwellings, curing old ulcers and ſcrophulous complaints, and is a powerful cleanſer of the ſtomach and bowels. 3. St Mungo's well is ſo called from Kentigern a Scotch ſaint, much honoured hereabouts, whom his tutor Servanus biſhop of Orkney, out of affection for him, called *Mongah*, which in the Noriſh or Norway language ſignifies a dear friend.—The Harrogate ſeaſon is from May to Michaelmas; and the company aſſemble and lodge in five or ſix large houſes or inns on the heath, a mile from the village, each houſe having a long room and an ordinary: the beſt company uſed to lodge at Knareſborough, which is three miles off.

Harrow on the-Hill || Hartford.

HARROW-ON-THE-HILL, a town of Middleſex, ſo called from its ſituation on the higheſt hill in the county, is 10 miles north-weſt of London. This pariſh is noted for a free ſchool, founded in the reign of Queen Elizabeth. A ſilver arrow is ſhot for here once a-year, viz. Auguſt 4. by a ſelect number of the ſcholars, who are dreſſed for the purpoſe in the habit of archers.

HARROW, an inſtrument in *Agriculture*. See AGRICULTURE, N° 158.

HART, a ſtag, or male-deer, in the ſixth year. See CERVUS, MAMMALIA *Index*.

HART-Beeſt, or Quanga. See CAPRA, MAMMALIA *Index*.

HART's-Horns, the horns of the common male deer.—The ſcrapings or raſpings of the horn of this animal are medicinal, and uſed in decoctions, ptiſans, &c.

Hartſhorn jelly is nutritive and ſtrengthening, and is ſometimes given in diarrhœas; but a decoction of burnt hartſhorn in water is more frequently uſed for this purpoſe, and is called *hartſhorn drink*.

The coal of hartſhorn, by being calcined with a long continued and ſtrong fire, is changed into a very white earth, called *hartſhorn* calcined to whiteneſs. This earth is employed in medicine as an abſorbent, and adminiſtered in dyſenteries and labour pains, which are ſuppoſed to be cauſed by acrid and ill-digeſted matters. This earth levigated is the baſis of Sydenham's white decoction, which is commonly preſcribed in theſe diſeaſes.

The ſalt of hartſhorn is a great ſudorific, and given in fevers with ſucceſs; and hartſhorn alſo yields, by diſtillation, a very penetrative volatile ſpirit.

HARTFORD, the capital of the county of the ſame name, ſignifying, as is commonly thought, the "ford of harts," ſtands on the river Lea, 21 miles from London; and is of conſiderable antiquity. Here the Eaſt-Saxon kings often kept their court; and here, in 673, was held a ſynod. King Alfred built a caſtle here, by which the Daniſh veſſels were deſtroyed, that came up from the Thames by its river as far as Ware, where the Danes had erected a fort, from which they made

Hartford. made frequent ſallies to plunder and deſtroy the country. The preſent caſtle conſiſts of a gate-houſe or lodge of brick, and a range of brick buildings, which ſeem of the time of James or Charles I. and alſo of a very ancient wall of ruble ſtone, with angular towers, ſuppoſed to have been ſtanding ever ſince its firſt foundation. The manor of this town was all along the king's, of whom both the town and caſtle were formerly held *in capite*. The barons took the latter from King John, but Henry III. recovered it. Edward III. gave the town a charter for markets on Thurſday and Saturday, and in his grant of it to John of Gaunt it is called *The Honour of Hartford*. It ſent members to parliament in the reign of Edward I. but after the 7th of Henry V. on the petition of the bailiff and burgeſſes to be exempted by reaſon of their poverty, that privilege was diſcontinued till the 22d of James I. Henry VI. who kept his Eaſter here in 1429, ordained by his charter, confirming their market, that no other ſhould be kept on the ſame days, within ſeven miles, on pain of having the goods ſeized by the bailiffs of Hartford. This manor being then part of Queen Margaret's jointure, the courts were held in her name, and ſhe appointed a horſe fair to be kept in what part of the town the bailiff and conſtables though fit. The ſtandard of weights and meaſures was fixed here in the reign of Henry VII.; and Mary I. made this a corporation by the name of bailiffs and burgeſſes, of whom the latter were 16 by her charter. In the 25th and 35th of Elizabeth, Michaelmas-term was kept here, by reaſon of the plague at both times in London; and that queen, who ſometimes reſided in its caſtle, and declared the borough as parcel of her duchy of Lancaſter, granted it a new charter, by the ſtyle of a bailiff, 11 capital burgeſſes, and 16 aſſiſtants, with a market on Saturday. James I. granted it a new charter, with the ſtyle of mayor, burgeſſes, and commonalty, to have 10 capital burgeſſes and 16 aſſiſtants, the mayor to be choſen out of the former by both of them; and a fair was then appointed here on May 12. Here was once a monaſtery, founded by a nephew of William the Conqueror; and here were formerly five churches which are now reduced to two. In St Andrew's there is a ſeat not only for the mayor and aldermen, but another for the governors of Chriſt church hoſpital in London, who have erected a houſe in this town on account of its healthy air and dry ſituation, to receive ſuch children as wanted either health or room in that hoſpital; and they have built a gallery in the church, wherein 200 of their children may be accommodated. The town is now governed by a mayor, high-ſteward, who is generally a nobleman, a recorder, 9 aldermen, a town-clerk, chamberlain, 10 capital burgeſſes, and 16 aſſiſtants, and has 2 ſerjeants at mace. The chief commodities of its market are wheat, malt, and wool; and it is ſaid to ſend 5000 quarters of malt to London weekly by the river Lea. Beſides the abovementioned, here are two fairs on July 5. and November 8. and two others for cattle, viz. the Saturday fortnight before Eaſter, and its Midſummer fair is chiefly for horſes. Here is a handſome free grammar-ſchool, beſides 3 charity ſchools; but the ſplendour of the place is much diminiſhed ſince the north road from London was turned through Ware. The county gaol, however, is ſtill kept in the town, and the gaol-delivery in the caſtle. It gives the title of earl to the noble family of Seymour-Conway.

Hartford-ſhire || Hartley.

HARTFORDSHIRE, a county of England, deriving its name from Hartford the capital; and that from the harts with which it anciently abounded, being then overrun with woods. It is bounded on the eaſt by Eſſex, on the weſt by Bedfordſhire and Buckinghamſhire, on the ſouth by Middleſex, and on the north by Cambridgeſhire. This county is much indented by thoſe that ſurround it: the longeſt part is about 35 miles, and the broadeſt about 27; and the circumference is 190, containing about 451,000 acres. It is divided into eight hundreds, which contain 19 market towns, 54 vicarages, 120 pariſhes, and near 950 villages, with about 16,500 houſes, and 90,000 inhabitants; and ſends ſix members to parliament, two knights for the ſhire, with two burgeſſes for St Alban's, and as many for Hartford. Before the reign of Queen Elizabeth, one ſheriff ſerved both for this ſhire and Eſſex; but in the ninth year of her reign, it had one allotted for itſelf. With regard to eccleſiaſtical juriſdiction, it belongs partly to the dioceſe of Lincoln, and partly to that of London. Though the ſoil in general, eſpecially in the Chiltern and ſouthern parts, is but very indifferent, and much inferior to that of the neighbouring counties; yet the air is ſo much ſuperior, that lands in this ſhire generally ſell at three or four years purchaſe more than in many others on that account. But it muſt be owned, that the ſoil of Hartfordſhire has been much improved of late, by draining, ſowing graſs ſeeds, and other methods. There are few or no manufactures in the county; but its markets are much frequented, in conſequence of its being near London, for malt and all ſorts of grain, which, with the many thoroughfares through it, make ample amends.

HARTLAND, a town in Devonſhire, near the Briſtol channel, with a market on Saturdays, much frequented by the people of Cornwall, who come hither in boats. It gives its name to a point, called *Hartland Point*, at the entrance of Briſtol channel W. Long. 4. 45. N. Lat. 51. 9.

HARTLEPOOL, a ſea-port town in the county of Durham. It is commodiouſly ſeated on a promontory, and is almoſt encompaſſed by the ſea. It is an ancient corporation, governed by a mayor and aldermen, with other ſubordinate officers. It is at preſent a pretty large, but poor place. It depends chiefly on the fiſhing trade; and its harbour is much frequented by colliers paſſing to and from Newcaſtle. W. Long. 0. 55. N. Lat. 54. 40.

HARTLEY, a town of Northumberland, on the coaſt, ſituated north-weſt of Tynemouth, where Lord Delaval has conſtructed a pretty haven, whence coals are ſhipped for London. Here are large ſalt works and copperas works, and likewiſe conſiderable glaſs works; and there is here a canal cut through a ſolid rock to the harbour, 52 feet deep, 30 broad, and 900 long. Theſe works are the ſole property of Lord Delaval, and yield a revenue of above 20,000l. per annum.

HARTLEY, *David*, M. A. born at Ilingworth, where his father was curate, received his academical education at Jeſus college, Cambridge, of which he was a fellow. He firſt began to practiſe phyſic at Newark, in Nottinghamſhire; from whence he removed

Hartogia ‖ Harutſch.

ved to St Edmund's Bury, in Suffolk. After this, he ſettled for ſome time in London; and laſtly went to live at Bath, where he died in 1757, aged 53, leaving two ſons and a daughter. He publiſhed "A view of the preſent evidence for and againſt Mrs Stephens's * medicines as a ſolvent for the ſtone, containing 155 caſes, with ſome experiments and obſervations;" London 1739. He is ſaid to have alſo written againſt Dr Warren, of St Edmund's Bury, in defence of inoculation; and ſome letters of his are to be met with in the Philoſophical Tranſactions. The doctor was certainly a man of learning, and reputed a good phyſician; but too fond of noſtrums. But his moſt conſiderable literary production is a work entitled, "Obſervations on man, his frame, his duty, and his expectations, in two parts;" London, 1749, 2 vols. 8vo. The firſt part contains obſervations on the frame of the human body and mind, and on their mutual connections and influences. The ſecond part contains obſervations on the duty and expectations of mankind.

* See *Stephens's Medicines.*

HARTOGIA, a genus of plants belonging to the monœcia claſs, and in the natural method ranking under the 48th order, *Aggregatæ*. See BOTANY *Index*.

HARUSPICES, pretenders to divination by certain ſigns or omens among the Romans.—The Roman haruſpices were at firſt all taken from Hetruria, where their art had moſt credit. Afterwards young Romans were ſent into Hetruria, in order to be brought up in the ſcience. It conſiſted in foretelling future events by attending to various circumſtances of the victims. Firſt, It was an ill omen when the victim would not come to the altar without dragging, when it broke its rope, fled away, avoided the ſtroke, ſtruggled much after it, made a great bellowing, was long a-dying, or bled but little. Secondly, preſages were drawn from inſpecting the noble parts of the victim when opened; as the heart, lungs, ſpleen, and eſpecially the liver. If all theſe were ſound, if the top of the liver was large and well-made, and if its fibres were ſtrong, it preſaged well for the affair in queſtion. Thirdly, Knowledge was alſo drawn by the haruſpices from the manner in which the fire conſumed the victim. If the flame brightened immediately, was pure and clear, roſe up in a pyramid without noiſe, and did not go out till the victim was conſumed, theſe were happy ſigns. Fourthly, The ſmoke alſo was conſidered, whether it whirled about in curls, or ſpread itſelf to the right or the left, or gave a ſmell different from the common one of broiled meat. Fifthly, It was a lucky omen if the incenſe they burned melted all at once, and gave a moſt agreeable ſmell.

HARUSPICY. See HARUSPICES and DIVINATION.

HARUTSCH, a mountainous region in the interior of Africa, which Mr Horneman calls the moſt remarkable region which came under his obſervation during his journey. It preſents ſuch a rugged, broken and terrific ſcene, as naturally leads to the ſuppoſition, that its ſurface has been, at ſome remote period, convulſed by volcanic eruptions. The face of the whole country exhibits continued ranges of hills, ſome not more than 12 feet above the plain, and others extremely lofty.

Contiguous to this region which is called *Harutſch-el-aſſuat*, or *Black Harutſch*, lies the White Harutſch or *Harutſch-el-abiat*. This latter country is a vaſt plain which ſpreads to the mountains riſing towards Fezzan, and is interſperſed with iſolated mountains. Harveſt ‖ Harvey.

Many of the hills contain petrifactions, and the matter of which they are compoſed is friable limeſtone, in which the petrifactions are very looſely imbedded, and may be taken out with eaſe. In theſe Mr Horneman found, among other marine productions, the heads of fiſhes ſo large, that one of them would have been a ſufficient burden for an ordinary man. Vaſt numbers of ſhells are likewiſe found in the adjacent vallies, which have the appearance of being glazed, and have a vitreous fracture. It is not the abode of man, but the Arabian caravans frequently paſs through it. The extent of this region is ſaid to be ſeven days journey from north to ſouth, and five days from eaſt to weſt. It lies between 15° and 20° E. Long. and between 28° and 30° N. Lat. *Horneman's Travels*, p. 48.

HARVEST, probably derived from a Saxon word ſignifying *herb feaſt*, is that ſeaſon of the year when the corn is ripe and fit to be reaped and gathered into barns.

Harveſt-Fly, a large four-winged fly of the cicada kind, very common in Italy, and erroneouſly ſuppoſed to be a graſshopper. See CICADA, ENTOMOLOGY *Index*.

Harveſt-Home, denotes the feaſt often obſerved at the cloſe of harveſt, and alſo the ſong uſed on that occaſion. See DECEMBER.

HARVEY, DR WILLIAM, an eminent Engliſh phyſician in the 17th century, was incorporated doctor of phyſic in Cambridge, afterwards admitted into the college of phyſicians in London, and was appointed lecturer of anatomy and chirurgery in that college. In theſe lectures he opened his diſcovery relating to the circulation of the blood; which, after a variety of experiments, he communicated to the world in his *Exercitatio anatomica de motu cordis et ſanguinis*. He was phyſician to King James I. and to King Charles I. and adhered to the royal cauſe. His works have eternized his memory. In 1651, he publiſhed his *Exercitationes de generatione animalium*, a very curious work; but it would have been more ſo, had not his papers been deſtroyed during the civil wars. In 1654, he was choſen preſident of the college of phyſicians in his abſence: but his age and weakneſs were ſo great, that he could not diſcharge the duty of that office; and therefore deſired them to chooſe Dr Pringle. As he had no children, he ſettled his paternal eſtate upon the college. He had three years before built a combination-room, a library, and a muſeum; and in 1656 he brought the deeds of his eſtate, and preſented them to the college. He was then preſent at the firſt feaſt, inſtituted by himſelf, to be continued annually, together with a commemoration ſpeech in Latin, to be ſpoken on the 18th of October, in honour of the benefactors to the college; he having appointed a handſome ſtipend for the orator, and alſo for the keeper of the library and muſeum, which are ſtill called by his name. He died in 1657.

This great phyſician had the happineſs, in his lifetime, to find the clamours of ignorance, envy, and prejudice, againſt his doctrine, totally ſilenced, and to ſee it univerſally eſtabliſhed. It has by length of

Harwich. time, been more and more confirmed, and every man now ſees and knows it from his own experience. It appears to be of the utmoſt importance in medicine; as it is perhaps impoſſible to define health and ſickneſs in fewer words, than that the one is a free, and the other an obſtructed, circulation. Dr Harvey was not only an excellent phyſician, but an excellent man; his modeſty, candour, and piety, were equal to his knowledge; the farther he penetrated into the wonders of nature, the more he was inclined to venerate the Author of it.

HARWICH, a town of Eſſex, in England, 72 miles from London. It is not large; but is well built and populous, has a good maritime trade, is almoſt encompaſſed by the ſea, and has ſtrong works. It is walled in; and the ſtreets are paved for the moſt part with clay, which tumbling down from the cliff, where is a petrifying water between the town and Beacon-Hill, ſoon grows as hard as ſtone; and the inhabitants boaſt the wall is as ſtrong and the ſtreets are as clean as thoſe that are of real ſtone. The harbour or bay is very large, ſafe, and deep; and is commanded by a ſtrong fort on the Suffolk ſide, though not in that county. Here is a dock belonging to the government, with all conveniences for building, cleaning, and refitting men of war. A little way from the town, on a high hill called *Beacon-hill*, is a very fine light-houſe, which is ſeen at a great diſtance, and is very uſeful on this dangerous coaſt. At this place the packet boats which paſs between England and Holland are ſtationed, and the town is much benefited by the paſſengers. The bay is ſo ſpacious, by the influx of the Stour from Maningtree, and the Orwell from Ipſwich, and ſuch uſe was made of it in the Dutch war, that 100 ſail of men of war have been ſeen there at one time, with their tenders, beſides 300 or 400 ſail of colliers; for it is a perfect harbour to within two miles of Ipſwich, and able to receive ſhips of 100 guns all the way. The inns here are very good; but the accommodations dear, by reaſon of the great concourſe of paſſengers to and from Holland, which was the motive of fitting up ſloops to go thither directly from the Thames, when the ſtage coaches that uſed to ply two or three times a week between this place and London were laid down. This place was firſt made a free borough, and had a grant of its market on Tueſdays in the reign of Edward II. Its government was ſettled by charter of King James I. in a mayor, choſen yearly, November 30. out of eight aldermen, who with 24 capital burgeſſes, the electors, and the recorder, make the corporation. By this charter it had alſo a power to elect two burgeſſes to parliament, the grant of its Friday market, and its two fairs on May-day and October 18. which are each for three days. The town has alſo an admiralty juriſdiction within its liberties, and the return of all writs, fines, &c. Though the entrance into the ſea here is between two and three miles wide at high-water, yet the channel where the ſhips muſt keep to come to the harbour, which is on the Suffolk ſide, is deep and narrow; ſo that all ſhips that come in or go out are commanded by the guns of Landguard-Fort on that ſide. This town was fortified heretofore on the land ſide, but in the reign of King Charles I. the fortifications were demoliſhed. It has ſince been ordered to be refortified. The church here, ever ſince the reformation, has been a chapel to the mother-church at Dover-Court. Harwood in Haſſelquiſt.

HARWOOD, a ſmall but pretty town in the north riding of Yorkſhire, with a coſtly ſtone-bridge of 11 arches over the Wherfe, which runs in a bed of ſtone, and is as clear as rock-water. Near it are the ruins of an ancient caſtle, built ſoon after the conqueſt; and which remained a neat ſtrong building in Camden's time. It had a variety of maſters; one of whom, in the reign of King John, obtained a grant for a market and fair here. In the reign of Edward III. it was valued at 400 marks a-year. This caſtle was ruined in the civil wars. It has eight or nine dependant conſtabularies, wherein are many antiquities. The remains of the caſtle, which ſeems to have been the keep, is in a condition to exiſt long. The caſtle itſelf covered near an acre of ground. Near it is now Harwood-Houſe, one of the firſt houſes in the county for elegance and ſuperior embelliſhments; built on part of the ſite of Gawthorp-Hall, now no more. In the church are ſome ancient monuments, particularly that of lord chief-juſtice Gaſcoigne, who committed the prince of Wales to priſon for ſtriking him on the bench.

HASLEMERE, a town of Surry, in England, ſeated on the edge of the county next Hampſhire, 43 miles from London, is an ancient place, and was once deſtroyed by the Danes. It is a borough by preſcription, and has ſent members to parliament ever ſince the reign of Edward IV. who are choſen by a bailiff and burgage-teeners. It is ſaid to have had ſeven pariſh-churches formerly, though but one church now, which is a chapel of eaſe to Chidinfold; and that it ſtood heretofore upon a hill more to the ſouth than the preſent town.

HASSELQUIST, FREDERIC, was a native of Eaſt Gothland, and born in the year 1722. He proſecuted his medical and botanical ſtudies at Upſal. The great Linnæus having repreſented in his lectures what important advantages might be gained by a young ſtudent, by travelling through the country of Paleſtine, at that time but little known, Haſſelquiſt felt the fire of ambition burn within him at the declaration of his maſter. The crown giving no pecuniary encouragement for undertakings of this magnitude, extenſive collections were made by private individuals, eſpecially from the country of our author, and ſtipends were granted him by all the faculties in the univerſity of Upſal.

Protected in this manner, he began his journey in 1749 during the ſummer ſeaſon, and he obtained a paſſage to Smyrna in a Swediſh Eaſt-Indiaman, through the influence of Lagerſtroem. The Swediſh conſul at Smyrna received him in the moſt friendly manner, at which place he arrived about the latter end of the year. In the beginning of 1750 he ſet out for Egypt, and remained in the metropolis of that country for about nine months, from which place he tranſmitted to Linnæus ſome ſpecimens of his reſearches, which obtained the approbation of the public after they were publiſhed. By the influence of Dr Wargentin, a collection of 10,000 dollars of copper currency was made for the encouragement of young Haſſelquiſt in the proſecution of his reſearches. In the ſpring of 1751, he paſſed through Jaffa to Jeruſalem, and returned afterwards to Smyrna by the way of Rhodes and Scio, completely fulfilling the expectations of his country; but he did

Haſſelquiſta || Haſtings.

did not live long enough to reap the fruits of his labours. His lungs were affected by the burning deſerts of Arabia, and after languiſhing for ſome time in great diſtreſs, he expired in February 1752, before he had finiſhed the 30th year of his age.

Having been under the neceſſity of contracting debt, all his collections were ſeized upon by the Turks, who threatened to expoſe them to ſale; but Queen Louiſa Ulrica redeemed them by the payment of 14,000 dollars of copper money, and they arrived at Stockholm in a ſtate of excellent preſervation. They were compoſed of Arabian manuſcripts, ſhells, birds, ſerpents, inſects, &c. An account of his voyage was publiſhed by Linnæus, by whom his memory was honoured with a plant which he called *Haſſelquiſta*.

HASSELQUISTA, a genus of plants belonging to the pentandria claſs, and in the natural method ranking under the 45th order, *Umbellatæ*. See BOTANY *Index*.

HASSELT, a handſome town of the United Provinces, in Overyſſel, ſeated on the river Wecht, in E. Long. 6. 5. N. Lat. 23. 46.

HASSELT, a town of Germany, in the circle of Weſtphalia, and in the territory of Liege, ſituated on the river Demer, in E. Long. 4. 49. N. Lat. 50. 55.

HASSIDEANS, or ASSIDEANS. See ASSIDEANS.

HASSOCK, a baſs made of ruſhes, to kneel or reſt the feet upon in churches.

HASP *and* STAPLE, in *Scots Law*, the ſymbol commonly uſed in burgage tenements for entering and infefting an heir, by delivering into his hands the haſp and ſtaple of the door.

HASTA, or *Hasta Pura*, among medaliſts, ſignifies a kind of ſpear or javelin, not ſhod or headed with iron; or rather an ancient ſceptre, ſomewhat longer than ordinary, occaſionally given to all the gods.

The haſta is ſuppoſed a ſymbol of the goodneſs of the gods, and of the conduct of providence, which is equally mild and forcible.

HASTA, in ſome countries, is a meaſure or quantity of ground amounting to thirty paces: thus called, according to M. Du Cange, from the haſta or rod wherewith it was meaſured.

HASTATED LEAF, in *Botany*, a leaf of the ſhape of a ſpear.

HASTING-PEAR, a name given by the gardeners to a ſpecies of pear, called alſo by ſome the *green chiſſel pear*. This is a moderately large pear, and is longiſh towards the pedicle; its ſkin is thin, and of a whitiſh green; the pulp is melting, and of a ſugary flavour. It ripens in July.

HASTINGS, a town of Suſſex in England, 64 miles from London. It is the chief of the cinque-ports; and was formerly obliged to find 21 ſhips, within 40 days after the king's ſummons, well furniſhed and armed for ſervice, and to maintain the crews a fortnight at its own charge. The town is ſuppoſed to have taken its name from Haſtings, the famous Daniſh pirate, who uſed to build fortreſſes when he went aſhore for his prey, to cover his men, and ſecure his retreat. In King Athelſtan's reign here was a mint. This town had charters from Edward the Confeſſor, William I. and II. Henry II. Richard I. Henry III. Edward I. and Charles II. exempting it from toll, and empowering it to hold courts of judicature on life and death. It is incorporated by the ſtyle of mayor, jurats, and commonalty. It has handſome houſes, and cuſtomhouſe officers; but frequent ſtorms have rendered it an indifferent harbour, though a vaſt ſum of money has been laid out at times to make it a good one. It has ſent members to parliament ever ſince Edward III. London is ſupplied from hence with abundance of fiſh that are taken on the coaſt. The town lies between two high cliffs towards the ſea, and as high a hill on the land ſide, having two ſtreets, and in each a pariſh-church, divided by a ſtream of freſh water called the Bourne. About the year 1377, this town was burnt by the French; and after it was rebuilt, it was divided into the two pariſhes. Here are two charity-ſchools, erected for the teaching of 200 or 300 children. There was a caſtle on the hill, which overlooked the town, but it is now in ruins. The markets here are on Wedneſdays and Saturdays: the fairs are on Tueſday and Wedneſday in Whitſun-week, and July 26. October 23. and 24. Here was formerly a priory. Haſtings was a barony in the Huntingdon family, now in the Rawdon family. Haſtings.

This town is remarkable for a battle fought in its neighbourhood, between Harold king of England and William duke of Normandy, on the 15th of October 1066, in which the former was defeated and killed; and by his death William, ſurnamed the *Conqueror*, became king of England: (ſee ENGLAND, N° 86.)—The night before the battle, the aſpect of things was very different in the two camps. The Engliſh ſpent the time in riot, jollity, and diſorder; the Normans in prayer and other duties of religion. The next day both armies prepared for battle. The duke divided his army into three lines: the firſt, headed by Montgomery, conſiſted of archers and light-armed infantry: the ſecond, commanded by Martel, was compoſed of his braveſt battalions, heavy-armed, and ranged in cloſe order: his cavalry, at whoſe head he placed himſelf, formed the third line; and were ſo diſpoſed, that they ſtretched beyond the infantry, and flanked each wing of the army. He ordered the ſignal of battle to ſound: and the whole army, moving at once, and ſinging the hymn or ſong of Roland the famous peer of Charlemagne, advanced, in order and with alacrity, towards the enemy.

Harold had ſeized the advantage of a riſing ground, and having beſides drawn ſome trenches to ſecure his flanks, he reſolved to ſtand upon the defenſive, and to avoid all action with the cavalry, in which he was inferior. The Kentiſh men were placed in the van, a poſt which they had always claimed as their due; the Londoners guarded the ſtandard; and the king himſelf, accompanied by his two valiant brothers, Gurth and Leofwin, diſmounting from horſeback, placed himſelf at the head of his infantry, and expreſſed his reſolution to conquer or to periſh in the action. The firſt attack of the Normans was deſperate, but was received with equal valour by the Engliſh: and after a furious combat, which remained long undecided, the former, overcome by the difficulty of the ground, and hard preſſed by the enemy, began firſt to relax their vigour; then to give ground; and confuſion was ſpreading among the ranks, when William, who found himſelf

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ſelf on the brink of deſtruction, haſtened, with a ſelect band, to the relief of his diſmayed forces. His preſence reſtored the action; the Engliſh were obliged to retreat with loſs; and the duke, ordering his ſecond line to advance, renewed the attack with freſh forces and with redoubled courage. Finding that the enemy, aided by the advantage of ground, and animated by the example of their prince, ſtill made a vigorous reſiſtance, he tried a ſtratagem, which was very delicate in its management, but which ſeemed adviſable in his deſperate ſituation, when, if he gained not a deciſive victory, he was totally undone: he commanded his troops to make a haſty retreat, and to allure the enemy from their ground by the appearance of flight. The artifice ſucceeded againſt theſe unexperienced troops; who, heated by the action, and ſanguine in their hopes, precipitantly followed the Normans into the plain. William gave orders, that at once the infantry ſhould face about upon their purſuers, and the cavalry make an aſſault upon their wings, and both of them purſue the advantage which the ſurpriſe and terror of the enemy muſt give them in that critical and deciſive moment. The Engliſh were repulſed with great ſlaughter, and driven back to the hill; where being rallied again by the bravery of Harold, they were able, notwithſtanding their loſs, to maintain the poſt and continue the combat. The duke tried the ſame ſtratagem a ſecond time with the ſame ſucceſs; but even after this double advantage, he ſtill found a great body of the Engliſh, who maintaining themſelves in firm array, ſeemed determined to diſpute the victory to the laſt extremity. He ordered his heavy-armed infantry to make the aſſault upon them; while his archers, placed behind, ſhould gall the enemy, who were expoſed by the ſituation of the ground, and who were intent in defending themſelves againſt the ſwords and ſpears of the aſſailants. By this diſpoſition he at laſt prevailed. Harold was ſlain by an arrow, while he was combating with great bravery at the head of his men. His two brothers ſhared the ſame fate; and the Engliſh, diſcouraged by the fall of theſe princes, gave ground on all ſides, and were purſued with great ſlaughter by the victorious Normans. A few troops, however, of the vanquiſhed dared ſtill to turn upon their purſuers; and taking them in deep and miry ground, obtained ſome revenge for the ſlaughter and diſhonour of the day. But the appearance of the duke obliged them to ſeek their ſafety by flight, and darkneſs ſaved them from any farther purſuit by the enemy.

Thus was gained by William duke of Normandy, the great and deciſive victory of Haſtings, after a battle which was fought from morning till ſunſet, and which ſeemed worthy, by the heroic feats of valour diſplayed by both armies, and by both commanders, to decide the fate of a mighty kingdom. William had three horſes killed under him; and there fell near 15,000 men on the ſide of the Normans. The loſs was ſtill more conſiderable on that of the vanquiſhed; beſides the death of the king and his two brothers. The dead body of Harold was brought to William, who reſtored it without ranſom to his mother.

HASTIVE, a French term, ſometimes uſed in Engliſh for early, forward, or ſomething that comes before the ordinary time or ſeaſon. The haſtive fruits are ſtrawberries and cherries. We have haſtive peas, &c. Haſtive ‖ Hat-Making.

HAT, a covering for the head, worn by the men throughout the weſtern part of Europe. Hats are ſaid to have been firſt ſeen about the year 1400, at which time they became of uſe for country wear, riding, &c. F. Daniel relates, that when Charles VII. made his public entry into Rouen, in 1449, he had on a hat lined with red velvet, and ſurmounted with a plume or tuft of feathers: he adds, that it is from this entry, or at leaſt under this reign, that the uſe of hats and caps is to be dated, which henceforward began to take place of the chaperoons and hoods that had been worn before. In proceſs of time, from the laity, the clergy alſo took this part of the habit; but it was looked on as a great abuſe, and ſeveral regulations were publiſhed, forbidding any prieſt or religious perſon to appear abroad in a hat without coronets, and enjoining them to keep to the uſe of chaperoons, made of black cloth, with decent coronets; if they were poor, they were at leaſt to have coronets faſtened to their hats, and this upon penalty of ſuſpenſion and excommunication. Indeed the uſe of hats is ſaid to have been of a longer ſtanding among the eccleſiaſtics of Britanny, by 200 years, and eſpecially among the canons; but theſe were no other than a kind of caps, and from hence aroſe the ſquare caps worn in colleges, &c. Lobineau obſerves, that a biſhop of Dol, in the 12th century, zealous for good order, allowed the canons alone to wear ſuch hats; enjoining, that if any other perſon came with them to church, divine ſervice ſhould immediately be ſuſpended.

Hats make a very conſiderable article in commerce: the fineſt, and thoſe moſt valued, are made of pure hair of an amphibious animal, called the caſtor or beaver, frequent in Canada and other provinces of North America.

Hat-Making. Great improvements have been made in this art of late years by ingenious and intelligent manufacturers. For the following account of the different proceſſes of this manufacture we are indebted to Mr Nicholſon, from whoſe Journal it is extracted, and to John Clennell, Eſq. of Newcaſtle, Mr Nicholſon's correſpondent on this ſubject, who has obligingly favoured us with ſome valuable corrections of this account.

"The materials for making hats are rabbits and hares fur cut off from the ſkin, after the hairs have been plucked out, together with wool and beaver. The former are mixed in various proportions, and of different qualities, according to the value of the article intended to be made; and the beaver is univerſally uſed for facing the finer articles, and never for the body or main ſtuff. Experience has ſhewn, that theſe materials cannot be evenly and well felted together, unleſs all the fibres be firſt ſeparated, or put into the ſame ſtate with regard to each other. This is the object of the firſt proceſs, called *bowing*. The material, without any previous preparation (A), is laid upon a platform of wood,

(A) Some writers mention a partial wetting of the fur while on the ſkin, by lightly ſmearing it with a ſolution of nitrate of mercury to give it a curl. Meſſrs Collinſons do not uſe it, or any other preparation.

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wood, or of wire, ſomewhat more than four feet ſquare, called a *hurdle*, which is fixed againſt the wall of the work-ſhop, and is enlightened by a ſmall window, and ſeparated by two ſide partitions from other hurdles, which occupy the reſt of the ſpace along the wall. The hurdle, if of wood, is made of deal planks, not quite three inches wide, diſpoſed parallel to the wall, and at the diſtance of one-fortieth or one-fiftieth of an inch from each other, for the purpoſe of ſuffering the duſt, and other impurities of the ſtuff, to paſs through; a purpoſe ſtill more effectually anſwered by the hurdle of wire.

"The workman is provided with a bow, a bow-pin, a baſket, and ſeveral cloths. The bow is a pole of yellow deal wood, between ſeven and eight feet long, to which are fixed two bridges, ſomewhat like that which receives the hair in the bow of the violin (B). Over theſe is ſtretched a catgut, about one-twelfth part of an inch in thickneſs. The bow-pin is a ſtick with a knob at each end, and is uſed for ſtriking or catching the bow-ſtring, by the vibration of which, as we ſhall ſhortly ſee, the ſtuff is thoroughly mixed. The baſket is a ſquare piece of ozier work, conſiſting of open ſtrait bars with no croſſing or interweaving. Its length acroſs the bars may be about two feet, and its breadth eighteen inches. The ſides into which the bars are fixed are ſlightly bended into a circular curve, ſo that the baſket may be ſet upright on one of theſe edges near the right hand end of the hurdle, where it uſually ſtands. The cloths are linen. Beſides theſe implements, the workman is alſo provided with brown paper.

"The *bowing* commences by ſhovelling the material towards the right hand partition with the baſket, upon which, the workman holding the bow horizontally in his left hand, and the bow-pin in his right, lightly places the bow-ſtring, and gives it a pluck with the pin. The ſtring, in its return, ſtrikes part of the fur, and cauſes it to riſe, and fly partly acroſs the hurdle in a light open form. By repeated ſtrokes, the whole is thus ſubjected to the bow; and this beating is repeated till all the original clots or maſſes of the filaments are perfectly opened and obliterated. The quantity thus treated at once is called a *batt*, and never exceeds half the quantity required to make one hat.

"When the batt is ſufficiently bowed, it is ready for *hardening*; which term denotes the firſt commencement of felting. The material, thus far prepared, is ſeen on the hurdle ſwelling in the centre, and leſſening gradually towards the edges. The reaſon of this is obvious; the hat is formed of two of theſe batts joined together, and by their union the whole becomes equally compact. It is now preſſed down by the convex ſide of the baſket, then covered with a cloth, and preſſed ſucceſſively in its various parts by the hands of the workman. The preſſure is gentle, and the hands are very ſlightly moved back and forwards at the ſame time through a ſpace of perhaps a quarter of an inch, to favour the hardening or entangling of the fibres. In a very ſhort time, indeed, the ſtuff acquires ſufficient firmneſs to bear careful handling. The cloth is then taken off, and a ſheet of paper, with its corners doubled in, ſo as to give it a triangular outline, is laid upon the batt, which laſt is folded over the paper as it lies, and its edges, meeting one over the other, form a conical cap. The joining is ſoon made good by preſſure with the hands on the cloth. Another batt, ready hardened, is in the next place laid on the hurdle, and the cap here mentioned placed upon it, with the joining downwards: By this means, as we before ſtated, the maſs becomes uniform in thickneſs, and aſſumes the form of a flannel bag. This laſt batt being alſo folded up, will conſequently have its place of junction diametrically oppoſite to that of the inner felt, which it muſt therefore greatly tend to ſtrengthen. The principal part of the hat is thus put together, and now requires to be worked with the hands a conſiderable time upon the hurdle, the cloth being alſo occaſionally ſprinkled with clear water. During the whole of this operation, which is called *baſoning* (C), the article becomes firmer and firmer, and contracts in its dimenſions. It may eaſily be underſtood, that the chief uſe of the paper is to prevent the ſides from felting together.

"The baſoning is followed by a ſtill more effectual continuation of the felting, called *working* (D). This is done in another ſhop, at an apparatus called a *battery*, conſiſting of a *kettle* (containing water ſlightly acidulated with ſulphuric acid, to which, for beaver hats, a quantity of the grounds of beer is added, or elſe plain water for rinſing out), and eight *planks* of wood joined together in the form of a fruſtum of a pyramid, and meeting in the kettle at the middle. The outer or upper edge of each plank is about two feet broad, and riſes a little more than two feet and a half above the ground;

(B) The bow is beſt made of aſh; it is compoſed of the *ſtang* or handle: the bridge at the ſmaller end, or that which is neareſt the window in the act of bowing, is called the *cock*; and the other bridge, which is nearer to the workman's hand, is called the *breech*.

(C) After bowing, and previous to the baſoning, a *hardening ſkin*, that is, a large piece of ſkin, about four feet long and three feet broad, of leather alumed or half tanned, is preſſed upon the batt, to bring it by an eaſier gradation to a compact appearance; after which it is baſoned, being ſtill kept upon the hurdle. This operation, the baſoning, derives its name from the proceſs or *mode of working*, being the ſame as that practiſed upon a wool hat after bowing; the laſt being done upon a piece of caſt metal, four feet acroſs, of a circular ſhape, called *a baſon*: the joining of each batt is made good here by ſhuffling the hand, that is, by rubbing the edges of each batt folded over the other to excite the progreſſive motion of each of the filaments in felting, and to join the two together.

(D) Before this operation is begun, the hat is dipped into the boiling kettle, and allowed to lie upon the plank until cold again; this is called *ſoaking*, that is, being perfectly ſaturated with the hot liquor: if they are put in too haſtily in this ſtate, for they are then only bowed and baſoned, they would burſt from the edges, each batt not being ſufficiently felted into the other.

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ground; and the ſlope towards the kettle is conſiderably rapid, ſo that the whole battery is little more than ſix feet in diameter. The quantity of ſulphuric acid added to the liquor is not ſufficient to give a ſour taſte, but only renders it rough to the tongue. In this liquor, heated rather higher than unpractiſed hands could bear, the article is dipped from time to time, and then worked on the planks with a roller, and alſo by folding or rolling it up, and opening it again; in all which, a certain degree of care is at firſt neceſſary, to prevent the ſides from felting together; of which, in the more advanced ſtages of the operation, there is no danger. The imperfections of the work now preſent themſelves to the eye of the workman, who picks out knots and other hard ſubſtances with a bodkin, and adds more felt upon all ſuch parts as require ſtrengthening. This added felt is patted down with a wet bruſh, and ſoon incorporates with the reſt. The beaver is laid on towards the concluſion of this kind of working. Mr Nicholſon could not diſtinctly learn why the beer grounds were uſed with beaver hats. Some workmen ſaid, that by rendering the liquor more tenacious, the hat was enabled to hold a greater quantity of it for a longer time; but others ſaid, that the mere acid and water would not adhere to the beaver facing, but would roll off immediately when the article was laid on the plank. It is probable, as he obſerves, that the manufacturers who now follow the eſtabliſhed practice, may not have tried what are the inconveniences this addition is calculated to remove.

"The journeymen tell me (ſays Mr Clennell), that the dregs are to hold or fill the body, whilſt a little vitriol cleanſes it of the dirt, &c. that may be on the rabbit or other wool; too much vitriol would make the whole that was weighed out to the journeymen work into the hats, but by the mutual action of the vitriol and the dregs, the quantity of the firſt being ſmall, about a wine glaſsfull, the dirt and the ſtrong hairs get purged out (the laſt from the ſhrinking in being ſlow, as well as their being ſtraight; for was the leſſening of the ſize at plank *rapid*, they would, in defiance of their ſtraightneſs, get entangled, and even as it is, they are ſlightly ſo; but care is taken to get them out by rubbing the body of the hat well with the hand in a circular manner) whilſt, at the ſame time, the dregs keep the hats plump. Another advantage attending the uſe of dregs, whether of beer, porter, or wine, is that as the boiling in the dregs does not draw out much of the mucilage from each hat, when they come to be ſtiffened the dregs form a body within the hat ſufficiently ſtrong or retentive to keep the glue from coming through amongſt the nap: vitriol *alone* would purge or weaken the hats too much, conſequently, half the quantity does better with the addition of dregs, and they diſallow the body to be cloſer from its getting more work: many journeymen, however, to hurry this part of the proceſs, uſe a quantity of vitriol, and open the body again by throwing in a handful or two of oatmeal; by this means they get a great many made, though at the ſame time they are left quite grainy *from the want of labour*. This, in handling the dry gray hat, when made, may be in part diſcovered, but in part only; in wearing the effect is ſhining ſpots, as if of greaſe, but is, in reality, the glue lodging upon the grainy parts."

Of theſe reaſons for the uſe of dregs, the laſt only appears to be perſpicuous or at all ſatisfactory. Acid of any kind, by taking out the greaſy ſubſtances on each pile of hair, allows the roughneſſes on the ſurface of each to operate with their full effect, and thus facilitates the mechanical action of felting; and Mr Collinſon informed Mr Nicholſon, that in a proceſs, called *carotting*, they make uſe of nitrous acid. In this operation, the material is put into a mixture of the nitrous and ſulphuric acids in water, and kept in the digeſting heat of a ſtove all night; by which means the hair acquires a ruddy or yellow colour, like the inner part of a carrot, from which it derives its name, and though it loſes part of its ſtrength it receives a curl which more readily promotes the action of felting.

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"It muſt be remembered, that our hat ſtill poſſeſſes the form of a cone, and that the whole of the ſeveral actions it has undergone have only converted it into a ſoft flexible felt, capable of being extended, though with ſome difficulty, in every direction. The next thing to be done is to give it the form required by the wearer. For this purpoſe, the workman turns up the edge or rim to the depth of about an inch and a half, and then returns the point back again through the centre or axis of the cap, ſo far as not to take out this fold, but to produce another inner fold of the ſame depth. The point being returned back again in the ſame manner, produces a third fold; and thus the workman proceeds, until the whole has acquired the appearance of a flat circular piece, conſiſting of a number of concentric undulations or folds, with the point in the centre. This is laid upon the plank, where the workman, keeping the piece wet with the liquor, pulls out the point with his fingers, and preſſes it down with his hand, at the ſame time turning it round on its centre in contact with the plank, till he has, by this means, rubbed out a flat portion equal to the intended crown of the hat. In the next place, he takes a block, to the crown of which he applies the flat central portion of the felt, and by forcing a ſtring down the ſides of the block, he cauſes the next part to aſſume the figure of the crown, which he continues to wet and work, until it has properly diſpoſed itſelf round the block. The rim now appears like a flounced or puckered appendage round the edge of the crown; but the block being ſet upright on the plank, the requiſite figure is ſoon given by working, rubbing, and extending this part. Water only is uſed in this operation of faſhioning or blocking; at the concluſion of which it is preſſed out by the ſame copper implement by which he drove down the card.

"Previous to the dyeing, the nap of the hat is raiſed or looſened out with a wire bruſh, or carding inſtrument. The fibres are too rotten after the dyeing to bear this operation; or if they could bear the operation, the colour of the hat would not be uniform, from a part of the nap having been confined, and conſequently not receiving the full action of the dye liquor. The dyeing materials are logwood, and a mixture of the ſulphates of iron and of copper, known in the market by the names of green copperas and blue vitriol. As the time of Mr Collinſon was limited, and my attention, ſays Mr Nicholſon, was more particularly directed to the mechanical proceſſes, I did not go into the dye-houſe; but I have no doubt that the hats are boiled with

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with the logwood, and afterwards immerſed in the ſaline ſolution, I particularly aſked whether galls were uſed, and was anſwered in the negative.

"The dyed hats are, in the next place, taken to the ſtiffening ſhop. One workman, aſſiſted by a boy, does this part of the buſineſs. He has two veſſels, or boilers, the one containing the grounds of ſtrong beer, which coſts ſeven ſhillings per barrel, and the other veſſel containing melted glue, a little thinner than it is uſed by carpenters. Our author particularly aſked, whether this laſt ſolution contained any other ingredient beſides glue, and was aſſured that it did not. The beer grounds are applied in the inſide of the crown to prevent the glue from coming through to the face, and alſo, as he ſuppoſes, to give the requiſite firmneſs at a leſs expence than could be produced by glue alone. If the glue were to paſs through the hat in different places, it might, he imagines, be more difficult to produce an even gloſs upon the face in the ſubſequent finiſhing. The glue ſtiffening is applied after the beer grounds are dried, and then only upon the lower face of the flap, and the inſide of the crown. For this purpoſe, the hat is put into another hat, called a ſtiffening hat, the crown of which is notched, or ſlit open in various directions. Theſe are then placed in a hole in a deal board, which ſupports the flap, and the glue is applied with a bruſh.

"The dry hat, after this operation, is very rigid, and its figure irregular. The next operation, therefore, is clearing with ſoap and boiling water to cleanſe the glue from the nap or pile; it is then dried. The laſt dreſſing is given by the application of moiſture and heat, and the uſe of the bruſh, and a hot iron, ſomewhat in the ſhape of that uſed by tailors, but ſhorter and broader on the face. The hat being ſoftened by expoſure to ſteam, is drawn upon a block, to which it is ſecurely applied by the former method of forcing a ſtring down from the crown to the commencement of the rim. The judgment of the workman is employed in moiſtening, bruſhing, and ironing the hat, in order to give and preſerve the proper figure. When the rim of the hat is not intended to be of an equal width throughout, it is cut by means of a wooden, or perhaps metallic pattern; but as no ſuch hats are now in faſhion, Mr Nicholſon ſaw only the tool for cutting them round. The contrivance is very ingenious and ſimple. A number of notches are made in one edge of a flat piece of wood for the purpoſe of inſerting the point of a knife, and from one ſide or edge of this piece of wood there proceeds a ſtrait handle, which lies parallel to the notched ſide, forming an angle ſomewhat like that of a carpenter's ſquare. When the legs of this angle are applied to the outſide of the crown, and the board lies flat on the rim of the hat, the notched edge will lie nearly in the direction of the radius, or line pointing to the centre of the hat. A knife being therefore inſerted in one of the notches, it is eaſy to draw it round by leaning the tool againſt the crown, and it will cut the border very regular and true. This cut is made before the hat is quite finiſhed, and is not carried entirely through; ſo that one of the laſt operations conſiſts in tearing off the redundant part, which by that means leave an edging of beaver round the external face of the flap. When the hat is completely finiſhed, the crown is tied up in gauze paper, which is neatly ironed down. It is then ready for the ſubſequent operations of lining," &c.

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This valuable memoir on the fabrication of hats is concluded with ſome obſervations on the probable gain or loſs of employing machinery in the manufacture. Theſe obſervations we recommend to the ſerious attention of every judicious hat-maker, who carries on his buſineſs on a large ſcale; for he will find them not the reveries of a raſh ſpeculatiſt, but the cool reflections of a real philoſopher, who is at the ſame time no ſtranger to the arts of life. They ſuggeſt the following ſubjects of enquiry; Whether carding, which is rapidly and mechanically done, be inferior to bowing, which does not promiſe much facility for mechanical operation? Whether a ſucceſſion of batts or cardings might be thrown round a fluted cone, which rapidly revolving, in contact with three or more cylinders, might perform the hardening, and even the working, with much more preciſion and ſpeed than they are now done by hand? Whether blocking or ſhaping be not an operation extremely well calculated for the operation of one or more machines? Whether looſe weaving and ſubſequent felting might not produce a lighter, cheaper, and ſtronger article? And how far the mechanical felting, which is not confined merely to the hairs of animals, might be applied to this art? *

* *Nichol. Journ.* 4to. vol. iv. 73.

Mr Dunnage has propoſed a method of making *water-proof hats*, in imitation of beaver, for which, in November 1794, he obtained a patent. This method is as follows: Let a ſhag be woven, of ſuch count in the reed, and cut over ſuch ſized wire, as will give the hats to be manufactured from it that degree of richneſs, or appearance of fur, which may be thought neceſſary. The materials of which this ſhag may be compoſed are various, and ſhould be accommodated to different kinds of hats, according to the degree of beauty and durability to be given them, and the price at which they are deſigned to be ſold; that is to ſay, ſilk, mohair, or any other hair that is capable of being ſpun into an end fine enough for the purpoſe, cotton, inkle, wool, or a mixture of any, or all the above materials, as may ſuit the different purpoſes of the manufacturer. Thoſe anſwer beſt, (ſays our author,) which are made with two poles, either of Bergam, Piedmont, or Organzine ſilk, riſing alternately, in a reed of about nine hundred count to eighteen inches wide, with three ſhoots over each wire. This method of weaving diſtributes the ſilk (as it may be put ſingle into the harneſs), and prevents any ribby appearance which it might have if the ſilk were paſſed double, and the whole of the pole cut over each wire. This may be made either on a two or four thread ground of hard ſilk, ſhot with fine cotton, which he thinks preferable for ſhoots, to ſilk, inkle, or any other material, as it forms both a cloſe and fine texture. An inferior kind of hats may be made from any of the before mentioned materials, and with cheaper ſilk. This ſhag ſhould be ſtretched on a frame, ſuch as dyers uſe to rack cloth; then (having previouſly ſet the pile upright with a comb, to prevent its being injured or ſtuck together), go over the ground with thin ſize, laid on with a ſoft bruſh. For black, or dark colours, common ſize will do; with white or any light colour, uſe iſinglaſs, or a ſize made from white kid leather. Theſe, or gum, or any other mucilaginous matter, which, without altering the colour, will prevent oil from getting through the ground ſo as to

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injure the pile, will anſwer the purpoſe. Take care not to apply more of any material, as a preparation, than may be fully ſaturated with oil or varniſh, ſo that water will not diſcharge it from the ground. The ſize, or rather glutinous matter, being dry, the pile muſt be teaſeled, or carded with a fine card, till the ſilk is completely taken out of the twiſt or throwing, when it will loſe its coarſe ſhaggy look, and aſſume the appearance of a very fine fur. It muſt now be once more ſet upright with a comb, and you may proceed to lay on your water-proof material; this too may be varied according to circumſtances. For black, or any dark colour, linſeed oil well boiled with the uſual driers, and thickened with a ſmall quantity of any good drying colour, will do; for white, or very fine colours, poppy or nut oil, or copal or other varniſhes, may be uſed. In this particular the manufacturer muſt judge what will beſt anſwer his purpoſe, taking care never to uſe any thing that will dry hard, or be ſubject to crack. Mr Dunnage has found good drying linſeed oil preferable to any other thing which he has uſed, and, with the precaution of laying on very little the firſt time, it will not injure the fineſt colours. When the firſt coat of oil is dry, go over it a ſecond and a third time, if neceſſary, till you are convinced the pores of the ground are fully cloſed up, and the ſtuff rendered impervious to water. It ſhould now ſtand ſeveral days, till the ſmell is ſufficiently gone off, and before it is taken from the frame, ſhould be gone over with ſome ox gall or lime-water, to take off the greaſineſs, which would otherwiſe prevent the ſtiffening from adhering to the oil. The material being now ready to be formed into hats, ſhould be cut into proper ſhapes for that purpoſe. The crown ſhould be made up over a block, with needle and ſilk, the oiled ſide outwards. The ſeams ſhould then be rubbed with a piece of hard wood, bone, or ivory, to make them lie flat, and the edges of the ſtuff pared off very near the ſtitches, that no joint may appear on the right ſide. The ſeams ſhould then be carefully gone over with the prepared oil, till every crevice or hole made by the needle is completely filled up, and the crown rendered perfectly water-proof. The crown may then be turned and ſtiffened, by ſticking linen, leather, paper, or any other material that may be found to anſwer the purpoſe, to the inner or painted ſide, till it acquires about the ſame degree of ſtiffneſs, or reſiſtance to the touch, as a good beaver. The mucilaginous matter which he uſed to attach the ſtiffening to the crown, and the upper and under parts of the brim to each other, was compoſed of one pound of gum-arabic or ſenega, one pound of ſtarch, and half a pound of glue, boiled up with as much water as reduced the whole to the conſiſtence of a thick paſte. A greater or leſs proportion of any of theſe ingredients may be uſed, and other glutinous and adheſive ſubſtances may anſwer the ſame purpoſes; or drying-oils may be made uſe of inſtead of this or other mucilage; or any of the reſinous gums diſſolved in oil or ſpirits; only it ſhould be obſerved, in this caſe, the hats will require more time in the preparation, as the oily matter, unleſs expoſed to the air, will not readily dry; but he found by experience that the above mentioned compoſition does not dry hard or brittle, but retains that pleaſant flexibility which is agreeable to the touch, while it communicates to the other materials a ſufficient degree of elaſticity. Before the brim is perfectly dry, care ſhould be taken to form a neck or riſing round the hole where it is to be attached to the crown, by notching it round with a pair of ſciſars, and then forcing it over a block ſomething larger than you have made the hole, ſo that the uncut ſtuff may turn up, under the lower edge of the crown, about a quarter of an inch. Before you join the crown and brim together, go over the outſide of the neck of the brim, and the inſide of the crown, as high as the neck will come (which ſhould be about half an inch), with the prepared oil; and when they are nearly dry, ſo as to adhere to the finger on touching them, put the crown over the neck of the brim, and let them be ſewed ſtrongly together, taking care to ſew down as little of the pile as poſſible, and uſing the ſame precaution of oiling, where the needle has been through, as was obſerved in making up the crown. The hat is now ready for dreſſing; which operation may be performed over a block, with a hot iron, bruſh, &c. in the ſame manner as thoſe commonly called felts. When putting in the lining, be very careful to let the needle only take hold of the under ſurface of the brim; for ſhould it perforate the upper one, the water will find its way through, and the hat be of no value. Though we have already declared how little we are acquainted with the operation of hat-making, we cannot help ſuggeſting the enquiry, whether theſe water-proof hats might not be improved both in ſtrength and beauty, by a ſlight felting before the application of the ſize by the bruſh. Such of them as are compoſed of wool or hair, or contain a mixture of theſe materials, are unqueſtionably ſuſceptible of felting.

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Dyeing of HATS. The inſtructions of Colbert direct hats to be firſt ſtrongly galled, by boiling them a long time in a decoction of galls with a little logwood, that the dye may penetrate the better into their ſubſtance; after which a proper quantity of vitriol, and decoction of logwood, with a little verdigriſe, are added, and the hats continued in this mixture alſo for a conſiderable time. They are afterwards to be put into a freſh liquor of logwood, galls, vitriol, and verdigriſe; and where the hats are of great price, or of a hair which difficultly takes the dye, the ſame proceſs is to be repeated a third time. For obtaining the moſt perfect colour, the hair or wool is to be dyed blue previouſly to its being formed into hats. But the following ſhorter proceſs is generally practiſed.

An hundred pounds of logwood, 12 pounds of gum, and ſix pounds of galls, are boiled in a proper quantity of water for ſome hours; after which, about ſix pounds of verdigriſe and ten of green vitriol are added, and the liquor kept juſt ſimmering, or of a heat a little below boiling. Ten or twelve dozen of hats are immediately put in, each on its block, and kept down by croſs bars for about an hour and an half: they are then taken out and aired, and the ſame number of others put in their room. The two ſets of hats are thus dipped and aired alternately, eight times each; the liquor being refreſhed each time with more of the ingredients, but in leſs quantity than at firſt.

This proceſs (ſays Dr Lewis) affords a very good black on woollen and ſilk ſtuffs as well as on hats, as we may ſee in the ſmall pieces of both kinds which are ſometimes dyed by the hatters. The workmen lay great

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great ſtreſs upon the verdigriſe, and affirm that they cannot dye a black hat without it: it were to be wiſhed that the uſe of this ingredient were more common in the other branches of the black dye; for the hatters dye, both on ſilk and woollen, is reckoned a finer black than what is commonly produced by the woollen and ſilk dyer.

But the general practice among hatters is to leave out the galls and verdigriſe, on account of the advance in price, and to uſe blue vitriol inſtead of them, in the proportion of 5lb. to 12 dozen of hats, which is found to anſwer the purpoſe equally well.

HATS are alſo made for women's wear, not only of the above ſtuffs, but of chips, ſtraw, or cane, by plaiting, and ſewing the plaits together; beginning with the centre of the crown, and working round till the whole is finiſhed. Hats for the ſame purpoſe are alſo woven and made of horſe-hair, ſilk, &c.

HAT is alſo figuratively uſed for the dignity of cardinal, or a promotion to that dignity. In this ſenſe they ſay, "to expect the hat; to claim, or have pretenſions to, the hat," &c.

Pope Innocent IV. firſt made the hat the ſymbol or cognizance of the cardinals, enjoining them to wear a red hat at the ceremonies and proceſſions, in token of their being ready to ſpill their blood for Jeſus Chriſt.

HATCH, or HATCHWAY, a ſquare or oblong opening in the DECK of a ſhip, of which there are ſeveral, forming the paſſages from one deck to another, and into the hold or lower apartments. See Plate CLXIX. where A repreſents the main-hatchway of the lower deck; NN the fore-hatchway; and OO the after-hatchway.—There are likewiſe hatches of a ſmaller kind, called *ſcuttles*. See UU in the ſame figure; as alſo the article SCUTTLE.—Hatches is alſo, though improperly, a name applied by ſailors to the covers or lids of the hatchway.

HATCHEL, or HITCHEL, in the manufactory of flax, hemp, &c. a tool, not unlike a card, for dreſſing and combing them into fine hairs.

They conſiſt of ſharp-pointed iron pins, or teeth, ſet orderly in a board.

Of theſe there are ſeveral ſorts, ſome with finer and ſhorter teeth, others with them coarſer and longer.

HATCHES, in mining, a term uſed in Cornwall, to expreſs any of the openings of the earth either into mines or in ſearch of them. The fruitleſs openings are called *eſſay-hatches;* the real mouths of the veins, *tin-hatches;* and the places where they wind up the buckets of ore, *wind-hatches*.

HATCHES alſo denote flood-gates ſet in a river, &c. to ſtop the current of the water, particularly certain dams or mounds made of rubbiſh, clay, or earth, to prevent the water that iſſues from the ſtream-works and tin-waſhes in Cornwall from running into the freſh rivers.

HATCHET, a ſmall light ſort of an axe, with a baſil edge on its left ſide, and a ſhort handle, as being to be uſed with one hand.—Hatchets are uſed by various artificers, and more particularly in hewing of wood.

HATCHING, the maturating fecundated eggs, whether by the incubation and warmth of the parent bird, or by artificial heat, ſo as to produce young chickens alive.

The art of hatching chickens by means of ovens has long been practiſed in Egypt; but it is there only known to the inhabitants of a ſingle village named *Berme*, and to thoſe that live at a ſmall diſtance from it. Towards the beginning of autumn they ſcatter themſelves all over the country; where each perſon among them is ready to undertake the management of an oven, each of which is of a different ſize; but, in general, they are capable of containing from forty to fourſcore thouſand eggs. The number of theſe ovens placed up and down the country is about 386, and they uſually keep them working for about ſix months: as, therefore, each brood takes up in an oven, as under a hen, only 21 days, it is eaſy in every one of them to hatch eight different broods of chickens. Every Bermean is under the obligation of delivering to the perſon who intruſts him with an oven, only two-thirds of as many chickens as there have been eggs put under his care; and he is a gainer by this bargain, as more than two-thirds of the eggs uſually produce chickens. In order to make a calculation of the number of chickens yearly ſo hatched in Egypt, it has been ſuppoſed that only two-thirds of the eggs are hatched, and that each brood conſiſts of at leaſt 30,000 chickens; and thus it would appear, that the ovens of Egypt give life yearly to at leaſt 92,640,000 of theſe animals.

Hatching.

This uſeful and advantageous method of hatching eggs has been lately diſcovered in France by the ingenious Mr Reaumur; who, by a number of experiments, has reduced the art to certain principles. He found by experience, that the heat neceſſary for this purpoſe is nearly the ſame with that marked 32 on his thermometer, or that marked 96 on Fahrenheit's. This degree of heat is nearly that of the ſkin of the hen, and what is remarkable, of the ſkin of all other domeſtic fowls, and probably of all other kinds of birds. The degree of heat which brings about the developement of the cygnet, the goſling, and the turkey-pout, is the ſame as that which fits for hatching the canary-ſong-ſter, and, in all probability, the ſmalleſt humming-bird: the difference is only in the time during which this heat ought to be communicated to the eggs of different birds; it will bring the canary-bird to perfection in 11 or 12 days, while the turkey-pout will require 27 or 28.

After many experiments, Mr Reaumur found, that ſtoves heated by means of a baker's oven, ſucceeded better than thoſe made hot by layers of dung: and the furnaces of glaſs-houſes and thoſe of the melters of metals, by means of pipes to convey heat into a room, might, no doubt, be made to anſwer the ſame purpoſe. As to the form of the ſtoves, no great nicety is required. A chamber over an oven will do very well. Nothing more will be neceſſary but to aſcertain the degree of heat; which may be done by melting a lump of butter of the ſize of a walnut, with half as much tallow, and putting it into a phial. This will ſerve to indicate the heat with ſufficient exactneſs: for when it is too great, this mixture will become as liquid as oil; and when the heat is too ſmall, it will remain fixed in a lump: but it will flow like a thick ſyrup, upon inclining the bottle, if the ſtove be of a right temper. Great attention therefore ſhould be given to keep the heat always at this degree, by letting in freſh air if it be too great, or ſhutting the ſtove more cloſe if it be too ſmall: and that all the eggs in the ſtove may equally ſhare the irregularities of the heat, it will be neceſſary to ſhift them

Hatching || Hatfield and Chace.

from the ſides to the centre; and thus to imitate the hens, who are frequently ſeen to make uſe of their bills, to puſh to the outer parts thoſe eggs that were neareſt to the middle of their neſts, and to bring into the middle ſuch as lay neareſt the ſides.

Mr Reaumur has invented a ſort of low boxes, without bottoms, and lined with furs. Theſe, which he calls *artificial parents*, not only ſhelter the chickens from the injuries of the air, but afford a kindly warmth, ſo that they preſently take the benefit of their ſhelter as readily as they would have done under the wings of a hen. After hatching, it will be neceſſary to keep the chickens, for ſome time, in a room artfully heated and furniſhed with theſe boxes; but afterwards they may be ſafely expoſed to the air in the court-yard, in which it may not be amiſs to place one of theſe artificial parents to ſhelter them if there ſhould be occaſion for it.

As to the manner of feeding the young brood, they are generally a whole day after being hatched, before they take any food at all; and then a few crumbs of bread may be given them for a day or two, after which they will begin to pick up inſects and graſs for themſelves.

But to ſave the trouble of attending them, capons may be taught to watch them in the ſame manner as hens do. Mr Reaumur aſſures, that he has ſeen above 200 chickens at once, all led about and defended only by three or four ſuch capons. Nay, cocks may be taught to perform the ſame office; which they, as well as the capons, will continue to do all their lives after.

HATCHING, or HACHING, in deſigning, &c. the making of lines with a pen, pencil, graver, or the like; and the interſecting or going acroſs thoſe lines with others drawn a contrary way, is called *counter-hatching*. The depths and ſhadows of draughts are uſually formed by hatching.

Hatching is of ſingular uſe in heraldry, to diſtinguiſh the ſeveral colours of a ſhield, without being illumined: thus, gules or red is hatched by lines drawn from the top to the bottom; azure, by lines drawn acroſs the ſhield; and ſo of other colours.

HATCHMENT, in *Heraldry*, the coat-of-arms of a perſon dead, uſually placed on the front of a houſe, whereby may be known what rank the deceaſed perſon was of when living: the whole diſtinguiſhed in ſuch a manner as to enable the beholder to know whether he was a bachelor, married man, or widower; with the like diſtinctions for women.

HATFIELD, BISHOPS, a town of Hartfordſhire 19 miles north from London. It was called Biſhops Hatfield, becauſe it belonged to the biſhops of Ely. Theodore archbiſhop of Canterbury held a ſynod here, anno 681, againſt the Eutychean hereſy. Here was once a royal palace, from whence both Edward VI. and Queen Elizabeth were conducted to the throne. King James I. exchanged the manor with Sir Robert Cecil, afterwards earl of Saliſbury, for Theobald's, in the pariſh of Cheſhunt in this county; and the lordſhip ſtill remains in that noble family, who have a very fine ſeat here.

HATFIELD *and Chace*, a town in the weſt riding of Yorkſhire, four miles from Doncaſter. The chace is famous for deer-hunting. There are many intrenchments near the town, as if it had been the camp of ſome great army. It is ſaid that no rats were ever ſeen in this town.

Hatfield-broad-oak || Havanna.

HATFIELD-BROAD-OAK, or *King's Hatfield*, a town of Eſſex in England, ſeated on a branch of the river Lea, 30 miles from London, is ſo called from the nature of the ſoil, from its tenure by King William the Conqueror and his ſucceſſors, and from a broad oak growing in the town. It has a market on Saturdays, and a fair in Auguſt.

HATTEM, a town of the United Provinces, in the duchy of Guelderland, ſeated on the river Uſſol, in E. Long. 6. 0. N. Lat. 53. 30.

HATTEMISTS, in eccleſiaſtical hiſtory, the name of a modern Dutch ſect, ſo called from Pontian Van Hattem, a miniſter in the province of Zealand, towards the cloſe of the 17th century, who being addicted to the ſentiments of Spinoza, was on that account degraded from his paſtoral office. The Verſchoriſts and Hattemiſts reſemble each other in their religious ſyſtems, though they never ſo entirely agreed as to form one communion. The founders of theſe ſects deduced from the doctrine of abſolute decrees a ſyſtem of fatal and uncontrollable neceſſity; they denied the difference between moral good and evil, and the corruption of human nature: from hence they farther concluded, that mankind were under no ſort of obligation to correct their manners, to improve their minds, or to obey the divine laws; that the whole of religion conſiſted not in acting, but in ſuffering; and that all the precepts of Jeſus Chriſt are reducible to this one, that we bear with cheerfulneſs and patience the events that happen to us through the divine will, and make it our conſtant and only ſtudy to maintain a permanent tranquillity of mind. Thus far they agreed; but the Hattemiſts farther affirmed, that Chriſt made no expiation for the ſins of men by his death, but had only ſuggeſted to us by his mediation, that there was nothing in us that could offend the Deity; this, they ſay, was Chriſt's manner of juſtifying his ſervants, and preſenting them blameleſs before the tribunal of God. It was one of their diſtinguiſhed tenets, that God does not puniſh men for their ſins, but by their ſins. Theſe two ſects, ſays Moſheim, ſtill ſubſiſt, though they no longer bear the names of their founders.

HATTOCK, a ſhock of corn containing twelve ſheaves; others make it only three ſheaves laid together.

HATUAN, a town and fort of Upper Hungary, in the county of Novigrod. It was taken by the Imperialiſts in 1685. It is ſeated on a mountain, in E. Long. 19. 48. N. Lat. 47. 52.

HAVANNA, a ſea-port town in the iſland of Cuba, in the Weſt Indies, and on the north-weſt part of it, oppoſite to Florida. It is famous for its harbour, which is in every reſpect one of the beſt in the Weſt Indies, and perhaps in the world. It is entered by a narrow paſſage, upwards of half a mile in length, which afterwards expands into a large baſon, forming three Cul de Sacs, and is ſufficient, in extent and depth, to contain 1000 ſail of the largeſt ſhips, having almoſt throughout ſix fathoms water, and being perfectly covered from every wind. The town was built by Diego de Velaſquez, who conquered the iſland of Cuba. It was but a ſmall place, and named originally the port of Carenas;

Havanna

Carenas; but afterwards, when the city by its increaſe of wealth grew conſiderable, it was called *St Chriſtopher of the Havanna*. In 1536, it was of ſo inconſiderable a value, that being taken by a French pirate, he ranſomed the place for the paltry ſum of 700 pieces of eight. Some time after it was taken by the Engliſh, and a ſecond time by the French: nor was its value underſtood, or any care taken to put it in a poſture of defence, till the reign of Philip II.; though what was then done proved inſufficient. But ſince the acceſſion of a branch of the houſe of Bourbon to the Spaniſh crown, more pains have been taken to render it a place of ſtrength.

The Havanna ſtands on the weſt ſide of the harbour, in a pleaſant plain; and is the reſidence of the governor and captain-general of Cuba, and of the royal officers, as well as of an aſſeſſor for the aſſiſtance of the governor and captain-general of the Weſt Indies. The biſhop of St Jago de Cuba likewiſe chooſes to fix his reſidence here. The buildings are elegant, built of ſtone, and ſome of them moſt ſuperbly furniſhed. Here are eleven churches and monaſteries, and two handſome hoſpitals. Near the middle of the town is a ſpacious ſquare, ſurrounded with uniform buildings. The churches are rich and magnificent; the lamps, candleſticks, and ornaments for the altars, being of gold and ſilver; ſome of the lamps are of the moſt curious workmanſhip, and weigh near 100 weight. The Recollects church, which ſtands on the beſt ground in the city, has 12 beautiful chapels in it, and in the monaſtery are cells for 50 fathers. The church of St Clara has ſeven altars adorned with plate, and the nunnery contains 100 women and ſervants, all clothed in blue. The church belonging to the Auguſtines has 13 altars; that of St Juan de Dios 9, with an hoſpital for ſoldiers of 12,000 pieces of eight revenue. It is not a biſhop's ſee, though the biſhop of St Jago reſides here, the revenue of which prelate is not leſs than 50,000 pieces of eight a-year. In 1700 the inhabitants were computed at 26,000, and we may very well imagine them to be increaſed ſince. They are a more polite and ſocial people than the inhabitants of any of the Spaniſh ports on the continent; and of late imitate the French both in their dreſs and manners. The city is ſupplied with water by a ſmall river called *Lagida*, which riſes from the hills on the ſouth weſt ſide of the town, and divides itſelf into three ſtreams, one of which falls into the ſea on the eaſt ſide of the town, but the other two flow through the place, entering the walls near the middle of the city.

As to the fortifications, it was already remarked, that the entrance to the harbour is by a narrow gut near half a mile in length: this paſſage is defended on the eaſt ſide by a ſtrong caſtle called *El Moro*, ſituated on a high rock; and on the walls and baſtions are mounted 40 pieces of cannon. Under the faces of the ſouth-weſt baſtion of the Moro, and more within the entrance of the harbour, is a battery of ſtone called the *Twelve Apoſtles*, almoſt level with the water, and the guns of which carry each a ball of 36 pounds. A little higher, and oppoſite to the Point gate, is the La Divina Paſtora, or the Shepherd's Battery, of 14 guns, level with the water. On the weſt ſide of the entrance, at the point, is a ſquare fort called the *Punta*, with four baſtions well mounted with cannon, about 200 yards diſtant from the Punta gate of the town. On the baſtions of the town, next the harbour, are a number of cannon; and about the middle of the city is another fort, called *El Fuerte*, a ſquare fort with four baſtions, mounted with 22 pieces of cannon, of no great ſtrength; but in this laſt the governor reſides, and in it the king of Spain's treaſures are depoſited till the arrival of the galleons. On the land-ſide, from the Punta gate to the dock-yard, there is a rampart with baſtions, faced with ſtone, and earthen parapets with a ditch, which in ſeveral places has fallen in, and is almoſt filled up, particularly behind the Punta and land-gates, near the ſtone quarries, which, if joined to one another, might be of great detriment to the place in caſe of a ſiege, as a lodgement might be made in them. The ground here riſes with an eaſy aſcent to the land-gate; and is either open paſture or garden ground, well ſtored with the cabbage-tree. Before the land-gate is a ravelin. The hill on a riſing ground from this gate (which is the higheſt part of the town) to the dock-yard, is ſteeper than on the other ſide. Havanna.

Such are the fortifications of the Havanna, which are the beſt the Spaniards have in the Weſt Indies, as indeed the place is of the greateſt importance. But though ſtrong, they have many defects, and from the ſituation of the town and forts, are commanded by many eminences, of which an enemy could not fail to take advantage. On the eaſt ſide of the harbour, the Cavannas, on a part of which the Moro is built, commands in a great meaſure that fort, but abſolutely commands the Punta, El Fuerte, and whole north-eaſt part of the city, which is the beſt fortified. On the weſt ſide of the city runs a ſuburb, called *Guadaloupe*, whoſe church is ſituated on an eminence about half a mile from the land-gate, with which it is on a level, and higher than any other part of the fortifications. From the north ſide of this riſing ground, the Punta gate may be flanked; and from the ſouth-eaſt ſide the dock yard is commanded. Along the north ſide runs an aqueduct, which falling into the ditch at the land-gate, runs down to the dock-yard, both for watering the ſhips and turning a ſaw-mill. About half a mile from the church, is a bridge made over a rivulet that runs into the bay about 100 yards. That road leads to the centre of the iſland, and extends to Baracoa, above 600 miles diſtant. From this bridge to the Lazaretto, is about two miles, with a riſing ground betwixt them. A trench thrown up between theſe two places would cut off the communication with the town by land. From theſe obſervations it will plainly appear, that the Havanna, though well fortified, is not impregnable.

The Havanna has greatly contributed to the maritime ſtrength of the crown of Spain, many ſhips having been built here within theſe few years, from 60 to 80 guns, the iſland furniſhing the fineſt materials, ſuch as oak, pine, cedar, and mahogany. The only defect of the harbour is the narrowneſs of its entry; for though free from bars and ſhoals, yet only one ſhip at a time can enter it; from which circumſtance the galleons have more than once been inſulted, and ſome of them taken, at the mouth of the harbour, the forts there not being able to afford them any aſſiſtance.

Upon the rupture with Spain in 1762, the Britiſh miniſtry ſent a ſquadron and army againſt this place under

Havanna. under the command of Admiral Pocock and lord Albemarle. The Spaniards had in the harbour at the time a fleet of twelve ſail of the line, two of them but juſt launched, two more on the ſtocks nearly finiſhed, and ſeveral merchant ſhips. The men of war were almoſt ready for ſea; but no account had reached the governor of the intended attack. The place, however, was gallantly defended, and ſuſtained a ſiege of two months and eight days before it could be reduced; when a capitulation was ſigned, and alongſt with the city was yielded a diſtrict of 180 miles to the weſtward. This conqueſt was without doubt in itſelf the moſt conſiderable, and in its conſequences the moſt deciſive, of any we had made ſince the beginning of the war; and in no operation were the courage, ſteadineſs, and perſeverance of the Britiſh troops, and the conduct of their leaders, more conſpicuous. The acquiſition of this place united in itſelf all the advantages which can be acquired in war. It was a military atchievement of the higheſt claſs. By its effect on the enemy's marine it was equal to the greateſt naval victory, and in the plunder it equalled the produce of a national ſubſidy. Nine ſail of the enemy's line-of-battle ſhips were taken; three of their capital ſhips had been ſunk by themſelves at the beginning of the ſiege; two more were in forwardneſs upon the ſtocks, and were afterwards deſtroyed by the captors. The enemy on this occaſion loſt a whole fleet of ſhips of war, beſides a number of conſiderable merchant ſhips; and in ready money, in tobacco collected at the Havanna on account of the king of Spain, and in other valuable mechandiſes, the ſum loſt by the enemy perhaps did not fall ſhort of three millions ſterling.

The city of Havanna was reſtored by the peace of 1763; and is of the greateſt importance to Spain, being the rendezvous for all their fleets to return from America to Europe, lying at the mouth of the gulf of Florida, through which they are all obliged to paſs. Here the navy of Spain ſtationed in the Weſt Indies ride; and here the galleons, the flota, and other merchant ſhips from other ports both of the continent and iſlands, meet in September, to take in proviſions and water, with great part of their lading, and for the convenience of returning to Spain in a body. A continual fair is held till their departure, which generally happens before the end of the month, when proclamation is made, forbidding any perſon belonging to the fleet to ſtay in town on pain of death; and accordingly, on firing the warning gun, they all retire on board.—The commerce carried on in this port, which is very conſiderable; may be diſtinguiſhed into the particular commerce of the iſland of Cuba, and that more general by the galleons and flota. The former conſiſts in hides, uſually ſtyled of the Havanna, which are excellent, and of great value; ſugar, tobacco, admirable in its kind, &c. Though ſtrangers are prohibited to trade, yet a contraband commerce is carried on briſker here than at La Vera Cruz. Some little trade is carried on by other ports of Cuba, but it is very inconſiderable. As to the general commerce, this port is the place of rendezvous (as already mentioned) for all ſhips, particularly from Carthagena, Puerto Velo, and La Vera Cruz, which return to Spain from the Indies. The Havanna is regularly ſupplied with European goods only by the regiſter ſhips from Cadiz and the Canaries. The flota and galleons bring there no more than the refuſe of their cargoes, which they had not been able to diſpoſe of at Carthagena, Puerto Velo, or Da Vela Cruz. When the fleet is in the harbour, proviſions are exceſſively dear on ſhore, and money ſo plenty, that a Spaniard expects half a piece of eight a-day from a male ſlave, and a quarter from a female, out of what they earn for their labour. The fleet generally ſails from thence, through the channel of Bahama, in the month of September; and is the richeſt in the world; ſince, in ſilver and merchandiſe, there is ſeldom leſs than thirty millions of pieces of eight on board, or ſix millions ſeven hundred and fifty thouſand pounds of our money.—It is natural to imagine, that a port of ſo much conſequence as the Havanna ought to be well fortified. Since it has been reſtored to Spain, many new works have been added, to prevent if poſſible a ſimilar diſaſter befalling it. W. Long. 82. 13. N. Lat. 23. 12.

Havel || Haul.

HAVEL, a river of Brandenburgh, which proceeds from a lake in the duchy of Mecklenburg, and running through the middle Marche, and through Brandenburg and other towns, runs north, and falls into the Elbe.

HAVELBERG, a town of Germany, in the circle of Lower Saxony, and in the electorate of Brandenburg, with a biſhop's ſee, ſecularized in favour of the houſe of Brandenburg. It is ſeated on the river Havel, in E. Long. 12. 26. N. Lat. 53. 5.

HAVEN, a ſea-port or harbour for ſhips. See PORT and HARBOUR. The word is derived from the Saxon *havene*, or the German *hafen*, or the French *havre*, which all ſignify the ſame thing.

HAVERCAMP, SIGIBERT, a celebrated Dutch ſcholar and critic, profeſſor of hiſtory, eloquence, and the Greek tongue, at Leyden. He was particularly ſkilled in medals; and was the author of ſome eſteemed works in that way, beſide giving good and elegant editions of ſeveral Greek and Latin authors. He died at Leyden in 1742, aged 58.

HAVERFORD-WEST, a town of Pembrokeſhire in South Wales, ſeated in W. Long. 5. N. Lat. 51. 50. on the ſide of a hill, which forms a part of the weſt bank of the river Dongledye, 256 miles from London. It is an incorporated town and county of itſelf. The mayor of the town is admiral, coroner, eſcheater, and clerk of the markets, within its precincts. Here the aſſizes are held and the county-jail kept. The town enjoys ſeveral privileges, and has its own courts. It was formerly fortified with a rampart and caſtle, which are now in ruins.

HAVERILL, a town of England, in the county of Suffolk, where there is a conſiderable manufactory of checks, cottons, and fuſtians. By the ruins of a church and caſtle ſtill to be ſeen, it appears to have been formerly a place of much greater conſequence than at preſent. It has now only about 300 poor clay-houſes, and one wide ſtreet not paved. E. Long. 0. 28. N. Lat. 52. 6.

HAUL, an expreſſion peculiar to ſeamen, implying to pull a ſingle rope, without the aſſiſtance of blocks or other ſuch mechanical powers. When a rope is otherwiſe pulled, as by the application of tackles, or the connection with blocks, &c. the term is changed into *bowſing*.

To

Haum || Hauriant.

To HAUL *the Wind*, is to direct the ſhip's courſe nearer to that point of the compaſs from which the wind ariſes. Thus, ſuppoſing a ſhip to ſail ſouth-weſt, with the wind northerly, and ſome particular occaſion requires to haul the wind more weſtward; to perform this operation, it is neceſſary to arrange the ſails more obliquely with her keel; to brace the yards more forward, by ſlackening the ſtarboard and pulling in the larboard braces, and to haul the lower ſheets further aft; and, finally, to put the helm a-port, i. e. over to the larboard ſide of the veſſel. As ſoon as her head is turned directly to the weſtward, and her ſails are trimmed accordingly, ſhe is ſaid to have hauled the wind four points; that is to ſay, from ſouth-weſt to weſt. She may ſtill go two points nearer to the direction of the wind, by diſpoſing her ſails according to their greateſt obliquity, or, in the ſea-phraſe, by *trimming all ſharp*; and in this ſituation ſhe is ſaid to be cloſe-hauled, as ſailing weſt-north-weſt.

HAUM, HALM, or *Hawn*, among farmers, denotes the ſtem or ſtalk of corn, peaſe, beans, &c. from the root to the ear.

HAUNCH, or HANCH, the *Hip*, or that part of the body between the laſt ribs and the thigh.

The haunches of a horſe are too long, if when ſtanding in the ſtable he limps, with his hind-legs farther back than he ought; and when the top or onſet of his tail is not in a perpendicular line to the tip of his hocks, as it always does in horſes whoſe haunches are of a juſt length. There are ſome horſes which, though they have too long haunches, yet commonly walk well: ſuch are good to climb hills, but are not at all ſure upon a deſcent; for they cannot ply their hams, and never gallop ſlowly, but always nearly upon a full ſpeed. The art of riding the great horſe has not a more neceſſary leſſon than that of putting a horſe upon his haunches; which, in other words, is called *coupling him well*, or putting him well together, or compact. A horſe that cannot bend or lower his haunches, throws himſelf too much upon his ſhoulder, and lies heavy upon the bridle.

HAVRE, in geography, &c. a French term ſignifying the ſame with haven or harbour.

HAVRE de Grace, a ſea-port town of France, and capital of a diſtrict of the ſame name, is ſeated in the province of Normandy, on the Engliſh channel, in a large plain at the mouth of the river Seine. It is a ſmall fortified town, nearly of a ſquare figure, divided into two parts by the harbour, ſurrounded with a wall and other works, and defended by a very ſtrong citadel. It is one of the moſt important places in France, on account of its foreign trade and convenient harbour; for which reaſon it was made a diſtinct government from the reſt of Normandy. It was ſurpriſed in 1562 by the Proteſtants, who delivered it to Queen Elizabeth; but it was loſt next year. In 1694 it was bombarded by the Engliſh, and alſo in the year 1758. E. Long. 0. 11. N. Lat. 49. 29.

HAVRE de Grace, a poſt-town and port of entry in America, in the county of Harford, Maryland. It contains about 300 inhabitants, and lies about 65 miles ſouth-weſt of Philadelphia. N. Lat. 39. 39.

HAURIANT, in *Heraldry*, a term peculiar to fiſhes; and ſignifies their ſtanding upright, as if they were refreſhing themſelves by ſucking in the air.

HAUTE FEUILLE, JOHN, an ingenious mechanic, born at Orleans in 1647. Though he embraced the ſtate of an eccleſiaſtic, and enjoyed ſeveral benefices, he applied almoſt his whole life to mechanics, in which he made a great progreſs. He had a particular taſte for clock-work, and made ſeveral diſcoveries in it that were of ſingular uſe. He claimed the diſcovery of moderating the vibration of the balance in watches by means of a ſmall ſteel-ſpring, which has ſince been made uſe of. This diſcovery he laid before the members of the Academy of Sciences in 1674; and theſe watches are, by way of eminence, called *pendulum-watches*; not that they have real pendulums, but becauſe they nearly approach to the juſtneſs of pendulums. M. Huygens perfected this happy invention; but having declared himſelf the inventor, and obtained from Louis XIV. a patent for making watches with ſpiral ſprings, the Abbé Feuille oppoſed the regiſtering of this privilege, and publiſhed a piece on the ſubject againſt M. Huygens. He wrote a great number of other pieces, moſt of which are ſmall pamphlets conſiſting of a few pages, but very curious; as, 1. His perpetual pendulum, quarto. 2 New inventions, quarto. 3. The Art of Breathing under Water, and the means of preſerving a Flame ſhut up in a ſmall Place. 4. Reflections on Machines for raiſing Water. 5. His opinion on the different ſentiments of Mallebranche and Regis relating to the appearance of the Moon when ſeen in the Horizon. 6. The Magnetic Balance. 7. A Placet to the King on the Longitude. 8. Letter on the Secret of the Longitude. 9. A new Syſtem on the Flux and Reflux of the Sea. 10. The Means of making ſenſible Experiments that prove the Motion of the Earth; and many other pieces. He died in 1724.

Haute Feuille || Hawkers.

See *Hooke* and *Watch*.

HAUTBOY, a muſical inſtrument of the wind kind, ſhaped much like the lute, only that it ſpreads and widens towards the bottom, and is ſounded through a reed. The treble is two feet long; the tenor goes a fifth lower when blown open: it has only eight holes; but the baſs, which is five feet long, has eleven.

The word is French, *haut bois*, q. d. "high wood;" and is given to this inſtrument becauſe the tone of it is higher than that of the violin.

HAW, a ſort of berry, the fruit of ſeveral ſpecies of meſpilus, thence denominated *hawthorns*. See MESPILUS, BOTANY *Index*.

HAW, among farriers, an excreſcence reſembling a griſtle, growing under the nether eyelid and eye of a horſe, which, if not timely removed, deſtroys it. See FARRIERY.

HAW, a ſmall parcel of land ſo called in Kent, as a *Hemphaw*, or *Beanhaw*, lying near the houſe, and incloſed for theſe uſes. But Sir Edward Coke, in an ancient plea concerning Feverſham in Kent, ſays *hawes* are houſes.

Haw-Finch. See LOXIA, ORNITHOLOGY *Index*.

HAWGH, or HOWGH, ſignifies a green plot in a valley as they uſe it in the north of England.

HAWK. See FALCO, ORNITHOLOGY *Index*.

HAWKERS, anciently, were fraudulent perſons, who went from place to place buying and ſelling braſs, pewter, and other merchandiſe, which ought to be uttered in open market. In this ſenſe the word is mentioned *anno* 25 Hen. VIII. cap. 6. and 33 *ejuſdem* cap.

Hawkers, Hawkesworth.

cap. 4. The appellation *hawkers* ſeems to have ariſen from their uncertain wandering, like thoſe who, with hawks, ſeek their game where they can find it.

The term is now uſed as ſynonymous with pedlar; a perſon who travels about the country ſelling wares. Every hawker muſt take out an annual licence, for which he muſt pay 4l. and if he travels with a horſe, aſs, or mule, for every one of them 8l. If he travels without a licence, or contrary to it, he forfeits for every offence to the informer, and the poor of the pariſh where diſcovered, 10l. The acts relating to hawkers do not extend to makers of goods or their agents; or to thoſe who ſell goods in fairs or markets; to the ſellers of fiſh, fruit, or other victuals; nor to the venders of books and newſpapers, 9 and 10 W. cap. 27. 3 and 4 Anne, cap. 4. But hawkers ſhall not, by virtue of ſuch licence, ſell or offer to ſale any tea or ſpirituous liquors, though with a permit, under the penalty of having the ſame ſeized, and impriſonment and proſecution of the offender, 9. Geo. II. cap. 35. Hawkers who were licenced on June 23. 1785, may ſet up any buſineſs in the place where they are reſident inhabitants, though not brought up thereto, and may employ therein perſons who have not been apprentices.

HAWKERS, is a term alſo applied to thoſe who go up and down London ſtreets and country towns, ſelling newſpapers, pamphlets, &c.

HAWKESWORTH, JOHN, a celebrated Engliſh writer, was born about the year 1719; though his epitaph, as we find it in the Gentleman's Magazine for Auguſt 1781, makes him to have been born in 1715. He was brought up to a mechanical profeſſion, that of a watchmaker as is ſuppoſed. He was of the preſbyterian perſuaſion, and a member of the celebrated Tom Bradbury's meeting, from which he was expelled for ſome irregularities. He afterwards devoted himſelf to literature, and became an author of conſiderable eminence. In the early part of life his circumſtances were rather confined. He reſided ſome time at Bromley in Kent, where his wife kept a boarding-ſchool. He afterwards became known to a lady who had great property and intereſt in the Eaſt India company, and through her means was choſen a director of that body. As an author, his Adventurer is his capital work; the merits of which, if we miſtake not, procured him the degree of LL. D. from Herring archbiſhop of Canterbury. When the deſign of compiling a narrative of the diſcoveries in the South Seas was on foot, he was recommended as a proper perſon to be employed on the occaſion: but in truth he was not a proper perſon, nor did the performance anſwer expectation. Works of taſte and elegance, where imagination and the paſſions were to be affected, were his province; not works of dry, cold, accurate narrative. However, he executed his taſk, and is ſaid to have received for it the enormous ſum of 6000l. He died in 1773; ſome ſay of high living; others of chagrin from the ill reception of his Narrative: for he was a man of the keeneſt ſenſibility, and obnoxious to all the evils of ſuch irritable natures. On a handſome marble monument erected to his memory at Bromley in Kent is an inſcription, of which the following is a part taken from the laſt number of The Adventurer:

Hawking.

"The hour is haſting, in which whatever praiſe "or cenſure I have acquired will be remembered "with equal indifference. Time, who is impatient "to date my laſt paper, will ſhortly moulder the "hand which is now writing in the duſt, and ſtill "the breaſt that now throbs at the reflection. But "let not this be read as ſomething that relates "only to another; for a few years only can divide "the eye that is now reading from the hand that "has written."

HAWKING, the exerciſe of taking wild-fowl by means of hawks. The method of reclaiming, manning, and bringing up a hawk to this exerciſe, is called *falconry*. See FALCONRY.

There are only two countries in the world where we have any evidence that the exerciſe of hawking was very anciently in vogue. Theſe are, Thrace and Britain. In the former, it was purſued merely as the diverſion of a particular diſtrict, if we may believe Pliny *, whoſe account is rendered obſcure by the darkneſs of his own ideas of the matter. The primæval Britons, with a fondneſs for the exerciſe of hunting, had alſo a taſte for that of hawking; and every chief among them maintained a conſiderable number of birds for that ſport. It appears alſo from a curious paſſage in the poems of Oſſian †, that the ſame diverſion was faſhionable at a very early period in Scotland. The poet tells us, that a peace was endeavoured to be gained by the proffer of 100 managed ſteeds, 100 foreign captives, and "100 hawks with fluttering wings, that fly acroſs the ſky." To the Romans this diverſion was ſcarce known in the days of Veſpaſian; yet it was introduced immediately afterwards. Moſt probably they adopted it from the Britons; but we certainly know that they greatly improved it by the introduction of ſpaniels into the iſland. In this ſtate it appears among the Roman Britons in the ſixth century. Gildas, in a remarkable paſſage in his firſt epiſtle, ſpeaks of Maglocunus, on his relinquiſhing the ſphere of ambition, and taking refuge in a monaſtery; and proverbially compares him to a dove, that haſtens away at the noiſy approach of the dogs, and with various turns and windings takes her flight from the talons of the hawk.

* Book x. 8.

† Vol. i. 115.

In after times, hawking was the principal amuſement of the Engliſh: a perſon of rank ſcarce ſtirred out without his hawk on his hand; which, in old paintings, is the criterion of nobility. Harold, afterwards king of England, when he went on a moſt important embaſſy into Normandy, is painted embarking with a bird on his fiſt, and a dog under his arm: and in an ancient picture of the nuptials of Henry VI. a nobleman is repreſented in much the ſame manner; for in thoſe days, *it was thought ſufficient for a nobleman to winde their horn, and to carry their hawk fair, and leave ſtudy and learning to the children of mean people.* The former were the accompliſhments of the times; Spenſer makes his gallant Sir Triſtram boaſt,

Biog. Britt. art. Caxton.

Ne is there hawk which mantleth her on pearch,
Whether high tow'ring, or accoaſting low,
But I the meaſure of her flight doe ſearch,
And all her prey, and all her diet know.

Book vi. canto 2.

In

Hawking. In ſhort, this diverſion was, among the old Engliſh, the pride of the rich, and the privilege of the poor; no rank of men ſeems to have been excluded the amuſement: we learn from the book of St Alban's that every degree had its peculiar hawk, from the *emperor* down to the *holy-water clerk*. Vaſt was the expence that ſometimes attended this ſport. In the reign of James I. Sir Thomas Monſon is ſaid to have given 1000l. for a caſt of hawks: we are not then to wonder at the rigour of the laws that tended to preſerve a pleaſure that was carried to ſuch an extravagant pitch. In the 34th of Edward III. it was made felony to ſteal a hawk; to take its eggs, even in a perſon's own ground, was puniſhable with impriſonment for a year and a day, beſides a fine at the king's pleaſure: in Queen Elizabeth's reign, the impriſonment was reduced to three months; but the offender was to find ſecurity for his good behaviour for ſeven years, or lie in priſon till he did. Such was the enviable ſtate of the times of *old* England; during the whole day, the gentry were given to the fowls of the air and the beaſts of the field; in the evening, they celebrated their exploits with the moſt abandoned and brutiſh ſottiſhneſs; at the ſame time, the inferior ranks of people, by the moſt unjuſt and arbitrary laws, were liable to capital puniſhments, to fines, and loſs of liberty, for deſtroying the moſt noxious of the feathered tribe.

According to Olearius, the diverſion of hawking is more followed by the Tartars and Perſians than ever it was in any part of Europe. *Il n'y avoit point de hutte* (ſays he) *qui n'euſt ſon aigle ou ſon faucon.*

The falcons or hawks that were in uſe in theſe kingdoms, are now found to breed in Wales, and in North Britain and its iſles. The peregrine falcon inhabits the rocks of Caernarvonſhire. The ſame ſpecies, with the gyrfalcon, the gentil, and the goſhawk, are found in Scotland, and the lanner in Ireland.

We may here take notice, that the Norwegian breed was, in old times, in high eſteem in England: they were thought bribes worthy a king. Jeoffrey Fitzpierre gave two good Norway hawks to King John, to obtain for his friend the liberty of exporting 100 cwt. of cheeſe; and Nicholas the Dane was to give the king a hawk every time he came into England, that he might have free liberty to traffic throughout the king's dominions.

Maddox Antiquit. Exchequer, l. 469.

They were alſo made the tenures that ſome of the nobility held their eſtates by, from the crown. Thus Sir John Stanley had a grant of the Iſle of Man from Henry IV. to be held of the king, his heirs, and ſucceſſors, by homage and the ſervice of two falcons, payable on the day of his or their coronation. And Philip de Haſtang held his manor of Combertoun in Cambridgeſhire, by the ſervice of keeping the king's falcons.

Blunt's Anc. Tenures, 20.

Hawking, though an exerciſe now much diſuſed among us, in compariſon of what it anciently was, does yet furniſh a great variety of ſignificant terms, which ſtill obtain in our language, Thus, the parts of a hawk have their proper names.—The legs, from the thigh to the foot, are called *arms;* the toes, the *petty ſingles;* the claws, the *pounces.*—The wings are called the *ſails;* the long feathers thereof, the *beams;* the two longeſt, the *principal feathers*; thoſe next thereto, the *flags.*—The tail is called the *train;* the breaſt-feathers, the *mails;* thoſe behind the thigh, the *pendant feathers.*—When the feathers are not yet full grown, ſhe is ſaid to be *unſummed;* when they are complete, ſhe is *ſummed:*—The craw, or crop, is called the *gorge:*—The pipe next the fundament, where the fæces are drawn down, is called the *pannel:*—The ſlimy ſubſtance lying in the pannel, is called the *glut:*—The upper and crooked part of the bill, is called the *beak;* the nether part, the *clap;* the yellow part between the beak and the eyes, the *ſear* or *fere;* the two ſmall holes therein, the *nares.* Hawking.

As to her furniture:—The leathers, with bells buttoned on her legs, are called *bewits.*—The leathern thong, whereby the falconer holds the hawk, is called the *leaſe* or *leaſh;* the little ſtraps, by which the leaſe is faſtened to the legs, *jeſſis;* and a line or pack-thread faſtened to the leaſe, in diſciplining her, a *creance.*—A cover for her head, to keep her in the dark, is called a *hood;* a large wide hood, open behind, to be wore at firſt, is called a *ruſter hood:* To draw the ſtrings, that the hood may be in readineſs to be pulled off, is called *unſtriking the hood.*—The blinding a hawk juſt taken, by running a thread through her eye-lids, and thus drawing them over the eyes, to prepare her for being hooded, is called *ſeeling.*—A figure or reſemblance of a fowl, made of leather and feathers, is called a *lure.*—Her reſting-place, when off the falconer's fiſt, is called the *perch.*—The place where her meat is laid, is called the *hack;* and that wherein ſhe is ſet, while her feathers fall and come again, the *mew.*

Something given a hawk, to cleanſe and purge her gorge, is called *caſting.*—Small feathers given her to make her caſt, are called *plumage:*—Gravel given her to help to bring down her ſtomach, is called *rangle:* Her throwing up filth from the gorge after caſting, is called *gleaming.*—The purging of her greaſe, &c. *enſeaming.*—A being ſtuffed is called *gurgiting.*—The inſerting a feather in her wing, in lieu of a broken one, is called *imping.*—The giving her a leg, wing, or pinion of a fowl to pull at, is called *tiring*:—The neck of a bird the hawk preys on, is called the *inke:*——What the hawk leaves of her prey, is called the *pill* or *pelf.*

There are alſo proper terms for her ſeveral actions.—When ſhe flutters with her wings, as if ſtriving to get away, either from perch or fiſt, ſhe is ſaid to *bate.*—When ſtanding too near they fight with each other, it is called *crabbing:*—When the young ones quiver, and ſhake their wings in obedience to the elder, it is called *cowring:*—When ſhe wipes her beak after feeding, ſhe is ſaid to *feak:*—When ſhe ſleeps, ſhe is ſaid to *jouk:*—From the time of exchanging her coat, till ſhe turn white again, is called her *intermewing:*—Treading is called *cawking:* When ſhe ſtretches one of her wings after her legs, and then the other, it is called *mantling:*—Her dung is called *muting:* when ſhe mutes a good way from her, ſhe is ſaid to *ſlice;* when ſhe does it directly down, inſtead of jerking backwards, ſhe is ſaid to *ſlime;* and if it be in drops, it is called *dropping.*—When ſhe as it were ſneezes, it is called *ſniting.*—When ſhe raiſes and ſhakes herſelf, ſhe is ſaid to *rouze.*——When, after mantling, ſhe croſſes her wings together over her back, ſhe is ſaid to *warble.*

When a hawk ſeizes, ſhe is ſaid to *bind:*—When after ſeizing, ſhe pulls off the feathers, ſhe is ſaid to *plume.*—When ſhe raiſes a fowl aloft, and at length deſcends

Hawking. deſcends with it to the ground, it is called *truſſing*.—When, being aloft, ſhe deſcends to ſtrike her prey, it is called *ſtooping*.—When ſhe flies out too far from the game, ſhe is ſaid to *rake*.—When, forſaking her proper game, ſhe flies at pyes, crows, &c. that chance to croſs her, it is called *check*.—When, miſſing the fowl, ſhe betakes herſelf to the next check, ſhe is ſaid to *fly on head*.——The fowl or game ſhe flies at is called the *quarry*.—The dead body of a fowl killed by the hawk, is called a *pelt*.—When ſhe flies away with the quarry, ſhe is ſaid to *carry*.—When in ſtooping ſhe turns two or three times on the wing, to recover herſelf ere ſhe ſeizes, it is called *cancelliering*.—When ſhe hits the prey, yet does not truſs it, it is called *ruff*.—The making a hawk tame and gentle, is called *reclaiming*.—The bringing her to endure company, *manning* her.—An old ſtaunch hawk, uſed to fly and ſet example to a young one, is called a *make-hawk*.

The reclaiming, manning, and bringing up a hawk to the ſport, is not eaſy to be brought to any preciſe ſet of rules.—It conſiſts in a number of little practices and obſervances, calculated to familiarize the falconer to his bird, to procure the love thereof, &c. See the article FALCONRY.

When your hawk comes readily to the lure, a large pair of luring-bells are to be put upon her; and the more giddy-headed and apt to rake out your hawk is, the larger muſt the bells be. Having done this, and ſhe being ſharp-ſet, ride out in a fair morning, into ſome large field unencumbered with trees or wood, with your hawk on your fiſt; then having looſened her hood, whiſtle ſoftly, to provoke her to fly; unhood her, and let her fly with her head into the wind; for by that means ſhe will be the better able to get upon the wing, and will naturally climb upwards, flying a circle. After ſhe has flown three or four turns, then lure her with your voice, caſting the lure about your head, having firſt tied a pullet to it; and if your falcon come in and approach near you, caſt out the lure into the wind, and if ſhe ſtoop to it reward her.

You will often find, that when ſhe flies from the fiſt, ſhe will take ſtand on the ground: this is a fault which is very common with ſoar-falcons. To remedy this, fright her up with your wand; and when you have forced her to take a turn or two, take her down to the lure, and feed her. But if this does not do, then you muſt have in readineſs a duck ſealed, ſo that ſhe may ſee no way but backwards, and that will make her mount the higher. Hold this duck in your hand, by one of the wings near the body; then lure with the voice, to make the falcon turn her head; and when ſhe is at a reaſonable pitch, caſt your duck up juſt under her; when, if ſhe ſtrike, ſtoop, or truſs the duck, permit her to kill it, and reward her by giving her a reaſonable gorge. After you have practiſed this two or three times, your hawk will leave the ſtand, and, delighted to be on the wing, will be very obedient.

It is not convenient, for the firſt or ſecond time, to ſhow your hawk a large fowl; for it frequently happens, that they eſcape from the hawk, and ſhe, not recovering them, rakes after them: this gives the falconer trouble, and frequently occaſions the loſs of the hawk. But if ſhe happens to purſue a fowl, and being unable to recover it, gives it over, and comes in again directly, then caſt out a ſealed duck; and if ſhe ſtoop and truſs it acroſs the wings, permit her to take her pleaſure, rewarding her alſo with the heart, brains, tongue, and liver. But if you have not a quick duck, take her down with a dry lure, and let her plume a pullet and feed upon it. By this means a hawk will learn to give over a fowl that rakes out, and on hearing the falconer's lure, will make back again, and know the better how to hold in the head. Hawking. Hawkings.

Some hawks have a diſdainful coyneſs, proceeding from their being high fed: ſuch a hawk muſt not be rewarded though ſhe ſhould kill: but you may give her leave to plume a little; and then taking a ſheep's heart cold, or the leg of a pullet, when the hawk is buſy in pluming, let either of them be conveyed into the body of the fowl, that it may favour of it; and when the hawk has eaten the heart, brains, and tongue of the fowl, take out what is incloſed, call her to your fiſt, and feed her with it: afterwards give her ſome of the feathers of the fowl's neck, to ſcour her, and make her caſt.

If your hawk be a ſtately high-flying one, ſhe ought not to take more than one flight in a morning; and if ſhe be made for the river, let her not fly more than twice: when ſhe is at the higheſt, take her down with your lure; and when ſhe has plumed and broken the fowl a little, feed her, by which means you will keep her a high-flyer, and fond of the lure.

HAWKINS, SIR JOHN, a very induſtrious writer and valuable magiſtrate, was born at London in the year 1719, where his father was employed as a builder and ſurveyor. He received an education for the ſame profeſſion, but afterwards a clerk to an attorney. His employment being chiefly copying, he improved his mind in knowledge by riſing early, and had made very great advances by the time that his clerkſhip ended. He was ſoon after admitted as an attorney, and his taſte for muſic made him become a member of the Academy of Ancient Muſic. Having attained a degree of celebrity by publiſhing the words of two ſets of cantatas, the muſic of which was furniſhed by Mr Stanley, he was introduced to ſome valuable acquaintances who aſſiſted him in carrying forward his profeſſional views. In 1749 he was introduced as a member of a tavern club which had been inſtituted by Dr Samuel Johnſon, and the connection thus formed between that great man and him was only diſſolved by death. In 1753 he married a daughter of Peter Storer, Eſq. by which he obtained a very handſome fortune; and this being augmented by the death of Mr Hawkins's brother, he laid aſide the profeſſion of an attorney, and lived as an independent gentleman. He afterwards became a juſtice of the peace for the county of Middleſex, and was both an active and uſeful magiſtrate. Being extremely fond of angling, he became the editor of Walton's Complete Angler, which he enriched with notes of his own and a life of the author, a work which has been frequently republiſhed ſince.

His "Obſervations on the Highways" brought him a liberal ſhare of public approbation, and it has ſerved as a model for all the acts which have ſince been paſſed. In 1765 he was choſen chairman to the quarter ſeſſions, and in the year 1772 he obtained the honour of knighthood. Some of the notes to the edition of Shakeſpeare by Johnſon

Hawſe. Johnſon and Steevens were furniſhed by Sir John, who for many years was engaged in writing the hiſtory of muſic, which he finiſhed in 1776, in five vols. 4to, dedicated to his majeſty. It abounds with curious and original information, and may be conſidered as a repoſitory of many uſeful things not elſewhere to be met with. His valuable library was deſtroyed by fire, which interrupted his literary labours, but made no change on the tranquillity of his mind. In the year 1787 his life and works of Dr Samuel Johnſon appeared in eleven vols. 8vo. This life is a garrulous miſcellany of anecdote, in which the author frequently wanders from his ſubject; yet it contains many facts reſpecting that extraordinary man which his enthuſiaſtic admirers could wiſh had been concealed. After this he prepared for the termination of his own life, which he perceived approaching, for he died in the month of May 1789, about 70 years of age.

HAWSE, or HAUSE, is generally underſtood to imply the ſituation of the cables before the ſhip's ſtem, when ſhe is moored with two anchors out from forward, viz. one on the ſtarboard, and the other on the larboard bow. Hence it is uſual to ſay, *ſhe has a clear hawſe*, or *a foul hawſe*. It alſo denotes any ſmall diſtance *a-head* of a ſhip, or between her head and the anchors employed to ride her, as, "He has anchored in our hawſe, The brig fell athwart our hawſe," &c.

A ſhip is ſaid to ride with a clear hawſe, when the cables are directed to their anchors, without lying athwart the ſtem; or croſſing, or being twiſted round each other by the ſhip's winding about, according to the change of the wind, tide, or current.

A foul hawſe, on the contrary, implies that the cables lie acroſs the ſtem, or bear upon each other, ſo as to be rubbed and chafed by the motion of the veſſel. The hawſe accordingly is foul, by having either a croſs, an elbow, or a round turn. If the larboard cable, lying acroſs the ſtem, points out on the ſtarboard ſide, while the ſtarboard cable at the ſame time grows out on the larboard ſide, there is a croſs in the hawſe. If, after this, the ſhip, without returning to her former poſition, continues to wind about the ſame way, ſo as to perform an entire revolution, each of the cables will be twiſted round the other, and then directed out from the oppoſite bow, forming what is called a round turn. An elbow is produced when the ſhip ſtops in the middle of that revolution, after having had a croſs: or, in other words, if ſhe rides with her head northward with a clear hawſe, and afterwards turns quite round ſo as to direct her head northward again, ſhe will have an elbow.

HAWSE-Holes, certain cylindrical holes cut through the bows of a ſhip on each ſide of the ſtem, through which the cables paſs in order to be drawn into or let out of the veſſel as occaſion requires. They are fortified on each ſide by the

HAWSE-Pieces, a name given to the foremoſt timbers of a ſhip, whoſe lower ends reſt on the knuckle-timber, or the foremoſt of the cant-timbers. They are generally parallel to the ſtem, having their upper ends ſometimes terminated by the lower part of the beak-head; and otherwiſe by the top of the bow, particularly in ſmall ſhips and merchantmen.

HAWSER, a large rope which holds the middle degree between the *cable* and *tow-line*, in any ſhip whereto it belongs, being a ſize ſmaller than the former, and as much larger than the latter. Hawſer || Hayward.

HAY, any kind of graſs cut and dried for the food of cattle. See AGRICULTURE *Index*.

HAY, a town of Brecknockſhire, in Wales, ſeated near the confluence of the rivers Wye and Dulas. It was a town of good note in the time of the Romans; it being then fortified with a caſtle and a wall, which were ruined in the rebellion of Owen Glendower. It is at preſent a pretty good town; and the market is large for corn, cattle, and proviſions. W. Long. 0. 56. N. Lat. 52. 10.

HAYES, CHARLES, Eſq. a very ſingular perſon, whoſe great erudition was ſo concealed by his modeſty, that his name is known to very few, though his publications are many. He was born in 1678, and became diſtinguiſhed in 1704 by A Treatiſe of Fluxions, folio; the only work to which he ever ſet his name. In 1710, came out a ſmall 4to pamphlet of 19 pages, intitled, A new and eaſy Method to find out the Longitude, from obſerving the Altitudes of the Celeſtial Bodies: and in 1723, The Moon, a Philoſophical Dialogue; tending to ſhow, that the moon is not an opaque body, but has original light of her own. During a long courſe of years, the management of the late Royal African Company lay in a manner wholly upon Mr Hayes, he being annually either ſub-governor or deputy-governor; notwithſtanding which, he continued his purſuit after general knowledge. To a ſkill in the Greek and Latin as well as modern languages, he added the knowledge of the Hebrew: and publiſhed ſeveral pieces relating to the tranſlation and chronology of the Scriptures. The African Company being diſſolved in 1752, he retired to Down in Kent, where he gave himſelf up to ſtudy. May 1753, he began to compile in Latin his *Chronographia Aſiatica, et Ægyptiaca*, which he lived to finiſh but not to publiſh; which, however, was publiſhed afterwards. Auguſt 1758, he left his houſe in Kent, and took chambers in Gray's-Inn, where he died, Dec. 18. 1760, in his 82d year. The title of his poſthumous works runs thus: *Chronographiæ Aſiaticæ et Egyptiacæ Specimen; in quo, 1. Origo Chronologiæ LXX Interpretum inveſtigatur. 2. Conſpectus totius operis exhibetur*, 8vo.

HAYNAULT. See HAINAULT.

HAYS, particular nets for taking rabbits, hares, &c. common to be bought in ſhops that ſell nets, and they may be had larger or ſhorter as you think fit; from 15 to 20 fathoms is a good length, and for depth a fathom.

As rabbits often ſtraggle abroad about mid-day for freſh graſs, where you perceive a number gone forth to any remote brakes or thickets, pitch two or three of theſe hays about their burrows; lie cloſe there: but in caſe you have not nets enough to incloſe all their burrows, ſome may be ſtopped up with ſtones, &c. Then ſet out with the coney-dog to hunt up and down at a good diſtance, and draw on by degrees to the man who is with you, and lies cloſe by the hay, who may take them as they bolt into it.

HAYWARD, the perſon who keeps the common herd or cattle of a town. He is appointed by the lord's

Hazael || Hazle.

court; and his office is to ſee that the cattle neither break nor crop the hedges of incloſed grounds.

HAZAEL, an officer belonging to Benhadad king of Syria, cauſed that prince to be put to death, and reigned in his ſtead. He defeated Joram, Jehu, and Jehoahaz, kings of Iſrael; and, after his death, was ſucceeded by Benhadad his ſon, 852 B. C.

HAZARD, or CHANCE, in gaming. See GAMING.

HAZARD, a game on dice, without tables, is very properly ſo called; ſince it ſpeedily makes a man, or undoes him.

It is played with only two dice; and as many may play at it as can ſtand round the largeſt round table.

Two things are chiefly to be obſerved, viz. main and chance; the latter belonging to the caſter, and the former, or main, to the other gameſters. There can be no main thrown above nine, nor under five; ſo that five, ſix, ſeven, eight, and nine, are the only mains ſtung at hazard. Chances and nicks are from four to ten: thus four is a chance to nine, five to eight, ſix to ſeven, ſeven to ſix, eight to five; and nine and ten a chance to five, ſix, ſeven, and eight: in ſhort, four, five, ſix, ſeven, eight, nine, and ten, are chances to any main, if any of theſe nick it not. Now nicks are either when the chance is the ſame with the main, as five and five, or the like; or ſix and twelve, ſeven and eleven, eight and twelve. Here obſerve, that twelve is out to nine, ſeven, and five; eleven is out to nine, eight, ſix, and five; and ames-ace and duce-ace, are out to all mains whatever.

HAZLE, or HAZEL. See CORYLUS, BOTANY *Index*.

The kernels of the fruit have a mild, farinaceous, oily taſte, agreeable to moſt palates. Squirrels and mice are fond of them, as well as ſome birds, ſuch as jays, nutcrackers, &c. A kind of chocolate has been prepared from them, and there are inſtances of their having been formed into bread. The oil expreſſed from them is little inferior to the oil of almonds; and is uſed by painters and by chemiſts for receiving and retaining odours. The charcoal made of the wood is uſed by painters in drawing.—Some of the Highlanders, where ſuperſtition has not totally ſubſided, look upon the tree itſelf as unlucky; but are glad to get two of the nuts naturally conjoined, which is a good omen. Theſe they call *eno-chomhlaich*, and carry them as an efficacious charm againſt witchcraft.

Evelyn tells us, that no plant is more proper for thickening of copſes than the hazle, for which he directs the following expeditious method. Take a pole of hazle (aſh or poplar may alſo be uſed) of 20 or 30 feet in length, the head a little lopped into the ground, giving it a chop near the ground to make it ſuccumb; this faſtened to the earth with a hook or two, and covered with ſome freſh mould at a competent depth (as gardeners lay their carnations), will produce a great number of ſuckers, and thicken and furniſh a copſe ſpeedily.

HAZLE Earth, or *Hazley Earth*, a kind of red loam, which is ſaid to be an excellent mixture with other ſorts of earth; uniting what is too looſe, cooling what is too hot, and gently retaining the moiſture.

Witch-HAZLE. See HAMAMELIS.

HEAD, the uppermoſt or foremoſt part of the body of an animal. See ANATOMY *Index*. Head.

HEAD-Ach, a moſt troubleſome ſenſation in the head, produced by various cauſes, and attended with different ſymptoms, according to its different degrees and the place where it is ſeated. See MEDICINE *Index*.

Dragon's HEAD, in *Aſtronomy*, is the aſcending node of the moon or other planet.

HEAD of a Ship, an ornamental figure erected on the continuation of a ſhip's ſtem, as being expreſſive of her name, and emblematical of war, navigation, commerce, &c.

HEAD, is alſo uſed in a more enlarged ſenſe to ſignify the whole front or fore part of the ſhip, including the bows on each ſide: the head therefore opens the column of water through which the ſhip paſſes when advancing. Hence we ſay, head-ſails, head-ſea, head-way, &c.

Thus, fig. 1. Plate CCL. repreſents one ſide of the fore part or head of a 74 gun ſhip, together with part of the bow, keel, and gunnel. The names of the ſeveral pieces, exhibited therein, are as follow:

AA Fore part of the keel, with *a a* the two falſe keels beneath it.

AC the ſtem.

a a The cat-head.

b b The ſupporter of the cat-head.

c c The knight-head, or bollard-timber, of which there is one on each ſide, to ſecure the inner end of the bowſprit.

d d The hauſe-holes.

e e The naval-hoods, i. e. thick pieces of plank laid upon the bow to ſtrengthen the edges of the hauſe-holes.

f The davit-chock, by which the davit is firmly wedged while employed to fiſh the anchor.

g The bulk-head, which terminates the forecaſtle on the fore ſide, being called the *beak-head*, *bulk-head*, by ſhipwrights.

H The gun-ports of the lower deck.

h The gun-ports of the upper deck and forecaſtle.

I, I, The channel, with their dead-eyes and chain-plates.

i The gripe, or fore foot, which unites the keel with the ſtem, forming a part of either.

k k Theſe dotted lines repreſent the thickneſs and deſcent of the different decks from the fore part of the ſhip towards the middle. The loweſt of the three dotted lines *l* expreſſes the convexity of the beams, or the difference between the height of the deck in the middle of its breadth and at the ſhip's ſide. This is alſo exhibited more clearly in the *MIDSHIP-Frame*; where the red curve of the beam is delineated. N. B. Theſe lines muſt be always parallel to the lines which terminate the gun-ports above and below.

m m The timbers of the head, and part of the bowſprit.

X The rails of the head which lie acroſs the timbers.

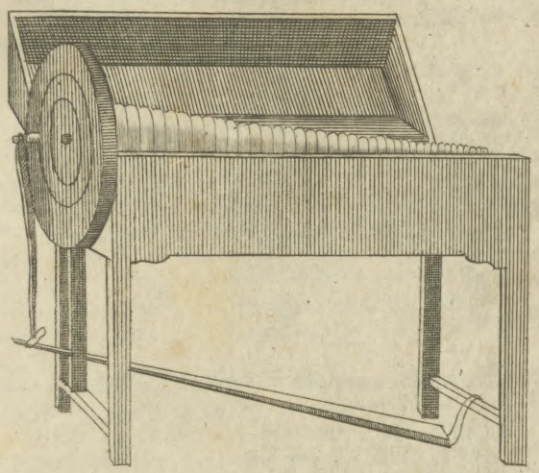
QZ Fore part of the main-wale.

RX Fore part of the channel-wale.

UC The load water-line.

Fig. 2. repreſents a head-view of a ſhip, with the projection

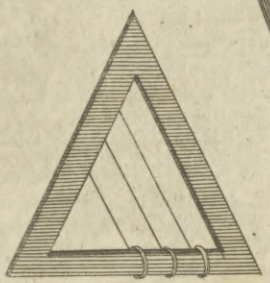
Harmonica.



Harps.

N.o 1.

N.o 3.



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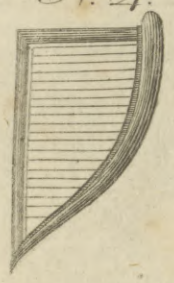

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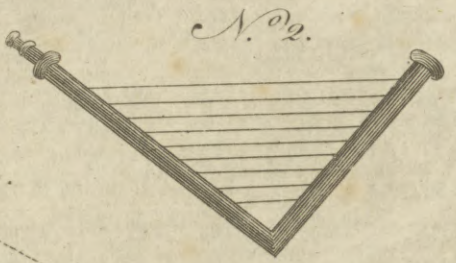

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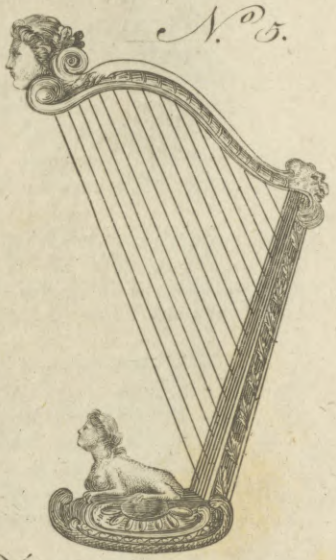
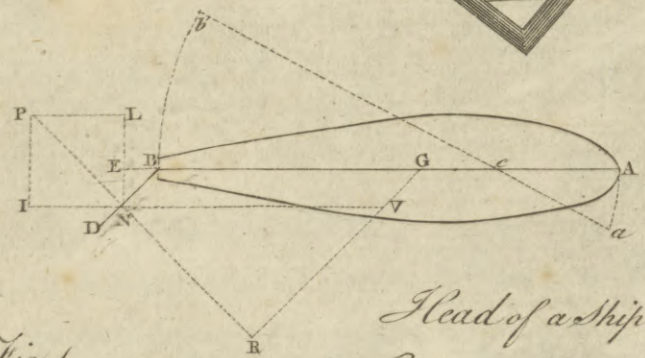


Helm.



Head of a Ship.

Fig. 1.

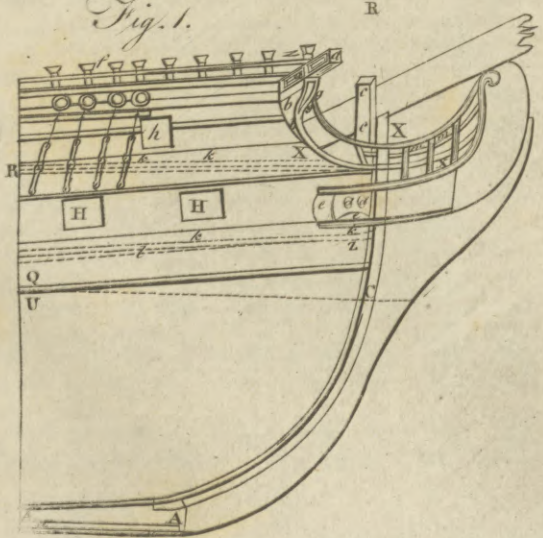
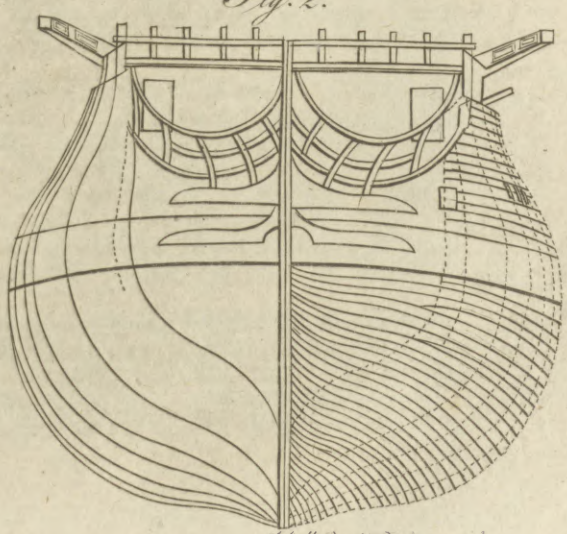
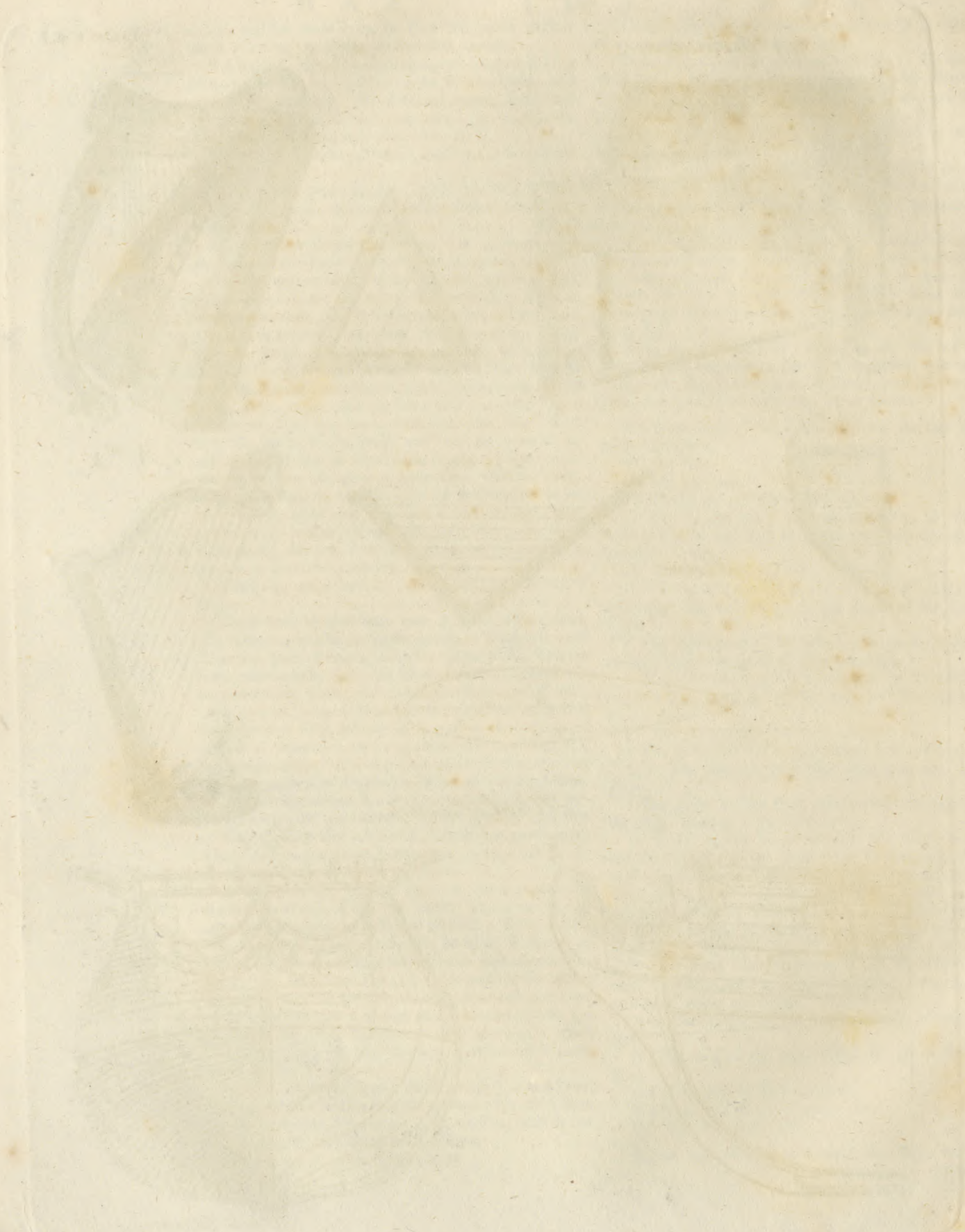


Fig. 2.



A. Bell. Prin. Wal. Sculptor fecit.



Head. projection of her principal timbers and all her planks laid on one ſide.

It is evident that the fore part of a ſhip is called its *head*, from the affinity of motion and poſition it bears to a fiſh, and in general to the horizontal ſituation of all animals whilſt ſwimming.

By the HEAD; the ſtate of a ſhip, which is laden deeper at the fore end than the after end.

HEAD-*Borow*, or HEAD-*Borough*, ſignifies the perſon who is the chief of the frank pledge, and had anciently the principal direction of thoſe within his own pledge. He was alſo called *burrow-head*, *burſhoulder*, now *borſholder*, *third-borow*, *tything-man*, *chief pledge*, and *borow-elder*, according to the diverſity of ſpeech in different places. This office is now uſually called a *high-conſtable*. The head-borow was the chief of ten pledges: the other nine were called *hand-borows*, or *plegii manuales*, &c.

HEAD-*Mould-ſhot*, a diſeaſe in children, wherein the ſutures of the ſkull, generally the coronal, *ride*; that is, have their edges ſhot one over another; and are ſo cloſe locked together, as to compreſs the internal parts, the meninges, or even the brain itſelf. The diſeaſe uſually occaſions convulſions, and is ſuppoſed to admit of no cure from medicine, unleſs room could be given by manual operation or a divulſion of the ſutures.

The head-mould-ſhot is the diſorder oppoſite to the horſe-ſhoe head.

HEAD-*Pence*, an exaction of a certain ſum formerly collected by the ſheriff of Northumberland from the inhabitants of that county, without any account to be made to the king. This was aboliſhed by the ſtatute 23 Henry VI. cap. 7.

HEAD-*Tin*, in *Metallurgy*, is a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice waſhed, that part of it which lies uppermoſt, or makes the ſurface of the maſs in the tub, is called the *head-tin*; this is ſeparated from the reſt, and after a little more waſhing becomes fit for the blowing-houſe.

HEAD-*Faſt*, a rope employed to faſten a ſhip to a wharf, chain, or buoy, or to ſome other veſſel alongſide.

HEAD-*Land*, a name frequently given to a cape or promontory.

HEAD-*Dreſs*, amongſt the Jewiſh, Grecian, and Roman ladies, as among ourſelves, was various, according to the different periods of time, and the fluctuation of faſhion. In general, it principally conſiſted of their hair differently tricked out. It was uſually divided before with a bodkin, into two equal parts; ſometimes it was covered with a net, or put into a kind of purſe, or tied behind in the form of a knot, or bound back and plaited with ribbands. It was waſhed with great care; eſſence and perfumes were applied to it, and gold duſt ſometimes made uſe of as powder. Pearls and jewels made a part of their ornaments; and pendants worn in the ear. To cover the defect of hair, perukes were made uſe of by the gentlemen of Rome. And we read that Otho had a covering of falſe hair, becauſe he had not much of his own. See HAIR and JEWELS.

Both Grecian and Roman ladies wore têtes. But whether they ever built up their heads ſo high as the Engliſh, or our continental neighbours, will admit of a diſpute. Headmoſt Health.

HEADMOST, the ſituation of any ſhip or ſhips which are the moſt advanced in a fleet, or line of battle.

Head-Rope, that part of the bolt-rope which terminates any of the principal ſails on the upper edge, which is accordingly ſewed thereto. See the article BOLT-ROPE.

Head-Sails, a general name for all thoſe ſails which are extended on the foremaſt and bowſprit, and employed to command the fore part of the ſhip: ſuch are the foreſail, fore-top-ſail, fore-top-gallant-ſail, jib, foreſtay-ſail, and the ſpritſail, with its topſail. This term is uſed in oppoſition to *after-ſails*, viz. all thoſe which are extended on the mizen-maſt, and on the ſtays between the mizen and main-maſts.

HEAD-*to-wind*; the ſituation of a ſhip or boat, when her head is turned to windward.

HEAD-*Way*, the motion of advancing at ſea. It is generally uſed when a ſhip firſt begins to advance; or when it is doubtful whether ſhe is in a ſtate of reſt or motion. It is in both ſenſes oppoſed to retreating, or moving with the ſtern foremoſt. See the article STERNWAY.

HEALFANG, HEALSFANG, or HALSFANG, in our ancient cuſtoms, ſignifies *colliſtrigium* or the puniſhment of the pillory. The word is compounded of two Saxon words; *halp*, *neck*, and *pangen*, "to contain:" *Pœna ſcilicet qua alicui collum ſtringatur*. The healfang, however, cannot ſignify a pillory in the charter of Canutus, De Foreſtis, cap. xiv. *Et pro culpa ſolvat regi duos ſolidos, quos Dani vocant* halfehang.

HEALFANG is alſo taken for a pecuniary puniſhment or mulct to commute for ſtanding in the pillory; and is to be paid either to the king or the chief lord. *Qui falſam teſtimonium dedit, reddat regi vel terræ domino* healfang.

HEALING, in its general ſenſe, includes the whole proceſs of curing or removing a diſorder, and recovering health. In this ſenſe medicine is defined the art of healing. In its more reſtrained ſenſe, as uſed in ſurgery, &c. healing denotes the uniting or conſolidating the lips of a wound or ulcer. The medicines proper for this intention are called *incarnatives*, *agglutinatives*, *vulneraries*, &c.

HEALING, in *Architecture*, denotes the covering the roof of a building. The healing is various; as of lead, tiles, ſlate, Horſham ſtone, ſhingles, or reeds and ſtraw.

HEALTH, is a right diſpoſition of the body, and of all its parts; conſiſting in a due temperature, a right conformation, juſt connexion, and ready and free exerciſe of the ſeveral vital functions.

Health admits of latitude, as not being the ſame in all ſubjects, who may yet be ſaid to enjoy health.

That part of medicine which ſhows the means of preſerving health, is termed *hygeine*. See MEDICINE *Index*.

The Greeks and Romans deified Health, repreſenting it under the figure of a woman, whom they ſuppoſed to be the daughter of Æſculapius. We find the name of the goddeſs *Salus*, or Health, on many medals of the Roman emperors, with different inſcriptions; as,

Heam ‖ Heart.

as, SALUS PUBLICA, SALUS REIPUBLICÆ, SALUS AUGUSTI, &c.

Methods of preſerving the HEALTH *of Mariners.* See MARINER.

HEAM, in beaſts, denotes the ſame with *after birth* in women. Thyme, pennyroyal, winter-ſavory, and common hore-hound, boiled in white wine, and given to a mare, are eſteemed good to expel the heam. Dittany, applied in a peſſary, expels the heam, as well as the dead foal; ſo alſo do fennel, hops, ſavin, angelica, &c.

HEARING, the act or faculty of perceiving ſounds. Hearing is reckoned among our external ſenſes. Its organ is the ear, and particularly the auditory nerve diffuſed through the ſame; and its object, certain motions or vibrations of the air. Hence hearing may be more ſcientifically defined a ſenſation, whereby, from a due motion impreſſed on the fibrillæ of the auditory nerve, and communicated thence to the ſenſory, the mind perceives and gets the idea of ſounds. See ANATOMY, N° 141.

HEARSE, among hunters, a hind in the ſecond year of her age. See HUNTING.

HEARSE is the name of a well-known carriage, uſed for conveying the dead to the grave. The word is alſo uſed by Shakeſpeare in his Henry VI. for a monument erected over a grave.

HEART, in *Anatomy*, a muſculous part of the animal body, ſituated in the thorax, on the anterior part of the diaphragm, between the two laminæ of the mediaſtinum, wherein the veins all terminate, and from which all the arteries ariſe; and which, by its alternate contraction and dilatation, is the chief inſtrument of the circulation of the blood, and the principle of life. See ANATOMY, N° 121, 122.

Several ingenious perſons have from time to time attempted to make eſtimates of the force of the blood in the heart and arteries; who have as widely differed from each other, as they have from the truth, for want of a ſufficient number of data to argue upon. This ſet the truly ingenious Dr Hales upon making proper experiments, in order to aſcertain the force of the blood in the veins and arteries of ſeveral animals.

If, according to Dr Keil's eſtimate, the left ventricle of a man's heart throws out in each ſyſtole an ounce or 1.638 cubic inches of blood, and the area of the orifice of the aorta be = 0.4187, then dividing the former by this, the quotient 3.9 is the length of the cylinder of blood which is formed in paſſing through the aorta in each ſyſtole of the ventricle; and in the 75 pulſes of a minute, a cylinder of 292.5 inches in length will paſs: this is at the rate of 1462 feet in an hour. But the ſyſtole of the heart being performed in one-third of this time, the velocity of the blood in that inſtant will be thrice as much, viz. at the rate of 4386 feet in an hour, or 73 feet in a minute. And if the ventricle throws out one ounce in a pulſe, then in the 75 pulſes of a minute, the quantity of blood will be equal to 4.4 lb. 11 oz. and, in 34 minutes, a quantity equal to a middle-ſized man, viz. 158lb. will paſs through the heart. But if, with Dr Harvey and Dr Lower, we ſuppoſe two ounces of blood, that is, 3.276 cubic inches, to be thrown out at each ſyſtole of the ventricle, then the velocity of the blood in entering the orifice of the aorta will be double the former, viz. at the rate of 146 feet in a minute, and a quantity of blood equal to the weight of a man's body will paſs in half the time, viz. 17 minutes. Heart.

If we ſuppoſe, what is probable, that the blood will riſe $7+\frac{1}{2}$ feet high in a tube fixed to the carotid artery of a man, and that the inward area of the left ventricle of his heart is equal to 15 ſquare inches, theſe multiplied into $7+\frac{1}{2}$ feet, give 1350 cubic inches of blood, which preſſes on that ventricle, when it firſt begins to contract, a weight equal to 15.5 pounds.

What the doctor thus calculates, from ſuppoſition, with regard to mankind, he actually experimented upon horſes, dogs, fallow-does, &c. by fixing tubes in orifices opened in their veins and arteries; by obſerving the ſeveral heights to which the blood roſe in theſe tubes, as they lay on the ground; and by meaſuring the capacities of the ventricles of the heart and orifices of the arteries. And, that the reader may the more readily compare the ſaid eſtimates together, he has given a table of them, ranged in the following order.

TABLE

Heart ‖ Heat.

Heart

The ſeveral animals.	Weight of each.	Height of the blood in the tube from the jugular vein.	Height of the blood in tubes fixed to arteries.	Capacity of the left ventricle of the heart.	Area of the orifice of the aorta.	Velocity of the blood in the aorta.	Quantities of blood equal to the weight of the animal, in what time.	How much in a minute.	Weight of the blood ſuſtained by the left ventricle contracting.	N° of pulſes in a minute.	Area of tranſverſe ſection of deſcending aorta.	Area of the tranſverſe ſection of aſcending aorta.
	Pounds. Ounces.	Inches.	Feet. Inches.	Cubic Inches.	Square inches.	Feet and inches in a minute.	Minutes.	Pounds.	Pounds.		Square inches.	Square inches.
Man	160	On ſtraining.	7 6	1.659	0.4187	56.55	34.18	4.38	51.5	75		
				3.318		113.3	17.5	9.36				
Horſe 1ſt			8 3									
2d			9 8									
3d	825	12 52	9 6	10	1.036	86.85	60	13.75	113.22	86	0.677	0.369
Ox	1600			12.5	1.539	76.95	88	18.14		38	0.912	0.84
												right. left.
Sheep	91	5½ 9	6 5½	1 85	0.172	174.5	20	4.593	36.56	65	0.094	0.07 0.012
Doe			4 2	9	0.476						0.383	0.246
												right. left.
Dogs 1ſt	52	0 6	6 8	1.172	0.196	144.77	11.9	4.34	33.61	97	0.106	0.041 0.034
2d	24	5 7	2 8	1	0.185	130.9	6.48	3.7			0.102	0.031 0.009
3d	18	5	4 8	0.633	0.118	130	7.8	2.3	19.8		0.07	0.022 0.009
4th	12 8	4	3 3	0.5	0.101	120	6.7	1.85	11.1		0.061	0.015 0.007

Heart-Burn, a diſeaſe uſually called *cardialgia* by phyſicians. In ſurfeits, or upon ſwallowing without due maſtication; when meats are eaten tough and fat, or with farinaceous ſubſtances unfermented; or when by any accident the ſaliva is vitiated, too ſcanty, or not intimately mixed with the food, the fermentation becomes tumultuous, the ſtomach ſwells with air, and this extraordinary commotion being attended with an unuſual heat, brings on the uneaſineſs called the *heart-burn;* which is remedied by whatever promotes a greater ſecretion of ſaliva, or helps to mix it with our aliment. The teſtaceous powders, as oyſter-ſhells, crabs-eyes, chalk, &c. are the uſual remedies for the heart-burn.

HEARTH, that part of the pavement of a room on which the fire is immediately placed.

Hearth-Money. See *Chimney-Money.*

HEAT, in *Phyſiology*, has a double meaning; being put either for that peculiar ſenſation which is felt on the approach of burning bodies, or for the cauſe of that ſenſation; in which laſt ſenſe it is ſynonymous with Fire. This mode of ſpeaking, however, is inaccurate, and, by confounding the effect with the cauſe, ſometimes produces obſcurity: it were to be wiſhed therefore that the word *heat* was uſed only to denote the effect; and *fire*, or ſome other term, to denote the cauſe of that effect.

The diſputes which formerly were ſo much agitated in the learned world concerning the nature of heat, viz. whether it conſiſted merely in the motion of the terreſtrial particles of bodies, or in that of a ſubtile fluid, are now moſtly ceaſed, and it is almoſt univerſally believed to be the effect of a fluid. See Chemistry *Index.*

Heat of Burning Bodies. } See Combustion, Che-
Heat of Chemical Mixtures. } mistry *Index.*

Method of Meaſuring Heat. See Thermometer and Pyrometer, Chemistry *Index.*

Degrees of Heat which Animals are capable of bearing.—The ancients were of opinion, that all countries lying within the tropics were uninhabitable by reaſon of their heat: but time has diſcovered their miſtake; and it is now found, that no part of the world is too hot for mankind to live in. The learned Profeſſor Boerhaave, in his chemiſtry, relates certain experiments made with great accuracy by the celebrated Fahrenheit, and others, at his deſire, on this ſubject, in a ſugar-baker's office; where the heat, at the time of making the experiments, was up to 146 degrees of Fahrenheit's thermometer. A ſparrow, ſubjected to air thus heated, died, after breathing very laborioufly, in leſs than ſeven minutes. A cat reſiſted this great heat ſomewhat above a quarter of an hour; and a dog about 28 minutes, diſcharging before his death a conſiderable quantity of a ruddy coloured foam, and exhaled a ſtench ſo peculiarly offenſive, as to throw one of the aſſiſtants into a fainting fit. This diſſolution of the humours, or great change from a natural

Heat. ſtate, the profeſſor attributes not to the heat of the ſtove alone, which would not have produced any ſuch effect on the fleſh of a dead animal; but likewiſe to the vital motion, by which a ſtill greater degree of heat, he ſuppoſes, was produced in the fluids circulating through the lungs, in conſequence of which the oils, ſalts, and ſpirits of the animal became ſo highly exalted.

Meſſieurs Du Hamel and Tillet having been ſent into the province of Augomois, in the years 1760 and 1761, with a view of endeavouring to deſtroy an inſect which conſumed the grain of that province, effected the ſame in the manner related in the Memoirs for 1761, by expoſing the affected corn, with the inſects included in it, in an oven, where the heat was ſufficient to kill them without injuring the grain. This operation was performed at Rochefoucault, in a large public oven, where, for economical views, their firſt ſtep was to aſſure themſelves of the heat remaining in it on the day after bread had been baked in it. This they did, by conveying in a thermometer on the end of a ſhovel, which, on its being withdrawn, indicated a degree of heat conſiderably above that of boiling water; but M. Tillet, convinced that the thermometer had fallen ſeveral degrees in drawing to the mouth of the oven, and appearing under ſome embarraſſment on that head, a girl, one of the attendants on the oven, offered to enter, and mark with a pencil the height at which the thermometer ſtood within the oven. The girl ſmiled on M. Tillet's appearing to heſitate at this ſtrange propoſition; and entering the oven, with a pencil given her for that purpoſe, marked the thermometer, after ſtaying two or three minutes, ſtanding at 100 degrees of Reaumur's ſcale, or, to make uſe of a ſcale better known in this country, at near 260 degrees of Fahrenheit's. M. Tillet began to expreſs an anxiety for the welfare of his female aſſiſtant, and to preſs her return. This female ſalamander, however, aſſuring him that ſhe felt no inconvenience from her ſituation, remained there 10 minutes longer; that is, near the time when Boerhaave's cat parted with her nine lives under a much leſs degree of heat; when the thermometer ſtanding at 288 degrees, or 76 degrees above that of boiling water, ſhe came out of the oven, her complexion indeed conſiderably heightened, but her reſpiration by no means quick or laborious. After M. Tillet's return to Paris, theſe experiments were repeated by Monſ. Marantin, commiſſaire de guerre, at Rochefoucault, an intelligent and accurate obſerver, on a ſecond girl belonging to the oven, who remained in it, without much inconvenience, under the ſame degree of heat, as long as her predeceſſor; and even breathed an air heated to about 325 degrees for the ſpace of five minutes.

M. Tillet endeavoured to clear up the very apparent contrariety between theſe experiments and thoſe made under the direction of Boerhaave, by ſubjecting various animals, under different circumſtances, to great degrees of heat. From his experiments, in ſome of which the animals were ſwaddled with clothes, and were thereby enabled to reſiſt for a much longer time the effects of the extraordinary heat, he infers, that Heat. the heat of the air received into the lungs was not, as was ſuppoſed by Boerhaave, the only or principal cauſe of the anxiety, laborious breathing, and death, of the animals on whom his experiments were made; but that the hot air, which had free and immediate acceſs to every part of the ſurface of their bodies, penetrated the ſubſtance on all ſides, and brought on a fever, from whence proceeded all the ſymptoms: on the contrary, the girls at Rochefoucault, having their bodies in great meaſure protected from this action by their clothes, were enabled to breathe the air, thus violently heated, for a long time without great inconvenience. In fact, we ſhould think too, that the bulk of their bodies, though not thought of much conſequence by M. Tillet, appears to have contributed not a little to their ſecurity. In common reſpiration, the blood, in its paſſage through the lungs, is cooled by being brought into contact with the external inſpired air. In the preſent experiments, on the contrary, the veſicles and veſſels of the lungs receiving at each inſpiration an air heated to 300 degrees, muſt have been continually cooled and refreſhed, as well as the ſubcutaneous veſſels, by the ſucceſſive arrival of the whole maſs of blood contained in the interior parts of the body, whoſe heat might be ſuppoſed at the beginning of the experiment not to exceed 100 degrees. Not to mention, that M. Tillet's two girls may not poſſibly have been ſubjected to ſo great a degree of heat as that indicated by the thermometer; which appears to us to have always remained on the ſhovel, in contact with the earth.

Theſe experiments ſoon excited other philoſophers to make ſimilar ones, of which ſome very remarkable ones are thoſe of Dr Dobſon at Liverpool, who gives the following account of them in the Philoſophical Tranſactions, vol. lxv.

"I. The ſweating-room of our public hoſpital at Liverpool, which is nearly a cube of nine feet, lighted from the top, was heated till the quickſilver ſtood at 224° on Fahrenheit's ſcale, nor would the tube of the thermometer indeed admit the heat to be raiſed higher. The thermometer was ſuſpended by a ſtring fixed to the wooden frame of the ſky-light, and hung down about the centre of the room. Myſelf and ſeveral others were at this time incloſed in the ſtove, without experiencing any oppreſſive or painful ſenſation of heat proportioned to the degree pointed out by the thermometer. Every metallic ſubſtance about us ſoon became very hot.

"II. My friend Mr Park, an ingenious ſurgeon of this place, went into the ſtove heated to 202°. After ten minutes, I found the pulſe quicked to 120. And to determine the increaſe of the animal heat, another thermometer was handed to him, in which the quickſilver already ſtood at 98°; but it roſe only to 99½, whether the bulb of the thermometer was incloſed in the palms of the hands or received in the mouth (A). The natural ſtate of this gentleman's pulſe is about 65.

"III. Another gentlman went through the ſame experiment

(A) The ſcale of the thermometer, which was ſuſpended by the ſtring about the middle of the room, was of metal;

Heat. experiment in the ſame circumſtances, and with the ſame effects.

" IV. One of the porters to the hoſpital, a healthy young man, and the pulſe 75, was incloſed in the ſtove when the quickſilver ſtood at 210°; and he remained there, with little inconvenience, for 20 minutes. The pulſe, now 164, and the animal heat, determined by another thermometer as in the former experiments, was 101½.

" V. A young gentleman of a delicate and irritable habit, whoſe natural pulſe is about 80, remained in the ſtove ten minutes when heated to 224°. The pulſe roſe to 145, and the animal heat to 102°. This gentleman, who had been frequently in the ſtove during the courſe of the day, found himſelf feeble, and diſpoſed to break out into ſweats for 24 hours after the experiment.

" VI. Two ſmall tin veſſels, containing each the white of an egg, were put into the ſtove heated to 224°. One of them was placed on a wooden ſeat near the wall, and the other ſuſpended by a ſtring about the middle of the ſtove. After ten minutes, they began to coagulate; but the coagulation was ſenſibly quicker and firmer in that which was ſuſpended, than in that which was placed on the wooden ſeat. The progreſs of the coagulation was as follows: it was firſt formed on the ſides, and gradually extended itſelf; the whole of the bottom was next coagulated; and laſt of all, the middle part of the top.

" VII. Part of the ſhell of an egg was peeled away, leaving only the film which ſurrounds the white; and part of the white being drawn out, the film ſunk ſo as to form a little cup. This cup was filled with ſome of the *albumen ovi*, which was conſequently detached as much as poſſible from every thing but the cup. The lower part of the egg ſtood upon ſome light tow in a common gallipot, and was placed on the wooden ſeat in the ſtove. The quickſilver in the thermometer ſtill continued at 224°. After remaining in the ſtove for an hour, the lower part of the egg which was covered with the ſhell was firmly coagulated, but that which was in the little cup was fluid and tranſparent. At the end of another hour it was ſtill fluid, except on the edges where it was thinneſt; and here it was ſtill tranſparent; a ſufficient proof that it was dried, not coagulated.

" VIII. A piece of bees-wax, placed in the ſame ſituation with the *albumen ovi* of the preceding experiment, and expoſed to the ſame degree of heat in the ſtove, began to melt in five minutes: another piece ſuſpended by a ſtring, and a third piece put into the tin veſſel and ſuſpended, began likewiſe to liquefy in five minutes.

Even theſe experiments, though more accurate than the former, do not ſhow the utmoſt degrees of heat which the human body is capable of enduring. Some others, ſtill more remarkable (as in them the body was expoſed to the heat without clothes), by Drs Fordyce and Blagden, are alſo recorded in the Philoſophical Tranſactions. They were made in rooms heated by flues in the floor, and by pouring upon it boiling water. There was no chimney in them, or any vent for the air, excepting through crevices at the door. In the firſt room were placed three thermometers, one in the hotteſt part of it, another in the cooleſt part, and a third on the table, to be uſed occaſionally in the courſe of the experiment. Of theſe experiments, the two following may be taken as a ſpecimen. Heat.

" About three hours after breakfaſt, Dr Fordyce having taken off all his clothes, except his ſhirt, and being furniſhed with wooden ſhoes tied on with liſt, went into one of the rooms, where he ſtaid five minutes in a heat of 90°, and begun to ſweat gently. He then entered another room, and ſtood in a part of it heated to 110°. In about half a minute his ſhirt became ſo wet that he was obliged to throw it aſide, and then the water poured down in ſtreams over his whole body. Having remained in this heat for ten minutes, he removed to a part of the room heated to 120°; and after ſtaying there 20 minutes, found that the thermometer placed under his tongue, and held in his hand, ſtood juſt at 100°, and that his urine was of the ſame temperature. His pulſe had gradually riſen to 145 pulſations in a minute. The external circulation was greatly increaſed, the veins had become very large, and an univerſal redneſs had diffuſed itſelf all over the body, attended with a ſtrong feeling of heat; his reſpiration, however, was little affected. He concluded this experiment by plunging in water heated to 100°; and after being wiped dry, was carried home in a chair; but the circulation did not ſubſide for two hours.

" Dr Blagden took off his coat, waiſtcoat, and ſhirt, and went into one of the rooms, as ſoon as the thermometer had indicated a degree of heat above that of boiling water. The firſt impreſſion of this hot air upon his body was exceedingly diſagreeable, but in a few minutes all his uneaſineſs was removed by the breaking out of a ſweat. At the end of 12 minutes he left the room very much fatigued, but no otherwiſe diſordered. His pulſe beat 136 in a minute, and the thermometer had riſen to 220 degrees.

In others of theſe experiments it was found, that a heat even of 260° of Fahrenheit's thermometer could be ſubmitted to with tolerable eaſe. But it muſt be obſerved, that in theſe great heats every piece of metal they carried about with them became intolerably hot. Small quantities of water placed in metalline veſſels quickly boiled; but in a common earthen veſſel it required an hour and an half to arrive at a temperature of 140°, nor could it ever be brought near the boiling point. Neither durſt the people, who with impunity breathed the air of this very hot room at 264 degrees, bear to put their fingers into the boiling water, which indicated only a heat of 212°. So far

metal; this was the only one I could then procure on which the degrees ran ſo high as to give any ſcope to the experiment. The ſcale of the other thermometer, which was employed for aſcertaining the variations in the animal heat, was of ivory.

Heat. from this, they could not bear the touch of quickſilver heated only to 120°, and could but juſt bear ſpirit of wine at 130°.

Animal HEAT. Of this there are various degrees; ſome animals preſerving a heat of 100° or more in all the different temperatures of the atmoſphere; others keep only a few degrees warmer than the medium which ſurrounds them; and in ſome of the more imperfect animals, the heat is ſcarcely one degree above the air or water in which they live.

The phenomenon of animal heat hath, from the earlieſt ages, been the ſubject of philoſophical diſcuſſion; and, like moſt other ſubjects of this nature, its cauſe is not yet aſcertained. The beſt treatiſes that have appeared on the ſubject are thoſe of Dr Dugud Leſlie, publiſhed in 1778; and Mr Adair Crawford, in 1779. From the firſt of theſe performances, the following account of the different opinions on this ſubject is extracted.

"The ancients poſſeſſed not the requiſites for minutely inveſtigating the ſcience of nature; and, prone to ſuperſtition, attributed every phenomenon which eluded their inveſtigation to the influence of a ſupernatural power. Hippocrates, the father and founder of medicine, accounted animal heat a myſtery, and beſtowed on it many attributes of the Deity. In treating of that ſubject, he ſays in expreſs terms, "what we call heat, appears to me to be ſomething immortal, which underſtands, ſees, hears, and knows every thing preſent and to come."—Ariſtotle ſeems to have conſidered the ſubject particularly, but nothing is to be met with in his works that can be ſaid to throw light upon it.—Galen tells us that the diſpute between the philoſophers and phyſicians of his time was, "whether animal-heat depended on the motion of the heart and arteries; or whether, as the motion of the heart and arteries was innate, the heat was not alſo innate." Both theſe opinions, however, he rejects; and attempts a ſolution of the queſtion on his favourite ſyſtem, namely, the peripatetic philoſophy: but his leading principles being erroneous, his deductions are of courſe inadmiſſible.

"To enter into a minute detail of all the opinions offered by the moderns on the cauſe of animal-heat, would far exceed our limits. Moſt of them, however, may be referred to one or other of the three general cauſes of heat, viz. mixture, fermentation, and mechanical means, or friction. See CHEMISTRY *Index*.

Internal HEAT *of the Earth.* It was formerly ſuppoſed that the heat of the earth increaſed in proportion to the depth from the ſurface; but this hypotheſis proceeded from imperfect and inaccurate obſervation, or from the preconceived notion of the exiſtence of central fires. At great depths, it ſeems not impoſſible that the temperature of the earth is uniformly and invariably the ſame; that is, at depths beyond the more immediate influence of the ſun's rays. But at moderate depths, ſo far as obſervation and experiment go, the temperature of the earth is preciſely the ſame as the average temperature of the climate where the obſervation is made. This fact, which is eſtabliſhed by the uniform temperature of ſprings correſponding exactly with the average temperature of the climate, ſeems to be an irreſiſtible argument againſt the opinion of the exiſtence of central fires.

This heat of the earth has been variouſly explained. Some have had recourſe to an immenſe body of fire lodged in the centre of the earth, which they conſider as a central ſun, and the great principle of the generation, vegetation, nutrition, &c. of foſſil and vegetable bodies. But Mr Boyle, who had been at the bottom of ſome mines himſelf, ſuſpects that this degree of heat, at leaſt in ſome of them, may ariſe from the peculiar nature of the minerals generated therein. To confirm this, he inſtances a mineral of a vitriolic kind, dug up in large quantities in many parts of England, which by the bare affuſion of common water will grow ſo hot, that it will almoſt take fire.—Theſe hypotheſes are liable to the following objections: 1. If there is within the earth a body of actual fire, it ſeems difficult to ſhow why that fire ſhould not conſume and moulder away the outer ſhell of earth, till either the earth was totally deſtroyed, or the fire extinguiſhed. 2. If the internal heat of the earth is owing to the action of water upon mineral ſubſtances, that action through time muſt have ceaſed, and the heat have totally vaniſhed; but we have no reaſon to think that the heat of the earth is any thing leſs juſt now than it was a thouſand years ago. If heat is nothing elſe than a certain mode of action in the ethereal fluid, or the matter of light, by which it flows out from a body in all directions as radii drawn from the centre to the circumference of a circle; it will then follow, that if an opaque body abſorbs any conſiderable quantity of light, it muſt neceſſarily grow hot. The reaſon of this is plain. The body can hold no more than a certain quantity of ethereal matter; if more is continually forcing itſelf in, that which has already entered muſt go out. But it cannot eaſily get out, becauſe it is hindered by the particles of the body among which it is detained. It makes an effort therefore in all directions to ſeparate theſe particles from each other; and hence the body expands, and the effort of the fluid to eſcape is felt when we put our hands on the body, which we then ſay is *hot*. Now, as the earth is perpetually abſorbing the ethereal matter, which comes from the ſun in an immenſe ſtream, and which we call his *light*, it is plain that every pore of it muſt have been filled with this matter long ago. The quantity that is lodged in the earth, therefore, muſt be continually endeavouring to ſeparate its particles from each other, and conſequently muſt make it hot. The atmoſphere, which is perpetually receiving that portion of the ethereal matter which iſſues from the earth, counteracts the force of the internal heat, and cools the external ſurface of the earth, and for a conſiderable way down; and hence, it is ſuppoſed, the earth for 20 or 30 feet down ſhows none of that heat which is felt at greater depths. See HEAT.

HEAT, in *Medicine.* Great heats are not ſo much the immediate, as the remote, cauſe of a general ſickneſs, by relaxing the fibres, and diſpoſing the juices to putrefaction; eſpecially among ſoldiers and perſons expoſed the whole day to the ſun: for the greateſt heats are ſeldom found to produce epidemic diſeaſes, till the perſpiration is ſtopped by wet clothes, fogs, dews, damps, &c. and then ſome bilious or putrid diſtemper is the certain conſequence, as fluxes and ardent intermitting fevers. Nevertheleſs, it muſt be allowed, that heats have ſometimes been ſo great as to prove the more immediate cauſe of particular diſorders; as when ſentinels

Heath || Heaven.

sentinels have been placed without cover or frequent reliefs in scorching heats; or when troops march or are exercised in the heat of the day; or when people imprudently lie down and sleep in the sun. All these circumstances are apt to bring on distempers, varying according to the season of the year. In the beginning of summer, these errors produce inflammatory fevers; and in autumn, a remitting fever or dysentery. To prevent, therefore, the effects of immoderate heats, commanders have found it expedient so to order the marches, that the men come to their ground before the heat of the day; and to give strict orders, that none of them sleep out of their tents, which, in fixed encampments, may be covered with boughs to shade them from the sun. It is likewise a rule of great importance to have the soldiers exercised before the cool of the morning is over; for by that means not only the sultry heats are avoided, but the blood being cooled, and the fibres braced, the body will be better prepared to bear the heat of the day. Lastly, in very hot weather, it has often been found proper to shorten the sentinels duty, when obliged to stand in the sun.

HEATH. See ERICA, BOTANY *Index*.

Berry-bearing HEATH. See EMPETRUM, BOTANY *Index*.

HEATH, *James*, an English historian, was born in 1629 at London; where his father, who was the king's cutler, lived. He was educated at Westminster school, and became a student of Christ-church, Oxford, in 1646. In 1648 he was ejected from thence by the parliament visitors for his adherence to the royal cause; lived upon his patrimony till it was almost spent; and then marrying, was obliged to write books and correct the press in order to maintain his family. He died of a consumption and dropsy at London in August 1664, and left several children to the parish. His principal publications were, 1. A brief Chronicle of the late Intestine War in the Three Kingdoms of England, Scotland, and Ireland, &c. 1661, 8vo; afterwards enlarged by the author, and completed from 1637 to 1663, in four parts, 1663, in a thick 8vo. To this was again added a continuation from 1663 to 1675 by John Philips, nephew by the mother to Milton, 1676, folio. 2. Flagellum; or, The Life and Death, Birth and Burial, of Oliver Cromwell, the late Usurper, 1663. The third edition came out with additions in 1665, 8vo. 3. A New Book of Loyal English Martyrs and Confessors, who have endured the Pains and Terrors of Death, Arraignment, &c. for the Maintenance of the just and legal Government of these Kingdoms both in Church and State, 1663, 12mo. The reason why such writers as our author continue to be read, and will probably always be read, is not only because *Historia quoquo modo scripta delectat*; but also because in the meanest historian there will always be found some facts, of which there will be no cause to doubt the truth, and which yet will not be found in the best. Thus Heath, who perhaps had nothing but pamphlets and newspapers to compile from, frequently relates facts that throw light upon the history of those times, which Clarendon, though he drew every thing from the most authentic records, has omitted.

HEATHENS, in matters of religion. See PAGANS.

HEAVEN, literally signifies the expanse of the firmament, surrounding our earth, and extended every way to an immense distance. Heaven.

HEAVEN, among Christian divines and philosophers, is considered as a place in some remote part of infinite space, in which the omnipresent Deity is said to afford a nearer and more immediate view of himself, and a more sensible manifestation of his glory, than in the other parts of the universe. This is often called the *empyrean*, from that splendour with which it is supposed to be invested; and of this place the inspired writers give us the most noble and magnificent descriptions.

The Pagans considered heaven as the residence only of the celestial gods, into which no mortals were admitted after death, unless they were deified. As for the souls of good men, they were consigned to the elysian fields. See *ELYSIAN Fields*.

HEAVEN, among astronomers, called also the ethereal and starry heaven, is that immense region wherein the stars, planets, and comets, are disposed. See ASTRONOMY *Index*.

This is what Moses calls the *firmament*, speaking of it as the work of the second day's creation; at least it is thus the word רקיע is usually rendered by his interpreters; though somewhat abusively, to countenance their own notion of the heavens being firm or solid. The word, it is certain, properly signifies no more than expanse or extension; a term very well adapted by the prophet to the impression which the heavens make on our senses; whence, in other parts of scripture, the heaven is compared to a curtain, or a tent stretched out to dwell in. The LXX first added to this idea of expansion that of firm or solid; rendering it by στερεωμα, according to the philosophy of those times; in which they have been followed by the modern translators.

The latter philosophers, as Des Cartes, Kircher, &c. have easily demonstrated this heaven not to be solid, but fluid; but they still suppose it full, or perfectly dense, without any vacuity, and cantoned out into many vortices.——But others have overturned not only the solidity, but the supposed plenitude, of the heavens. Sir Isaac Newton has abundantly shown the heavens void of almost all resistance, and, consequently, of almost all matter: this he proves from the phenomena of the celestial bodies; from the planets persisting in their motions without any sensible diminution of their velocity; and the comets freely passing in all directions towards all parts of the heavens.

Heaven, taken in a general sense, for the whole expanse between our earth and the remotest regions of the fixed stars, may be divided into two very unequal parts, according to the matter found therein; viz. the atmosphere, or aerial heaven, possessed by air; and the ethereal heaven, possessed by a thin, unresisting medium, called *ether*.

HEAVEN is more particularly used, in *Astronomy*, for an orb, or circular region, of the ethereal heaven.

The ancient astronomers assumed as many different heavens as they observed different motions therein. These they supposed all to be solid, as thinking they could not otherwise sustain the bodies fixed in them; and spherical, that being the most proper form for motion. Thus we had seven heavens for the seven planets, viz. the heavens of the Moon, Mercury, Venus, the Sun, Mars,

Hebdomadary || Hebe.

Mars, Jupiter, and Saturn. The eighth was for the fixed ſtars, which they particularly called the *firmament*. Ptolemy adds a ninth heaven, which he called the *primum mobile*. After him two cryſtalline heavens were added by King Alphonſus, &c. to account for ſome irregularities in the motions of the other heavens: and laſtly, an empyrean heaven was drawn over the whole, for the reſidence of the Deity; which made the number twelve. But others admitted many more heavens, according as their different views and hypotheſes required. Eudoxus ſuppoſed 23, Calippus 30, Regiomontanus 33, Ariſtotle 47, and Fracaſtor no leſs than 70. It muſt be added, however, that the aſtronomers did not much concern themſelves whether the heavens they thus allow of were real or not; provided they ſerved a purpoſe in accounting for any of the celeſtial motions, and agreed with the phenomena.

HEBDOMADARY, HEBDOMADARIUS, or HEBDOMADIUS, a member of a chapter or convent, whoſe week it is to officiate in the choir, to rehearſe the anthems and prayers, and to perform the uſual functions which the ſuperiors perform at ſolemn feaſts, and other extraordinary occaſions. The word is formed of the Greek ἑβδομας, which ſignifies the number *ſeven*; of ἑπτα, *ſeven*.

The hebdomadary generally collates to the benefices which become vacant during his week; though it is uſually looked upon as an abuſe.

In cathedrals, the hebdomadary was a canon or prebendary, who had the peculiar care of the choir, and the inſpection of the officers for his week.

In monaſteries, the hebdomadary is he who waits at table for a week, or other ſtated period; directs and aſſiſts the cook, &c.

HEBDOME, a ſolemnity of the ancient Greeks, in honour of Apollo, in which the Athenians ſung hymns to his praiſe, and carried in their hands branches of laurel. The word ſignifies the *ſeventh day*, this ſolemnity being obſerved on the ſeventh day of every lunar month.

HEBE, in ancient mythology, a goddeſs, the idea of whom, among the Romans, ſeems to have been much the ſame with that of eternal youth, or an immortality of bliſs; agreeably to which, ſhe is repreſented on a gem, in the great duke's collection at Florence, with a young airy look, and drinking out of a little bowl; or, according to Milton's expreſſion, "Quaffing immortality and joy." She is fabled to have been a daughter of Jupiter and Juno. According to ſome ſhe was the daughter of Juno only, who conceived her after eating lettuces. As ſhe was fair and always in the bloom of youth, ſhe was called the goddeſs of youth, and made by her mother cup-bearer to all the gods. She was diſmiſſed from her office by Jupiter, becauſe ſhe fell down in an indecent poſture as ſhe was pouring nectar to the gods at a grand feſtival; and Ganymedes, the favourite of Jupiter, ſucceeded her as cup-bearer. She was employed by her mother to prepare her chariot, and to harneſs her peacocks whenever requiſite. When Hercules was raiſed to the rank of a god, he was reconciled to Juno by marrying her daughter Hebe, by whom he had two ſons, Alexiares and Anicetus. As Hebe had the power of reſtoring gods and men to the vigour of youth, ſhe, at the inſtance of her huſband, performed that kind office to Iolaus his friend. Hebe was worſhipped at Sicyon, under the name of Dia, and at Rome under that of Juventas.

Hebenſtretia || Hebrew.

HEBENSTRETIA, a genus of plants belonging to the didynamia claſs; and in the natural method ranking under the 48th order, *Aggregatæ*. See BOTANY *Index*.

HEBER, the ſon of Salah, and father of Peleg, from whom the Hebrews derived their name, according to Joſephus, Euſebius, Jerome, Bede, and moſt of the interpreters of the ſacred writings; but Huet biſhop of Avranches, in his Evangelical Demonſtration, has attempted to prove, that the Hebrews took their name from the word *heber*, which ſignifies *beyond*, becauſe they came from beyond the Euphrates. Heber is ſuppoſed to have been born 2281 years B. C. and to have lived 464 years.

HEBRAISM, an idiom, or manner of ſpeaking, peculiar to the Hebrew language. See the next article.

HEBREW, ſomething relating to the Hebrew. See HEBREWS. Thus we ſay, *HEBREW Bible*. See BIBLE.

HEBREW Character. There are two kinds of Hebrew characters: the ancient, called alſo the *ſquare*; and the modern, or rabbinical character.

1. The ſquare Hebrew takes its denomination from the figure of its characters, which ſtand more ſquare, and have their angles more exact and preciſe than the other. This character is uſed in the text of Holy Scripture, and their other principal and moſt important writings. When both this and the rabbinical character are uſed in the ſame work, the former is for the text, or the fundamental part; and the latter for the acceſſory part, as the gloſs, notes, commentaries, &c.

The beſt and moſt beautiful characters of this kind, are thoſe copied from the characters in the Spaniſh manuſcripts; next, thoſe from the Italian manuſcripts; then thoſe from the French; and laſtly, thoſe of the Germans, whoſe characters are much the ſame, with reſpect to the other genuine ſquare Hebrew characters, that the Gothic or Dutch characters are with reſpect to the Roman.

Several authors contend, that the ſquare character is not the real ancient Hebrew character, written from the beginning of the language to the time of the Babyloniſh captivity; but that it is the Aſſyrian or Chaldee character, which the Jews aſſumed, and accuſtomed themſelves to, during the captivity, and retained afterwards. They ſay, that the Jews, during their captivity, had quite diſuſed their ancient character; ſo that Ezra found it neceſſary to have the ſacred books tranſcribed into the Chaldean ſquare character. Theſe authors add, that what we call the Samaritan character, is the genuine ancient Hebrew. Of this opinion are Scaliger, Bochart, Caſaubon, Voſſius, Grotius, Walton, Capellus, &c. and among the ancients Jerome and Euſebius. On this ſide it is urged, that the preſent characters are called Aſſyrian by the ancient Jewiſh writers of the Talmud, and therefore muſt have been brought from Aſſyria: but to this argument it is replied, that there were two ſorts of characters anciently in uſe, viz. the ſacred or preſent ſquare character, and the profane or civil, which we call Samaritan; and that the ſacred is called Aſſyrian, becauſe it firſt began in Aſſyria to come into common uſe. It is farther alleged,

Hebrew. leged, that the Chaldee letters, which the Jews now use, were unknown to the ancient Jews before the captivity, from Dan. i. 4. Moreover, it is inferred from 2 Kings xvii. 28. whence we learn that a Jewish priest was sent to teach the Samaritans the worship of Jehovah; on which occasion he must have taught them the law; and yet no mention occurs of his teaching them the language or character that the law was then written in, the character which the Samaritans used. But the chief argument is taken from some ancient Jewish shekels, with a legend on one side "The shekel of Israel," and on the other "Jerusalem the holy," both in Samaritan characters. These shekels, it is said, must have been coined before the division of the two kingdoms of Judah and Israel, or at least before the Assyrian captivity, because the Samaritans never afterwards reckoned Jerusalem holy. On the other side, or for the primitive antiquity of the square character, are the two Buxtorfs, Leusden, Calovius, Hottinger, Spanheim, Lightfoot, &c. They urge, from Matthew v. 18. that *jod* is really the least of the consonants in the present Hebrew, whereas it is one of the largest characters in the Samaritan alphabet: but Walton replies, that if our Saviour here speaks of the least letter of the alphabet, we can only infer, that the Chaldee character was used in our Saviour's time, which is not denied by those who maintain the Samaritan to be the original. They also allege, that the Jews were too obstinate and superstitious to allow their sacred character to be altered; but if this was done under the direction and authority of Ezra, the argument will be much invalidated. Farther, they say, that Ezra could not alter the ancient character, because it was impossible to make the alterations in all their copies. This argument, however, is contradicted by fact; since the old English black letter is actually changed for the Roman. They say, likewise, that Ezra was not disposed to profane the sacred writings with a heathen character: but this supposes that Ezra was so superstitious as to imagine, that there was some peculiar sanctity in the shape of the letters. Moreover, the advocates for this opinion appeal to ancient coins found in Judæa, with a legend in the Chaldee or Assyrian character. But the genuineness of these coins is much suspected.

The learned Jesuit Souciet maintains, with great address, that the ancient Hebrew character is that found on the medals of Simon, and others, commonly called *Samaritan medals;* but which, he asserts, were really Hebrew medals, struck by the Jews, and not the Samaritans.

Buxtorf endeavours to reconcile these two opinions, by producing a variety of passages from the rabbies to prove, that both these characters were anciently used; the present square character being that in which the tables of the law, and the copy deposited in the ark, were written; and the other character being used in the copies of the law which were written for private and common use, and in civil affairs in general; and that after the captivity, Ezra enjoined the former to be used by the Jews on all occasions, leaving the latter to the Samaritans and apostates. But it can hardly be allowed by any who consider the difference between the Chaldee and Samaritan characters, with respect to convenience and beauty, that they were ever used at the same time. After all, it is of no great moment which of these, or whether either of them, were the Hebrew. original characters; since it appears, that no change of the words has arisen from the manner of writing them, because the Samaritan and Jewish Pentateuch almost always agree after so many ages. It is most probable that the form of these characters has varied in different periods; this appears from the testimony of Montfaucon, in his Hexapla Origenis, vol. i. p. 22. &c. and is implied in Dr Kennicot's making the characters in which manuscripts are written one test of their age.

2. The modern, or rabbinical, is a good neat character, formed of the square Hebrew, by rounding it, and retrenching most of the angles or corners of the letters, to make it the more easy and flowing. The letters used by the Germans are very different from the rabbinical character used everywhere else, though all formed alike from the square character, by the German in a more slovenly manner than the rest.—The rabbins frequently make use either of their own, or the square Hebrew character, to write the modern languages in. There are even books in the vulgar tongues printed in Hebrew characters; instances whereof are seen in the French king's library.

Hebrew Language, that spoken by the Hebrews, and wherein the Old Testament is written.

This appears to be the most ancient of all the languages in the world, at least we know of none older; and some learned men are of opinion, that this is the language in which God spoke to Adam in Paradise. Dr Sharpe adopts the opinion that the Hebrew was the original language; not indeed that the Hebrew is the unvaried language of our first parents, but that it was the general language of men at the dispersion; and however it might have been improved and altered from the first speech of our first parents, it was the original of all the languages, or almost all the languages, or rather dialects, that have since arisen in the world.

The books of the Old Testament are the only pieces to be found, in all antiquity, written in pure Hebrew; and the language of many of these is extremely sublime: it appears perfectly regular, and particularly so in its conjugations. Indeed, properly speaking, it has but one conjugation; but this is varied in each seven or eight different ways, which has the effect of so many different conjugations, and affords a great variety of expressions to represent by a single word the different modifications of a verb, and many ideas which in the modern and in many of the ancient and learned languages cannot be expressed without a periphrasis.

The primitive words, which are called *roots*, have seldom more than three letters or two syllables.

In this language there are 22 letters, only five of which are usually reckoned vowels, which are the same with ours, viz. *a*, *e*, *i*, *o*, *u*; but then each vowel is divided into two, a long and a short, the sound of the former being somewhat grave and long, and that of the latter short and acute: it must however be remarked, that the two last vowels have sounds that differ in other respects besides quantity and a greater or less elevation. To these 10 or 12 vowels may be added others, called *semi-vowels*, which serve to connect the consonants, and to make the easier transitions from one

to

Hebrew. to another. The number of accents in this language is indeed prodigious: of theſe there are near 40, the uſe of ſome of which, notwithſtanding all the inquiries of the learned, are not yet perfectly known. We know, in general, that they ſerve to diſtinguiſh the ſentences like the points called *commas*, *ſemicolons*, &c. in our language; to determine the quantity of the ſyllables; and to mark the tone with which they are to be ſpoken or ſung. It is no wonder, then, that there are more accents in the Hebrew than in other languages, ſince they perform the office of three different things, which in other languages are called by different names.

As we have no Hebrew but what is contained in the Scripture, that language to us wants a great many words; not only becauſe in thoſe primitive times the languages were not ſo copious as at preſent; but alſo on this account, that the inſpired writers had no occaſion to mention many of the terms that might be in the language.

The Chaldee, Syriac, Ethiopic, &c. languages, are by ſome held to be only dialects of the Hebrew; as the French, Italian, Spaniſh, &c. are dialects of the Latin. It has been ſuppoſed by many very learned men, that the Hebrew characters or letters were often uſed hieroglyphically, and that each had its ſeveral diſtinct ſenſe underſtood as a hieroglyphic. Neuman, who ſeems to have taken infinite pains to find out this ſecret meaning of theſe letters, gives the following explication: א *aleph*, he ſays, is a character denoting motion, readineſs, and activity; ב *beth*, ſignifies, 1. Matter, body, ſubſtance, thing; 2. Place, ſpace, or capacity; and, 3. In, within, or contained: ג *gimel*, ſtands for flexion, bending, or obliquity of any kind: ד *daleth*, ſignifies any protruſion made from without, or any promotion of any kind: ה *he*, ſtands for preſence, or demonſtrative eſſence of any thing: ו *vau*, ſtands for copulation or growing together of things: ז *dſain*, expreſſes vehement protruſion and violent compreſſion, ſuch as is occaſioned by at once violently diſcharging and conſtringing a thing together; it alſo ſignifies ſometimes the ſtraitening of any figure into a narrow point at the end: ח *cheth*, expreſſes aſſociation, ſociety, or any kind of compoſition or combination of things together: ט *teth*, ſtands for the withdrawing, drawing back, or receſs of any thing: י *jod*, ſignifies extenſion and length, whether in matter or in time: כ *caph*, expreſſes a turning, curvedneſs, or concavity: ל *lamech*, ſtands for an addition, acceſs, impulſe, or adverſation, and ſometimes for preſſure: מ *mem*, expreſſes amplitude, or the amplifying any thing in whatever ſenſe; in regard to contiguous qualities, it ſignifies the adding length, breadth, and circumference; and in diſjunct qualities it ſignifies multitude: נ *nun*, ſignifies the propagation of one thing from another, or of the ſame thing from one perſon to another: ס *ſamech*, expreſſes cincture and coarctation: ע *ain*, ſtands for obſervation, objection, or obviation: פ *pe*, ſtands for a crookedneſs or an angle of any figure: צ *tſade*, expreſſes contiguity and cloſe ſucceſſion: ק *koph*, expreſſes a circuit or ambit: ר *reſh*, expreſſes the egreſs of any thing, as alſo the exterior part of a thing, and the extremity or end of any thing: ש *ſhin*, ſignifies the number three, or the third degree, or the utmoſt perfection of any thing: ת *tau*, expreſſes a ſequel, continuation, or ſucceſſion of any thing. Hebrew ‖ Hebrides.

According to this explication, as the ſeveral particular letters of the Hebrew alphabet ſeparately ſignify the ideas of motion, matter, ſpace, and ſeveral modifications of matter, ſpace, and motion, it follows that a language, the words of which are compoſed of ſuch expreſſive characters, muſt neceſſarily be of all languages the moſt perfect and expreſſive, as the words formed of ſuch letters, according to their determinate ſeparate ſignifications, muſt convey the idea of all the matters contained in the ſenſe of the ſeveral characters, and be at once a name and a definition, or ſuccinct deſcription of the ſubject, and all things material as well as ſpiritual, all objects in the natural and moral world, muſt be known as ſoon as their names are known, and their ſeparate letters conſidered.

The words *urim* and *thummim* are thus eaſily explained, and found perhaps the moſt appoſite and expreſſive words that were ever formed.

Rabbinical or *modern* HEBREW, is the language uſed by the rabbins in the writings they have compoſed. The baſis or body hereof is the Hebrew and Chaldee, with divers alterations in the words of theſe two languages, the meanings whereof they have conſiderably enlarged and extended. Abundance of things they have borrowed from the Arabic: the reſt is chiefly compoſed of words and expreſſions, chiefly from the Greek; ſome from the Latin; and others from the other modern tongues; particularly that ſpoken in the place where each rabbin lived or wrote.

The rabbinical Hebrew muſt be allowed to be a very copious language. M. Simon, in his Hiſt. Crit. du Vieux Teſtam. liv. iii. chap. 27. obſerves, that there is ſcarce any art or ſcience but the rabbins have treated thereof in it. They have tranſlated moſt of the ancient philoſophers, mathematicians, aſtronomers, and phyſicians; and have written themſelves on moſt ſubjects: they do not want even orators and poets. Add, that this language, notwithſtanding it is ſo crowded with foreign words, has its beauties viſible enough in the works of thoſe who have written well in it.

HEBREWS, the deſcendants of Heber, commonly called *Jews*. See HEBREW and JEWS.

HEBREWS, *or Epiſtle to the Hebrews*, a canonical book of the New Teſtament.

Though St Paul did not prefix his name to this epiſtle, the concurrent teſtimony of the beſt authors ancient and modern afford ſuch evidence of his being the author of it, that the objections to the contrary are of little or no weight.

The Hebrews, to whom this epiſtle was written, were the believing Jews of Paleſtine; and its deſign was to convince them, and by their means all the Jewiſh converts whereſoever diſperſed, of the inſufficiency and aboliſhment of the ceremonial and ritual law.

HEBRIDES, the general name of ſome iſlands lying to the north-weſt of Scotland, of which kingdom they conſtitute a part. They are ſituated between the 55th and 59th degrees of latitude, are ſuppoſed to be about 300 in number, and to contain 48,000 inhabitants. The names of the largeſt are LEWIS, SKY, MULL, ILAY, and ARRAN. Of theſe iſlands Mr Pennant hath given the following hiſtory.

" All the accounts left us by the Greek and Roman writers

Hebrides. writers are enveloped with obſcurity; at all times brief even in their deſcriptions of places they had eaſieſt acceſs to, and might have deſcribed with the moſt ſatisfactory preciſion; but in remote places, their relations furniſh little more than hints, the food for conjecture to the viſionary antiquary.

"That Pytheas, a traveller mentioned by Strabo, had viſited Great Britain, I would wiſh to make only *apocryphal*. He aſſerts that he viſited the remoter parts; and that he had alſo ſeen Thule, the land of romance amongſt the ancients; which all might pretend to have ſeen; but every voyager, to ſwell his fame, made the iſland he ſaw laſt the Ultima Thule of his travels. If Pytheas had reached theſe parts, he might have obſerved, floating in the ſeas, multitudes of gelatinous animals, the *meduſæ* of Linnæus, and out of theſe have formed his fable. He made his THULE a *compoſition of neither earth, ſea, nor air; but like a compoſition of them all*: then, catching his ſimile from what floated before him, compares it to the *lungs* of the ſea, the Ariſtotelian idea of theſe bodies; and from him adopted by naturaliſts, ſucceſſors to that great philoſopher. Strabo very juſtly explodes theſe abſurd tales; yet allows him merit in deſcribing the climate of the places he had ſeen. As a farther proof of his having viſited the Hebrides, he mentions their unfriendly ſky, that prohibits the growth of the finer fruits; and that the natives are obliged to carry their corn under ſhelter, to beat the grain out, leſt it ſhould be ſpoiled by the defect of ſun and violence of the rains. This is the probable part of his narrative; but when the time that the great geographer wrote is conſidered, at a period that theſe iſlands had been neglected for a very long ſpace by the Romans, and when the difficulties of getting among a fierce and unfriendly nation muſt be almoſt inſuperable, doubts innumerable reſpecting the veracity of this relater muſt ariſe. All that can be admitted in favour of him is, that he was a great traveller; and that he might have either viſited Britain from ſome of the nations commercing with our iſle; or received from them accounts, which he afterwards dreſſed out, mixed with the ornaments of fable. A traffic muſt have been carried on with the very northern inhabitants of our iſlands in the time of Pytheas, for one of the articles of commerce mentioned by Strabo, the ivory bits, were made either of the teeth of the walrus, or of a ſpecies of whale native of the northern ſeas.

"The geographer Mela, who flouriſhed in the reign of Claudius, is the next who takes notice of our leſſer iſlands. He mentions the Orcades as conſiſting of 30; the Ætmodæ of ſeven. The Romans had then made a conqueſt of the former, and might have ſeen the latter: but, from the words of the hiſtorian, it is probable that the Shetland iſlands were thoſe intended; for he informs us, that the "Ætmodæ were carried out over againſt Germany:" the ſite of the Hebrides will not admit this deſcription, which agrees very well with the others; for the ancients extended their Germany, and its imaginary iſlands, to the extreme north.

"Pliny the Elder is the next that mentions theſe remote places. He lived later than the preceding writers, and of courſe his information is fuller; by means of intervening diſcoveries, he has added ten more to the number of the Orcades; is the firſt writer that mentions the Hœbudes, the iſlands in queſtion; and joins in the Hebrides. ſame line Ætmodæ, or, as it is in the beſt editions more properly written, the *Acmodæ*, or extreme point of the Roman expeditions to the north, as the Shetland iſles in the higheſt probability were. Pliny and Mela agree in the number of the Ætmodæ, or Acmodæ; the former makes that of the Hœbudes 30; an account extremely near the truth, deducting the little iſles, or rather rocks, that ſurround moſt of the greater, and many of them ſo indiſtinct as ſcarcely to be remarked, except on an actual ſurvey.

"Solinus ſucceeds Pliny. If he, as is ſuppoſed, was contemporary with Agricola, he has made very ill uſe of the light he might have received from the expeditions of that great general; his officers might have furniſhed the hiſtorian with better materials than thoſe he has communicated. He has reduced the number of the Hœbudes to five. He tells us, that "the inhabitants were unacquainted with corn: that they lived only on fiſh and milk; that they had one king, as the iſlands were only ſeparated from each other by narrow ſtraits; that their prince was bound by certain rules of government to do juſtice: and was prevented by poverty from deviating from the true courſe, being ſupported by the public, and allowed nothing that he could call his own, not even a wife; but then he was allowed free choice, by turns one out of every diſtrict, of any female that caught his affection; which deprived him of all ambition about a ſucceſſor.

"By the number of theſe iſlands, and by the minute attention given by the hiſtorian to the circumſtance of their being ſeparated from each other by very narrow ſtraits, I ſhould imagine, that which is now called the *Long Iſland*, and includes Lewis, North Uiſt, Benbecula, South Uiſt, and Barra, to have been the five Hœbudes of Solinus; for the other great iſlands, ſuch as Sky, &c. are too remote from each other to form the preceding very characteriſtic deſcription of that chain of iſlands. Theſe might naturally fall under the rule of one petty prince; almoſt the only probable part of Solinus's narrative.

"After a long interval appears Ptolemy, the Egyptian geographer. He alſo enumerates five Ebudæ; and has given each a name; the Weſtern *Ebuda*, the Eaſtern, *Ricina*, *Maleos*, *Epidium*. Camden conjectures them to be the modern Sky, Lewis, Rathry or Racline, Mull, and Ilay; and I will not controvert his opinion.

"The Roman hiſtorians give very little light into the geography of theſe parts. Tacitus, from whom moſt might have been expected, is quite ſilent about the names of places; notwithſtanding he informs us, that a fleet by the command of Agricola performed the circumnavigation of Britain. All that he takes notice of is the diſcovery and the conqueſt of the Orkneys: it ſhould ſeem, that with the biographers of an ambitious nation, nothing ſeemed worthy of notice but what they could dignify with the glory of victory.

"It is very difficult to aſſign a reaſon for the change of name from *Ebudæ* to *Hebrides;* the laſt is modern; and ſeems, as the annotator on Dr Macpherſon ſuppoſes, to have ariſen from the error of a tranſcriber, who changed the *u* into *ri*.

"From

Hebrides. "From all that has been collected from the ancients, it appears, that they were acquainted with little more of the Hebrides than the bare names: it is probable, that the Romans, either from contempt of ſuch barren ſpots, from the dangers of the ſeas, the violence of the tides, and horrors of the narrow ſounds, in the inexperienced ages of navigation, never attempted their conqueſt, or ſaw more of them than what they had in ſight during the few circumnavigations of Great Britain, which were expeditions more of oſtentation than of utility.

"The inhabitants had probably for ſome ages their own governors, one little king to each iſland, or to each group, as neceſſity required. It is reaſonable to ſuppoſe, that their government was as much divided as that of Great Britain, which, it is well known, was under the direction of numbers of petty princes before it was reduced under the power of the Romans.

"No account is given in hiſtory of the time theſe iſlands were annexed to the government of Scotland. If we may credit our Saxon hiſtorians, they appear to have been early under the dominion of the Picts; for Bede and Adamnanus inform us, that ſoon after the arrival of St Columba in their country, Brude, a Pictiſh monarch, made the ſaint a preſent of the celebrated iſland of Iona. But neither the holy men of this iſland, nor the natives of the reſt of the Hebrides, enjoyed a permanent repoſe after this event. The firſt invaſion of the Danes does not ſeem to be eaſily aſcertained. It appears that they ravaged Ireland, and the iſle of Rathry, as early as the year 735. In the following century, their expeditions became more frequent: Harold Harfager, or the *light-haired*, purſued, in 875, ſeveral petty princes, whom he had expelled out of Norway; who had taken refuge in the Hebrides, and moleſted his dominions by perpetual deſcents from thoſe iſlands. He ſeems to have made a rapid conqueſt: he gained as many victories as he fought battles; he put to death the chief of the pirates, and made an indiſcriminate ſlaughter of their followers. Soon after his return, the iſlanders repoſſeſſed their ancient ſeats; and, in order to repreſs their inſults, he ſent Ketil the *flat-noſed* with a fleet and ſome forces for that purpoſe. He ſoon reduced them to terms, but made his victories ſubſervient to his own ambition; he made alliances with the reguli he had ſubdued; he formed intermarriages, and confirmed to them their old dominions. This effected, he ſent back the fleet to Harold; openly declared himſelf independent; made himſelf prince of the Hebrides; and cauſed them to acknowledge him as ſuch, by the payment of tribute and the badges of vaſſalage. Ketil remained, during life, maſter of the iſlands; and his ſubjects appear to have been a warlike ſet of freebooters, ready to join with any adventurers. Thus when Eric, ſon of Harold Harfager, after being driven out of his own country, made an invaſion of England, he put with his fleet into the Hebrides, received a large reinforcement of people fired with the hopes of prey, and then proceeded on his plan of rapine. After the death of Ketil, a kingdom was in after times compoſed out of them, which from the reſidence of the little monarch in the iſle of Man, was ſtyled that of *Man*. The iſlands became tributary to that of Norway for a conſiderable time, and princes were ſent from thence to govern; but at length they again ſhook off the yoke. Whether the little potentates ruled independent, or whether they put themſelves under the protection of the Scottiſh monarchs, does not clearly appear: but it is reaſonable to ſuppoſe the laſt, as Donald-bane is accuſed of making the Hebrides the price of the aſſiſtance given him by the Norwegians againſt his own ſubjects. Notwithſtanding they might occaſionally ſeek the protection of Scotland, yet they never were without princes of their own: policy alone directed them to the former. From the chronicles of the kings of Man we learn, that they had a ſucceſſion of princes. Hebrides.

"In 1089 is an evident proof of the independency of the iſlanders on Norway; for, on the death of Lagnan, one of their monarchs, they ſent a deputation to O'Brian king of Ireland, to requeſt a regent of royal blood to govern them during the minority of their young prince. They probably might in turn compliment in ſome other reſpects their Scottiſh neighbours: the iſlanders muſt have given them ſome pretence to ſovereignty; for,

"In 1093, Donald-bane, king of Scotland, calls in the aſſiſtance of Magnus the Barefooted, king of Norway, and bribes him with the promiſe of all the iſlands. Magnus accepts the terms; but at the ſame time boaſts, that he does not come to invade the territories of others, but only to reſume the ancient rights of Norway. His conqueſts are rapid and complete; for, beſides the iſlands, by an ingenious fraud he adds Cantyre to his dominions.

"The Hebrides continued governed by a prince dependent on Norway, a ſpecies of viceroy appointed by that court; and who paid, on aſſuming the dignity, ten marks of gold, and never made any other pecuniary acknowledgment during life: but if another viceroy was appointed, the ſame ſum was exacted from him. Theſe viceroys were ſometimes Norwegians, ſometimes natives of the iſles. In 1097 we find, that Magnus deputes a nobleman of the name of *Ingemund:* in after times we learn, that natives were appointed to that high office. Thus were the Hebrides governed, from the conqueſt by Magnus, till the year 1263, when Acho, or Haquin, king of Norway, by an unfortunate invaſion of Scotland, terminating in his defeat at Largs, ſo weakened the powers of his kingdom, that his ſucceſſor Magnus IV. was content to make a ceſſion of the iſlands to Alexander III.; but not without ſtipulating for the payment of a large ſum, and a tribute of 100 merks for ever, which bore the name of the *annual of Norway*. Ample proviſion was alſo made by Magnus in the ſame treaty, for the ſecurity of the rights and properties of his Norwegian ſubjects who choſe to continue in the iſles, where many of their poſterity remain to this day.

"Notwithſtanding this revolution, Scotland ſeems to have received no real acquiſition of ſtrength. The iſlands ſtill remained governed by powerful chieftains, the deſcendants of Somerled, thane of Heregaidel, or Argyle, who, marrying the daughter of Olave, king of Man, left a divided dominion to his ſons Dugal and Reginald: from the firſt were deſcended the Macdougals

Hebrides. Macdougals of Lorn; from the laſt, the powerful clan of the Macdonalds. The lordſhip of Argyle, with Mull, and the iſlands north of it, fell to the ſhare of the firſt; Ilay, Cantyre, and the ſouthern iſles, were the portion of the laſt: a diviſion that formed the diſtinction of the Sudereys and Nordereys, (as further noticed in the article IONA).

"Theſe chieftains were the ſcourges of the kingdom: they are known in hiſtory but as the devaſtations of a tempeſt; for their paths were marked with the moſt barbarous deſolation. Encouraged by their diſtance from the ſeat of royalty, and the turbulence of the times, which gave their monarchs full employ, they exerciſed a regal power, and often aſſumed the title; but are more generally known in hiſtory by the ſtyle of the *lords of the iſles*, or the earls of Roſs; and ſometimes by that of the *Great Macdonald*.

"Hiſtorians are ſilent about their proceedings, from the retreat of the Danes, in 1263, till that of 1335, when John, lord of the iſles, withdrew his allegiance. In the beginning of the next century his ſucceſſors were ſo independent, that Henry IV. entered into a formal alliance with the brothers Donald and John. This encouraged them to commit freſh hoſtilities againſt their natural prince. Donald, under pretence of a claim to the earldom of Roſs, invaded and made a conqueſt of that county: but penetrating as far as the ſhire of Aberdeen, after a fierce but undeciſive battle with the royal party, thought proper to retire, and in a little time to ſwear allegiance to his monarch James I. But he was permitted to retain the county of Roſs, and aſſume the title of earl. His ſucceſſor, Alexander, at the head of 10,000 men, attacked and burnt Inverneſs; at length terrified with the preparations made againſt him, he fell at the royal feet, and obtained pardon as to life, but was committed to ſtrict confinement.

"His kinſman and deputy, Donald Balloch, reſenting the impriſonment of his chieftain, excited another rebellion, and deſtroyed the country with fire and ſword; but on his flight was taken and put to death by an Iriſh chieftain, with whom he fought protection."

"Theſe barbarous inroads were very frequent with a ſet of banditti, who had no other motive in war but the infamous inducement of plunder.

"In the reign of James II. in the year 1461, Donald, another petty tyrant, an earl of Roſs, and lord of the iſles, renewed the pretence of independency; ſurpriſed the caſtle of Inverneſs; forced his way as far as Athol; and obliged the earl and counteſs, with the principal inhabitants, to ſeek refuge in the church of St Bridget, in hopes of finding ſecurity from his cruelty by the ſanctity of the place: but the barbarian and his followers ſet fire to the church, put the eccleſiaſtics to the ſword, and, with a great booty, carried the earl and counteſs priſoners to his caſtle of Claig, in the iſland of Ilay. In a ſecond expedition, immediately following the firſt, he ſuffered the penalty of his impiety: a tempeſt overtook him, and overwhelmed moſt of his aſſociates; and he, eſcaping to Inverneſs, periſhed by the hands of an Iriſh harper; his ſurviving followers returned to Ilay, conveyed the earl and counteſs of Athol to the ſanctuary they had violated, and expiated their crime by reſtoring the plunder, and making large donations to the ſhrine of the offended ſaint. Hebrides.

"John, ſucceſſor to the laſt earl of Roſs, entered into alliance with Edward IV. and ſent ambaſſadors to the court of England, where Edward empowered the biſhop of Durham and earl of Wincheſter to conclude a treaty with him, another Donald Balloch, and his ſon and heir John. They agreed to ſerve the king with all their power, and to become his ſubjects: the earl was to have 100 marks ſterling for life in time of peace, and 200l. in time of war; and theſe iſland allies, in caſe of the conqueſt of Scotland, were to have confirmed to them all the poſſeſſions benorth of the Scottiſh ſea; and in caſe of a truce with the Scottiſh monarch, they were to be included in it. But about the year 1476, Edward, from a change of politics, courted the alliance of James III. and dropt his new allies. James, determined to ſubdue this rebellious race, ſent againſt them a powerful army under the earl of Athol; and took leave of him with this good wiſh, *Furth, Fortune, and fill the fetters;* as much as to ſay, "Go forth, be fortunate, and bring home many captives;" which the family of Athol has uſed ever ſince for its motto. Roſs was terrified into ſubmiſſion; obtained his pardon; but was deprived of his earldom, which by act of parliament was then declared unalienably annexed to the crown: at the ſame time the king reſtored to him Knapdale and Cantyre, which the earl had reſigned; and inveſted him anew with the lordſhip of the iſles, to hold them of the king by ſervice and relief.

"Thus the great power of the iſles was broken: yet for a conſiderable time after, the petty chieftains were continually breaking out into ſmall rebellions, or haraſſed each other in private wars; and tyranny ſeems but to have been multiplied. James V. found it neceſſary to make the voyage of the iſles in perſon in 1536, ſeized and brought away with him ſeveral of the moſt conſiderable leaders, and obliged them to find ſecurity for their own good behaviour and that of their vaſſals. The names of theſe chieftains were (according to Lindeſay), *Mydyart*, *Mac-connel*, *Macloyd*, of the Lewis; *Mac-niel*, *Mac-lane*, *Mac-intoſh*, *John Mudyart*, *Mac-kay*, *Mac-kenzie*, and many others; but by the names of ſome of the above, there ſeem to have been continental as well as inſular malecontents. He examined the titles of their holdings; and finding ſeveral to have been uſurped, reunited their lands to the crown. In the ſame voyage he had the glory of cauſing a ſurvey to be taken of the coaſts of Scotland, and of the iſlands, by his pilot Alexander Lindeſay; which were publiſhed in 1583, at Paris, by Nicholas de Nicholay, geographer to the French monarch.

"The troubles that ſucceeded the death of James occaſioned a neglect of theſe inſulated parts of the Scottiſh dominions, and left them in a ſtate of anarchy. In 1614, the Mac-donalds made a formidable inſurrection, oppugning the royal grant of Cantyre to the earl of Argyle and his relations. The petty chieftains continued in a ſort of rebellion; and the ſword of the greater, as uſual in weak governments, was employed againſt them: the encouragement and protection given by them to pirates, employed the power of the Camp-

Hebrides.

bells during the reign of James VI. and the beginning of that of Charles I. (A).

"But the turbulent ſpirit of the old times continued even to the preſent age. The heads of clans were by the diviſions, and a falſe policy that predominated in Scotland during the reign of William III. flattered with an ideal importance: inſtead of being treated as bad ſubjects, they were courted as deſirable allies: inſtead of feeling the hand of power, money was allowed to bribe them into the loyalty of the times. They would have accepted the ſubſidies, notwithſtanding they deteſted the prince that offered them. They were taught to believe themſelves of ſuch conſequence, that in theſe days turned to their deſtruction. Two recent rebellions gave legiſlature a late experience of the folly of permitting the feudal ſyſtem to exiſt in any part of its dominions. The act of 1748, for aboliſhing heritable juriſdictions, at once deprived the chieftains of all power of injuring the public by their commotions. Many of theſe *Reguli* ſecond this effort of legiſlature, and neglect no opportunity of rendering themſelves hateful to their unhappy vaſſals, the former inſtruments of their ambition."

Smollet's Mod. Hiſt. i. 430, &c.

"The ſituation of theſe iſlands in the great Atlantic ocean renders the air cold and moiſt in the greater part of them. In the moſt northerly iſles the ſun, at the ſummer ſolſtice, is not above an hour under the horizon at midnight, and not longer above it at midday in the depth of winter. The ſoil of the Hebrides varies alſo in different iſles, and in different parts of the ſame iſland: ſome are mountainous and barren, producing little elſe than heath, wild myrtle, fern, and a little graſs; while others, being cultivated and manured with ſea-weed, yield plentiful crops of oats and barley.

"Lead mines have been diſcovered in ſome of theſe iſlands, but not worked to much advantage; others have been found to contain quarries of marble, limeſtone, and freeſtone; nor are they deſtitute of iron, talc, cryſtals, and many curious pebbles, ſome of which emulate the Braſilian topaz.

"With reſpect to vegetables, over and above the plentiful harveſts of corn that the natives earn from agriculture, and the pot-herbs and roots that are planted in gardens for the ſuſtenance of the people, theſe iſlands produce ſpontaneouſly a variety of plants and ſimples, uſed by the iſlanders in the cure of their diſeaſes; but there is hardly a ſhrub or tree to be ſeen, except in a very few ſpots, where ſome gentlemen have endeavoured to rear them with much more trouble than ſucceſs.

"The animals, both of the land and ſea, domeſtic and wild, quadrupeds, fowls, and fiſhes, found in and about theſe iſlands, are of the ſame ſpecies, ſize, and configuration, with thoſe of the ORKNEYS.

"The people inhabiting theſe iſlands are of the ſame race with thoſe who live in the Highlands of Scotland; ſpeak the ſame language, wear the ſame habit, and obſerve the ſame cuſtoms. [See the article HIGHLANDS.]

Hebrides.

"The commodities which may be deemed the ſtaples of this country are black cattle, ſheep, and fiſh, which they ſell to their fellow-ſubjects of Scotland. Part of the wool they work up into knit-ſtockings, coarſe cloth, and that variegated ſtuff called *tartan*. They likewiſe ſalt mutton in the hide, and export it in boats or barklings to different parts of the main land. Cod, ling, mackerel, whiting, haddock, and ſoles, are here caught in abundance, together with a ſmall red cod, remarkably voracious, of a very delicate flavour: there are likewiſe two kinds of white fiſh, which ſeem to be peculiar to this coaſt, known by the names of *lithe* and *cea*, eſteemed good eating. But the greateſt treaſure the ocean pours forth is the prodigious quantity of herrings, which, at one ſeaſon of the year, ſwarm in all the creeks and bays along the weſtern ſhore of Scotland. Theſe are counted the largeſt, fatteſt, and fineſt herrings caught in any part of the northern ſeas. This fiſhery employs a great number of hands, and brings a conſiderable advantage to the kingdom. The fiſh are caught, cured, barrelled up, and exported: but whether from want of ſkill, or a proper ſalt for pickling, the Scotch-cured herrings of this coaſt, though ſuperior to all others in their natural ſtate, are counted inferior to thoſe which are dreſſed and pickled by the Dutch fiſhermen.

"How mean and contracted ſoever the commerce and produce of theſe iſlands may be at preſent, they are perhaps more capable of improvement in both articles than any part of the Britiſh dominions in Europe. The inhabitants are ſo little ſkilled in huſbandry, that the ſoil, though generally good in the low grounds, yields nothing but ſcanty crops of oats and barley; and great tracts of land lie altogether uncultivated. If a very ſmall number of judicious farmers would ſettle in ſome of the moſt conſiderable iſlands, they would ſoon raiſe ſuch harveſts as would enrich themſelves; employ and maintain all the idle people, a great number of whom are obliged to repair to foreign countries for ſubſiſtence; afford ſufficient bread for the inhabitants, and even ſupply the barren parts of the oppoſite continent. The ſoil in many places would produce wheat, and almoſt everywhere would give good paſturage, inſomuch that, with proper culture, the people might provide hay and fodder for their cattle, which during the ſeverity of the winter die in great numbers for want of proviſion. Improvements of this kind would be the more eaſily made, as the ſea-ſhore abounds with ſhells for lime and ſea-weeds for manure; and the labourers would be eaſily ſubſiſted by the fiſh that ſwarm not only in the ocean which ſurrounds theſe iſlands, but likewiſe in the numerous lakes and rivers of freſh water. Martin declares, that he knew 100 families in this country maintained by as many little farms, the rent of each not exceeding 5s. one ſheep, and a few pecks of oats.

"The commerce of theſe iſlands might be extended in ſuch a manner as to render them a ſtaple of trade, and an excellent nurſery for ſeamen. They are furniſhed

(A) In the beginning of the 17th century the iſlanders were continually haraſſing Ireland with their plundering invaſions, or landing there to ſupport rebellions: at length it was made treaſon to receive theſe Hebridian Redſhanks as they were ſtyled.

Hebrides. niſhed with an infinite number of bays, creeks, and harbours, for the convenience of navigation: the inhabitants are numerous, ſtrong, active, and every way qualified for the life of a mariner. The ſea affords myriads of fiſh for exportation: the lands might afford plenty of paſturage for black cattle, horſes, and ſheep, as well as plenteous harveſts of corn and other grain: woollen and linen manufactures might be proſecuted to great advantage, where labour is cheap and proviſions are reaſonable. The iſlands afford good ſtone and lime; and ſome parts of the oppoſite main land, timber for building. They have plenty of fuel, not only for the ordinary purpoſes of life, but alſo for ſalt-pans, which might be erected on different parts of the coaſt; and for burning ſea-ware for the uſe of a glaſs or ſoap manufacture. Finally, the ſituation of theſe iſlands is ſo commodious for trade, that the navigator is immediately in the open ſea, and almoſt in the neighbourhood of Denmark, Sweden, Hamburgh, Holland; nay, with a favourable wind, he can reach the coaſts of France and Spain in a week's ſailing: if he is bound for the Britiſh plantations, or indeed for any part of the known globe, he is at once diſencumbered of the land, and proſecutes his voyage through the open ſea without obſtruction or difficulty."

To the neglected ſtate of theſe iſlands, and to their great importance in various natural reſpects, the attention of government has been called within theſe few years by the repreſentation and efforts of different patriotic noblemen and gentlemen, and a regular eſtabliſhment has been formed under the name of the Britiſh Society for extending the Fiſheries and improving the Sea-coaſts of the Kingdom; in conſequence of which many uſeful plans for the improvement of thoſe iſlands have been adopted, and are gradually carrying into execution.

New HEBRIDES, a cluſter of iſlands lying in the Great South ſea, or Pacific ocean. The northern iſlands of this archipelago were firſt diſcovered by that great navigator Quiros in 1606, and not without reaſon conſidered as a part of the ſouthern continent, which at that time, and till very lately, was ſuppoſed to exiſt. They were next viſited by M. de Bougainville in 1768, who, beſides landing on the iſland of Lepers, did no more than diſcover that the land was not connected, but compoſed of iſlands, which he called the *Great Cyclades*. Captain Cook, beſides aſcertaining the extent and ſituation of theſe iſlands, added the knowledge of ſeveral in this group which were before unknown. He explored the whole cluſter; and thinking himſelf thereby intitled to affix to them a general appellation, he named them the *New Hebrides*. They are ſituated between latitudes of 14 deg. 25. min. and 20 deg. 4 min. ſouth; and between 166 deg. 41 min. and 170 deg. 21 min. eaſt longitude; and extend 125 leagues in the direction of north-north-weſt and ſouth-ſouth-eaſt. The moſt northern part of this archipelago was called by M. de Bougainville the *Peak of the Etoile*. The whole cluſter conſiſts of the following iſlands; ſome of which have received names from the different European navigators; others retain the names which they bear among the natives. viz. Tierra del Eſpiritu Santo,. Mallicollo, St Bartholomew, Iſle of Lepers, Aurora, Whitſuntide, Ambrym, Immer, Apee, Three Hills, Sandwich, Montagu, Hinchinbrook, Shepherd, Eorramanga, Irronan, Annatom, and Tanna.

Hebron, Hebrus. HEBRON, in *Ancient Geography*, a very ancient city ſituated in the hilly country of the tribe of Judah to the ſouth. Its more ancient name was *Kiriath Arba*, or *Cariath Arba*. In antiquity this city vied with moſt ancient cities of Egypt, being ſeven years prior to Zoan, tranſlated *Tanis* by the Seventy. Joſephus makes it not only older than Tanis, but even than Memphis. It ſtood to the weſt of the lake Aſphaltites, and was for ſome time the royal reſidence of David. After the captivity it fell into hands of the Edomites, as did all the ſouth country of Judea. It is now called *Habroun*, ſituated ſeven leagues to the ſouth of Bethlehem. The Arabs call it *El-kalil*, "the well-beloved;" which is the epithet they uſually apply to Abraham, whoſe ſepulchral grotto they ſtill ſhow. Habroun is ſeated at the foot of an eminence, on which are ſome wretched ruins, the miſhapen remains of an ancient caſtle. The adjacent country is a ſort of oblong hollow, five or ſix leagues in length, and not diſagreeably varied by rocky hillocks, groves of fir-trees, ſtunted oaks, and a few plantations of vines and olive trees. Theſe vineyards are not cultivated with a view to make wine, the inhabitants being ſuch zealous Mahometans as not to permit any Chriſtians to live among them: they are only of uſe to procure dried raiſins, which are badly prepared, though the grapes are of an excellent kind. The peaſants cultivate cotton likewiſe, which is ſpun by their wives, and ſold at Jeruſalem and Gaza. They have alſo ſome ſoap manufactories, the kali for which is ſold them by the Bedouins; and a very ancient glaſs-houſe, the only one in Syria. They make there a great quantity of coloured rings, bracelets for the wriſts and legs, and for the arms above the elbows, beſides a variety of other trinkets, which are ſent even to Conſtantinople. In conſequence of theſe manufactures, Mr Volney informs us, Habroun is the moſt powerful village in all this quarter; and is able to arm 800 or 900 men, who adhere to the faction Kaiſi, and are the perpetual enemies of the people of Bethlehem. This diſcord, which has prevailed throughout the country from the earlieſt times of the Arabs, cauſes a perpetual civil war. The peaſants are inceſſantly making inroads on each other's lands, deſtroying their corn, dourra, ſeſamum, and olive trees, and carrying off their ſheep, goats, and camels. The Turks, who are everywhere negligent in repreſſing ſimilar diſorders, are the leſs attentive to them here, ſince their authority is very precarious. The Bedouins, whoſe camps occupy the level country, are continually at open hoſtilities with them; of which the peaſants avail themſelves to reſiſt their authority, or do miſchief to each other, according to the blind caprice of their ignorance or the intereſt of the moment. Hence ariſes an anarchy which is ſtill more dreadful than the deſpotiſm which prevails elſewhere, while the mutual devaſtations of the contending parties render the appearance of this part of Syria more wretched than that of any other.

HEBRUS, in *Ancient Geography*, the largeſt river of Thrace, riſing from Mount Scombrus; running in two channels till it comes to Philippopolis, where they unite. It empties itſelf at two mouths into the Ægean ſea, to the north of Samothrace. It was ſuppoſed to roll its waters upon golden ſands. The head of Orphe-

Hecate || Hecatombæon.

us was thrown into it after it had been cut off by the Ciconian women.

HECATE, in fabulous hiſtory, a daughter of Perſes and Aſteria, the ſame as Proſerpine or Diana. She was called Luna in heaven, Diana on earth, and Hecate or Proſerpine in hell; whence her name of *Diva triformis*, *tergemina*, *triceps*. She was ſuppoſed to preſide over magic and enchantments. She was generally repreſented like a woman, with the head of a horſe, a dog, or a boar; and ſometimes ſhe appeared with three different bodies, and three different faces, with one neck. Dogs, lambs, and honey, were generally offered to her, eſpecially in ways and croſs roads; whence ſhe obtained the name of *Trivia*. Her power was extended over heaven, the earth, ſea, and hell; and to her kings and nations ſuppoſed themſelves indebted for their proſperity.

HECATESIA, a yearly feſtival obſerved by the Stratonicenſians in honour of Hecate. The Athenians paid alſo particular worſhip to this goddeſs, who was deemed the patroneſs of families and of children. From this circumſtance the ſtatues of the goddeſs were erected before the doors of the houſes; and upon every new moon a public ſupper was always provided at the expence of the richeſt people, and ſet in the ſtreets, where the pooreſt of the citizens were permitted to retire and feaſt upon it, while they reported that Hecate had devoured it. There were alſo expiatory offerings, to ſupplicate the goddeſs to remove whatever evils might impend on the head of the public, &c.

HECATOMB, in antiquity, a ſacrifice of a hundred beaſts of the ſame kind, at a hundred altars, and by a hundred prieſts or ſacrificers. The word is formed of the Greek ἑκατόμβη, which properly ſignifies a ſumptuous or magnificent ſacrifice.—Other derives it from the Greek ἑκατον *centum*, "a hundred," and βους *bos*, "bullock," &c.; on which footing the hecatomb ſhould be a ſacrifice of 100 bullocks.—Others derive the word from ἑκατον and πους *pes*, "foot;" and on that principle hold, that the hecatomb might conſiſt of only 25 four-footed beaſts. They add, that it did not matter what kind of beaſts were choſen for victims, provided the quota of feet were but had.

Pythagoras is ſaid to have ſacrificed a hecatomb to the muſes of 100 oxen, in joy and gratitude for his diſcovering the demonſtration of the 47th propoſition of the firſt book of Euclid, viz. that in a rectangled triangle the ſquare of the hypothenuſe is equal to the ſquares of the two other ſides.

For the origin of hecatombs: Strabo relates, that there were 100 cities in Laconia, and that each city uſed to ſacrifice a bullock every year for the common ſafety of the country; whence the inſtitution of the celebrated ſacrifice of 100 victims, called *hecatombs*. Others refer the origin of hecatombs to a plague, wherewith the 100 cities of Peloponneſus were afflicted; for the removal whereof, they jointly contributed to ſo ſplendid a ſacrifice.

Julius Capitolinus relates, that for a hecatomb they erected 100 altars of turf, and on theſe ſacrificed 100 ſheep and 100 hogs. He adds, that when the emperors offered ſacrifices of this kind, they ſacrificed 100 lions, 100 eagles, and 100 other beaſts of the like kind.

HECATOMBÆON was the firſt month of the Athenian year, conſiſting of 30 days; beginning on the firſt new moon after the ſummer ſolſtice, and conſequently anſwering to the latter part of our June and the beginning of July. It had its name from the great number of hecatombs ſacrificed in it. See HECATOMB.

Hecatompolis || Hecla.

HECATOMPOLIS, in *Ancient Geography*, a ſurname of the iſland of Crete, from its 100 cities. The territory of Laconia alſo had anciently this name for the ſame reaſon; and the cuſtom of theſe 100 cities was to ſacrifice a hecatomb annually.

HECATOMPYLOS, in *Ancient Geography*, the metropolis of Parthia, and royal reſidence of Arſaces, ſituated at the ſprings of the Araxes. Thebes in Egypt had alſo the ſame name from its 100 gates.

HECK, an engine to take fiſh. A ſalmon heck is a grate for catching that ſort of fiſh.

HECKLE, among hemp-dreſſers. See HATCHEL.

HECLA, a volcano of Iceland, and one of the moſt furious in the world, ſituated in the ſouthern part of the iſland. See ICELAND.

It was viſited in the year 1772 by Dr Van Troil, a Swediſh gentleman, along with Mr (now Sir Joſeph) Banks, Dr Solander, and Dr James Lind of Edinburgh. On their firſt landing they found a tract of land 60 or 70 miles in extent entirely ruined by lava, which appeared to have been in the higheſt ſtate of liquefaction. Having undertaken a journey to the top of the mountain, they travelled 300 or 360 Engliſh miles over an uninterrupted tract of lava; and had at length the pleaſure of being the firſt who had arrived at the ſummit of the mountain.

Hecla, according to the accounts of theſe gentlemen, is ſituated in the ſouthern part of the iſland, about four miles from the ſea-coaſt, and is divided into three parts at the top, the middle point being the higheſt; and, according to an exact obſervation with Ramſden's barometer, is 5000 feet above the level of the ſea. They were obliged to quit their horſes at the firſt opening from which the fire had burſt. They deſcribe this as a place with lofty glazed walls and high glazed cliffs, unlike any thing which they had ever ſeen before.

A little higher up they found a large quantity of grit and ſtones; and ſtill farther on another opening, which, though not deep, deſcended lower than that of the higheſt point. Here they imagined they plainly diſcerned the effects of boiling water; and not far from thence the mountain began to be covered with ſnow, excepting ſome ſpots which were bare. The reaſon of this difference they ſoon perceived to be the hot vapour aſcending from the mountain. As they aſcended higher they found theſe ſpots become larger; and about 200 yards below the ſummit, a hole about a yard and a half in diameter was obſerved, from whence iſſued ſo hot a ſteam, that they could not meaſure the degree of heat with the thermometer. The cold now began to be very intenſe; Fahrenheit's thermometer, which, at the foot of the mountain was at 54, now fell to 24; the wind alſo became ſo violent, that they were ſometimes obliged to lie down for fear of being blown down the moſt dreadful precipices. On the very ſummit they experienced at the ſame time a high degree of heat and cold; for, in the air, Fahrenheit's thermometer ſtood conſtantly at 24, but when ſet on the ground, roſe to 153: the barometer ſtood at 22.247. Though they were

Hecla. were very much inclined to remain here for ſome time, it could by no means be done with ſafety; for which reaſon they were obliged to deſcend very quickly.

The mountain ſeems to be made up, not of lava, but of ſand, grit, and aſhes; which are thrown up with the ſtones partly diſcoloured, and partly melted by the fire. Several ſorts of pumice ſtones were found on it, among which was one with ſome ſulphur. Sometimes the pumice was ſo much burnt, that it was as light as tow. Its form and colour was ſometimes very fine, but at the ſame time ſo ſoft, that it was difficult to remove it from one place to another. The common lava was found both in large pieces and ſmall bits; as likewiſe a quantity of black jaſper burned at the extremities, and reſembling trees and branches. Some ſlate of a ſtrong red colour was obſerved among the ſtones thrown out by the volcano. In one place the lava had taken the form of chimney-ſtacks half broken down.—As they deſcended the mountain they obſerved three openings. In one, every thing looked as red as brick; from another, the lava had flowed in a ſtream about 50 yards broad, and after proceeding for ſome way, had divided into three large branches. Further on they perceived an opening, at the bottom of which was a mount in form of a ſugar-loaf, in throwing up of which the fire appeared to have exhauſted itſelf.

We have already obſerved, that our travellers were the firſt who aſcended to the top of this mountain. The reaſon that no one before them had ever done ſo was partly founded in ſuperſtition, and partly the ſteepneſs and difficulty of the aſcent, which was greatly facilitated by an irruption in 1766. Moſt kinds of lava found in other volcanic countries are to be met with about Hecla, or other Iceland volanoes; as the gray, dark perforated kind, ſimilar to the Derbyſhire loadſtone; the Iceland agate, *pumex vitreus* both the *niger* and *viridis*. Some have conjectured this to be the *lapis obſidianus* of the ancients, which they formed into ſtatues.

The lava is ſeldom found near the openings whence the eruptions proceed, but rather looſe grit and aſhes; and indeed the greater part of the Icelandic mountains conſiſt of this matter; which, when it is grown cold, generally takes an arched form. The upper cruſt frequently grows hard and ſolid, whilſt the melted matter beneath it continues liquid. This forms great cavities, whoſe walls, bed, and roof, are of lava, and where great quantities of ſtalactite lava are found. There are a vaſt number of theſe caves in the iſland, ſome of which are very large, and are made uſe of by the inhabitants for ſheltering their cattle. The largeſt in the iſland is 5034 feet long, and from 50 to 54 in breadth, and between 34 and 36 in height.—There are ſome prodigious clefts left by the eruptions, the largeſt of which is called *Almeneggaa*, near the water of Tingalla, in the ſouth-weſtern part of the iſland. It is 105 feet broad and very long. The direction of the chaſm itſelf is from north to ſouth. Its weſtern wall, from which the other has been perpendicularly divided, is 107 feet ſix inches in height, and conſiſts of many ſtrata, of about 10 inches each in height, of lava grown cold at different times. The eaſtern wall is only 45 feet four inches in height, and that part of it which is directly oppoſite to the higheſt part of the other ſide is no more than 36 feet 5 inches high.

HECTIC FEVER. See MEDICINE *Index*. Hectic Fever

HECTOR, the ſon of Priam and Hecuba, and the father of Aſtyanax, is celebrated for the valour with which he defended the city of Troy againſt the Greeks. He was killed by Achilles, who dragged his body, faſtened to his chariot, thrice round the walls of Troy, and afterwards reſtored it to Priam for a large ranſom. See TROY. Hedwig.

HEDERA, IVY, a genus of plants belonging to the pentandria claſs; and in the natural method giving name to the 46th order, *Hederaceæ*. See BOTANY *Index*.

HEDERACEÆ (from *hedera*, "ivy"), the name of the 46th order in Linnæus's fragments of a natural method, conſiſting of ivy, and a few other genera, which from their general habit and appearance ſeem nearly allied to it. See BOTANY *Index*.

HEDGES, in *Agriculture*, are either planted to make fences round incloſures, or to divide the ſeveral parts of a garden. When they are deſigned as outward fences, they are planted either with hawthorn, crabs, or black-thorn; but thoſe hedges which are planted in gardens, either to ſurround wilderneſs-quarters, or to ſcreen the other parts of a garden from ſight, are planted according to the fancy of the owner; ſome preferring ever-greens, in which caſe the holly is beſt; next the yew, then the laurel, lauruſtinus, phyllyrea, &c. Others prefer the beech, the hornbeam, and the elm. See AGRICULTURE and GARDENING.

HEDGE-Hog. See ERINACEUS, MAMMALIA *Index*.

HEDGE-Sparrow. See MOTACILLA, ORNITHOLOGY *Inaex*.

HEDWIG, JOHN, a botaniſt of great eminence, was born at Cronſtadt in Tranſylvania, in October 1730, of an originally Saxon family. In his earlieſt years he diſcovered a ſtrong attachment to the ſtudy of botany, in which he afterwards excelled ſo much. He was left with very little to ſupport him on the death of his father. The fame of Gerlach led him to Zittau in Luſatia, where he proſecuted his ſtudies for three years, aſſiſted by the generoſity of different benefactors. He ſtudied philoſophy, mathematics, and medicine, at Leipſic, where he was diſtinguiſhed for his diligence and regularity of deportment. He afterwards aſſiſted Ludwig in the regulation of his library, anatomical muſeum and botanical garden; and in 1756, he entered into the family of Boſe, profeſſor of botany, for whom he prepared plants for demonſtration, and attended patients in the public infirmary. In 1759 he took the degree of M. D. and practiſed at Chemnitz in Saxony, where he entered into the married ſtate.

It was cuſtomary with him to walk the fields by five in the morning, to contemplate the beauties of nature, to viſit his patients after breakfaſt, and ſpend the afternoon and evening in examining ſuch plants as he had collected during his early excurſions. He particularly applied himſelf to the inveſtigation of the graſſes, and indeed of the whole cryptogamia claſs of plants, which botaniſts at that period had greatly neglected. At the age of 40, he taught himſelf to draw and paint the objects which he had diſcovered, and the compound microſcope which he received from Koehler of Dreſden, greatly aſſiſted him in thoſe reſearches. By the perſuaſion of his ſecond wife (whom he married about a year after the death of his firſt), he was prevailed with to

ſettle

Hedwig || Heel.

settle at Leipsic in 1781, where he published his great work, entitled, *Fundamentum Historiæ Naturalis Muscorum Frondosorum*. In this he gave an accurate history of mosses from his own observations, and illustrated the whole with appropriate plates. In it he discovered such sagacity, industry, and profound research, as astonished all the botanists of his time, and induced them to pay more attention to this curious subject. He gained the prize given by the Petersburgh academy for his curious and excellent treatise *Theoria Generationis et Fructificationis Plantarum Cryptogamicarum Linnæi, mere propriis Observationibus et Experimentis Superstructa*, published in 1784.

His literary reputation increased his medical practice; he was chosen physician to the town guards in the last mentioned year, and two years after he became professor of medicine in the university. In 1789, he was chosen ordinary professor of botany, and superintended the physic garden. He corrected the false notions which then prevailed, respecting the efficacy of the medulla or pith, the perforation of the flowers, the excrements of plants, the increase of the vessels of vegetables, and the genuine use of the leaves. By the death of a favourite daughter of a consumption at 16 years of age, he received a severe shock; and a catarrhal affection, followed by a nervous fever, deprived the world of that great man on 7th of February 1799, in the 69th year of his age.

It is agreed on all hands, that Dr Hedwig was a man of great modesty, the usual concomitant of extraordinary talents; that he was friendly and benevolent, upright in his dealings, not solicitous about wealth, and free from parade, both in teaching and in writing. In the forests of Hispaniola there is an ever-green tree, the name of which, *hedwigia balsamifera*, was intended in the most honourable manner to perpetuate his memory. He left behind him two sons, one a painter of eminence at Magdeburg, and the other Dr Romanus Adolphus Hedwig, already known to the botanical world by several publications.

HEDYCARYA, a genus of plants belonging to the dicœcia class. See BOTANY *Index*.

HEDYOTIS, a genus of plants belonging to the tetrandria class of plants; and in the natural method ranking under the 47th order, *Stellatæ*. See BOTANY *Index*.

HEDYSARUM, a genus of plants belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. See BOTANY *Index*.

HEEL, in *Anatomy*, the hind part of the foot. See ANATOMY, n° 66.

Heel of a Horse, the lower hinder-part of the foot comprehended between the quarters and opposite to the toe. The heel of a horse should be high and large, and one side of it should not rise higher than the other upon the pastern. To recover the heels of a horse that is hoof-bound, you should take out his sole and keep his heels very wide, by which they will be restored in a month.

Heel of a Horseman. This being the part that is armed with the spur, the word is used for the spur itself: "This horse understands the heel well." To ride a horse from one heel to another, is to make him go sideways, sometimes to one heel and sometimes to another.

Heel || Hegira.

HEEL, in the sea-language. If a ship leans on one side, whether she be aground or afloat, then it is said she heels a-starboard, or a-port; or that she heels offwards, or to the shore; that is, inclines more to one side than to another.

HEELER, or *Bloody-Heel Cock*, a fighting cock, that strikes or wounds much with his spurs.

The masters know such a cock, even while a chicken, by the striking of his two heels together in his going.

HEEMSKIRK. See HEMSKIRK.

HEGIRA, in *Chronology*, a celebrated epoch among the Mahometans. The word is Arabic, formed of חגרה, *hagirah*, "flight;" of חגר, "to fly, quit one's country, family, friends, &c.

The event which gave occasion to this epocha, was Mahomet's flight from Mecca. The magistrates of that city, fearing his impostures might raise a sedition, resolved to expel him: this, accordingly, they effected in the year of our Lord 622, on the evening of the 15th or 16th of July. See ARABIA, N° 44.

To render this epocha more creditable, the Mahometans affect to use the word *hegira* in a peculiar sense for an act of religion, whereby a man forsakes his country, and gives way to the violence of persecutors and enemies of the faith: they add, that the Corashites, being then the strongest party in the city, obliged their prophet to fly, as not being able to endure his abolishing of idolatry. This flight was not the first of Mahomet's, but it was the most famous. It happened in the 14th year from his assuming the character of prophet and apostle, and promulgating his new religion.

The orientals do not agree with us as to the time of the hegira. Among the Mahometans, Amasi fixes it to the year of Christ 630, and from the death of Moses 2347; and Ben Cassem to the year of the world 5800: according to the Greek computation, among the Christians, Said Ebn Batrik refers the hegira to the year of Christ 614, and of the creation 6114.

Khondemir relates, that it was Omar, the second caliph, that first established the hegira as an epocha, and appointed the years to be numbered from it: at the time he made this decree, there were already seven years elapsed. This establishment was made in imitation of the Christians, who, in those times, reckoned their years from the persecution of Diocletian.

But there is another hegira, and that earlier too, though of less eminence. Mahomet, in the 14th year of his mission, was obliged to relinquish Medina: the Corashites had all along opposed him very vigorously, as an innovator and disturber of the public peace; and many of his disciples, not enduring to be reputed followers of an impostor, desired leave of him to abandon the city, for fear of being obliged to renounce their religion. This retreat makes the first hegira. These two hegiras the Mahometans, in their language, call *hegiratan*.

The years of the hegira consist only of 354 days. To reduce these years to the Julian kalendar, i. e. to find what Julian year a given year of the hegira answers to, reduce the year of the hegira given into days, by multiplying by 354, divide the product by 365,

Heidegger. 365, and from the quotient ſubtract the intercalations, i. e. as many days as there are four years in the quotient; and laſtly, to the remainder add 622. See YEAR.

HEIDEGGER, JOHN JAMES, was the ſon of a clergyman, and a native of Zurich in Switzerland, where he married, but left his country in conſequence of an intrigue. Having had an opportunity of viſiting the principal cities of Europe, he acquired a taſte for elegant and refined pleaſures, as they are called, which, united to a ſtrong inclination for voluptuouſneſs, by degrees qualified him for the management of public amuſements. In 1708, when he was near 50 years old, he came to England on a negociation from the Swiſs at Zurich; but, failing in his embaſſy, he entered as a private ſoldier in the guards for protection. By his ſprightly engaging converſation and inſinuating addreſs, he ſoon worked himſelf into the good graces of our young people of faſhion; from whom he obtained the appellation of *the Swiſs Count*. He had the addreſs to procure a ſubſcription, with which, in 1709, he was enabled to furniſh out the opera of "Thomyris," which was written in Engliſh, and performed at the queen's theatre in the Haymarket. The muſic, however, was Italian; that is to ſay, airs ſelected from ſundry of the foreign operas by Bunoncini, Scarlatti, Steffani, Gaſparini, and Albinoni. Heidegger by this performance alone was a gainer of 500 guineas. The judicious remarks he made on ſeveral defects in the conduct of our operas in general, and the hints he threw out for improving the entertainments of the royal theatre, ſoon eſtabliſhed his character as a good critic. Appeals were made to his judgment; and ſome very magnificent and elegant decorations introduced upon the ſtage in conſequence of his advice, gave ſuch ſatisfaction to George II. who was fond of operas, that, upon being informed to whoſe genius he was indebted for theſe improvements, his majeſty was pleaſed from that time to countenance him, and he ſoon obtained the chief management of the opera-houſe in the Haymarket. He then ſet about improving another ſpecies of diverſion, not leſs agreeable to the king, which was the maſquerades, and over theſe he always preſided at the king's theatre. He was likewiſe appointed maſter of the revels. The nobility now careſſed him ſo much, and had ſuch an opinion of his taſte, that all ſplendid and elegant entertainments given by them upon particular occaſions, and all private aſſemblies by ſubſcriptions, were ſubmitted to his direction. From the emoluments of theſe ſeveral employments, he gained a regular conſiderable income, amounting, it is ſaid, in ſome years, to 5000l. which he ſpent with much liberality, particularly in the maintenance of a ſomewhat too luxurious table; ſo that it may be ſaid he raiſed an income, but never a fortune. At the ſame time his charities ought not to paſs unnoticed, which were frequent and ample. After a ſucceſsful maſquerade, he has been known to give away ſeveral hundred pounds at a time. "You know poor objects of diſtreſs better than I do," he would frequently ſay to a particular acquaintance; "be ſo kind as to give away this money for me." This well-known liberality, perhaps, contributed much to his carrying on that diverſion with ſo little oppoſition as he met with. He died in 1749, at the advanced age of 90 years. Heidegger, Heidenheim.

As this perſon was long the *Arbiter Elegantiarum* of England, and is alluded to in many publications of his time, ſome account of him, it was thought, might be here expected: but to add all the anecdotes that have appeared concerning him, would enlarge this article beyond the limits to which it is entitled. One or two of the moſt remarkable, however, are ſubjoined in a note (A), as they may afford entertainment to many of our readers.

HEIDENHEIM, a town of Germany, in Swabia, and in the territory of Brentzhall, with a handſome palace or caſtle, belonging to the houſe of Wirtemberg. E. Long. 10. 19. N. Lat. 48. 37.

HEIDELBERG,

(A) Heidegger's countenance was peculiarly unpleaſing, from an unuſual harſhneſs of features. There is a mezzotinto of him by J. Faber, 1742, from a painting by Vanloo, a ſtriking likeneſs; and his face is introduced in more than one of Hogarth's prints.—Heidegger was, however, the firſt to joke upon his own uglineſs; and he once laid a wager with the earl of Cheſterfield, that within a certain given time his lordſhip would not be able to produce ſo hideous a face in all London. After ſtrict ſearch, a woman was found, whoſe features were at firſt ſight thought ſtronger than Heidegger's; but upon clapping her head-dreſs upon himſelf, he was univerſally allowed to have won the wager. Jolly, a well-known taylor, carrying his bill to a noble duke; his grace, for evaſion, ſaid, "Damn your ugly face, I never will pay you till you bring me an uglier fellow than yourſelf!" Jolly bowed and retired, wrote a letter, and ſent it by a ſervant to Heidegger; ſaying, "His grace wiſhed to ſee him the next morning on particular buſineſs." Heidegger attended, and Jolly was there to meet him; and in conſequence, as ſoon as Heidegger's viſit was over, Jolly received the caſh.

The late facetious duke of Montagu (the memorable author of the Bottle Conjurer at the theatre in the Haymarket) gave an entertainment at the Devil-tavern, Temple-bar, to ſeveral of the nobility and gentry, ſelecting the moſt convivial, and a few hard drinkers, who were all in the plot. Heidegger was invited, and in a few hours after dinner was made ſo dead drunk that he was carried out of the room, and laid inſenſible upon a bed. A profound ſleep enſued; when the late Mrs Salmon's daughter was introduced, who took a mould from his face in plaſter of Paris. From this a maſk was made, and a few days before the next maſquerade (at which the king promiſed to be preſent, with the counteſs of Yarmouth) the duke made application to Heidegger's valet-de-chambre, to know what ſuit of clothes he was likely to wear; and then procuring a ſimilar dreſs, and a perſon of the ſame ſtature, he gave him his inſtructions. On the evening of the maſquerade, as ſoon as his majeſty was ſeated (who was always known by the conductor of the entertainment and the officers of the court, though concealed by his dreſs from the company), Heidegger, as uſual, ordered the muſic to play "God ſave the king;" but his back was no ſooner turned, than the falſe Heidegger ordered them to ſtrike up "Charly o'er the water." The whole company

Heidelberg, Height.

HEIDELBERG, a conſiderable and populous town of Germany, capital of the Lower Palatinate, with a celebrated univerſity. It is noted for its great tun, which holds 800 hogſheads, generally kept full of good Rheniſh wine. It ſtands in a pleaſant rich country, and was a famous ſeat of learning: but it has undergone ſo many calamities, that it is nothing now to what it was formerly. It was firſt reduced to a heap of ruins in 1622 by the Spaniards; and the rich library was tranſported partly to Vienna, and partly to the Vatican at Rome. After this it enjoyed the benefits of peace, till the Proteſtant electoral houſe became extinct, and a bloody war enſued, in which not only the caſtle was ruined, but the tombs and bodies of the electors were ſhamefully violated and pillaged. This happened in 1693; and the people of the Palatinate were obliged to leave their dwellings, and to go for refuge into foreign countries. To add to theſe misfortunes, the elector reſided at Manheim, and carried moſt of the people of diſtinction along with him, ſo that it is uncertain whether Heidelberg will ever recover itſelf or not, though they have begun to rebuild ſome of the fortifications. The great tun was broke to pieces in 1693 by the French, and at great expence in 1729 was repaired. The town ſtands on the river Neckar, over which there is a handſome bridge. E. Long. 8. 48. N. Lat. 49. 25.

HEIGHT, in general, ſignifies the difference between the ground and the top of any object meaſured perpendicularly.

Methods of Meaſuring HEIGHTS. See MENSURATION and BAROMETER.

Heila || Heineccius.

HEILA, a town of royal Pruſſia, in Caſſubia, ſeated at the mouth of the river Viſtula, on the Baltic ſea, and formerly ſubject to Poland, 12 miles north of Dantzic. E. Long. 19. 25. N. Lat. 54. 53.

HEILEGEN-HAVE, a ſea-port town of Germany, in Lower Saxony, and in Wageria, ſeated on the Baltic ſea, over againſt the iſland of Termeren. E. Long. 11. 15. N. Lat. 57. 30.

HEINECCIUS, JOHN GOTLIEB, one of the greateſt civilians of the 18th century, was born at Eiſenberg, in the principality of Altenburg, in 1681. After having ſtudied at Goſlar and Leipſic, he was deſigned for the miniſtry, and began to preach; but diſliking that profeſſion, he laid it aſide, and applied himſelf entirely to the ſtudy of philoſophy and the civil law. In 1710, he became profeſſor of philoſophy at Hall; and in 1721, he was made profeſſor of civil law, with the title of *counſellor of the court*. His great reputation made the ſtates of Frieſland invite him to Franeker in 1724; but three years after, the king of Pruſſia prevailed on him to accept of a profeſſorſhip of law at Francfort on the Oder, where he diſtinguiſhed himſelf till the year 1733. Becoming again profeſſor at Hall, he remained there till his death, which happened in 1741, notwithſtanding his being invited to Marpurg, Denmark, and three academies in Holland. He wrote many works, all of them much eſteemed. The principal are, 1. *Antiquitatum Romanarum juriſprudentiam illuſtrantium ſyntagma*. It was this excellent abridgment that gave riſe to his reputation in foreign countries. 2. *Elementa juris civilis ſecundum ordinem inſtitutionum et pandectarum*. 3. *Fundamenta ſtyli cultioris*. There are few works

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company were inſtantly thunderſtruck, and all the courtiers not in the plot were thrown into a ſtupid conſternation. Heidegger flew to the muſic-gallery, ſwore, ſtamped, and raved, accuſing the muſicians of drunkenneſs, or of being ſet on by ſome ſecret enemy to ruin him. The king and the counteſs laughed ſo immoderately, that they hazarded a diſcovery. While Heidegger ſtaid in the gallery, "God ſave the king" was the tune; but when, after ſetting matters to rights, he retired to one of the dancing rooms, to obſerve if decorum was kept by the company, the counterfeit ſtepping forward, and placing himſelf upon the floor of the theatre, juſt in front of the muſic gallery, called out in a moſt audible voice, imitating Heidegger, damned them for blockheads, had he not juſt told them to play "Charly o'er the water?" A pauſe enſued; the muſicians, who knew his character, in their turn thought him either drunk or mad; but as he continued his vociferation, "Charly" was played again. At this repetition of the ſuppoſed affront, ſome of the officers of the guards, who always attended upon theſe occaſions, were for aſcending the gallery and kicking the muſicians out; but the late duke of Cumberland, who could hardly contain himſelf, interpoſed. The company were thrown into great confuſion. "Shame! Shame!" reſounded from all parts, and Heidegger once more flew in a violent rage to that part of the theatre facing the gallery. Here the duke of Montagu, artfully addreſſing himſelf to him, told him, "The king was in a violent paſſion; that his beſt way was to go inſtantly and make an apology, for certainly the muſicians were mad, and afterwards to diſcharge them. Almoſt at the ſame inſtant, he ordered the falſe Heidegger to do the ſame. The ſcene now became truly comic in the circle before the king. Heidegger had no ſooner made a genteel apology for the inſolence of his muſicians, but the falſe Heidegger advanced, and in a plaintive tone, cried out, "Indeed, Sire, it was not my fault but that devil's in my likeneſs." Poor Heidegger turned round, ſtared, ſtaggered, grew pale, and could not utter a word. The duke then humanely whiſpered in his ear the ſum of his plot, and the counterfeit was ordered to take off his maſk. Here ended the frolic; but Heidegger ſwore he would never attend any public amuſement, if that witch the wax-work woman did not break the mould, and melt down the maſk before his face.

Being once at ſupper with a large company, when a queſtion was debated, Which nationaliſt of Europe had the greateſt ingenuity? to the ſurpriſe of all preſent, he claimed that character for the Swiſs, and appealed to himſelf for the truth of it. "I was born a Swiſs (ſaid he), and came to England without a farthing, where I have found means to gain 5000l. a-year, and to ſpend it. Now I defy the moſt able Engliſhman to go to Switzerland, and either to gain that income or to ſpend it there."—Heidegger is ſaid to have had ſo remarkable a memory, that he once walked from Charing-croſs to Temple-bar, and back again; and when he came home, wrote down every ſign on each ſide of the ſtreet.

Heinetken || Heir-loom.

works ſo uſeful as this for forming a Latin ſtyle. 4. *Elementa philoſophiæ rationalis et moralis, quibus præmiſſa hiſtoria philoſophica.* 5. *Hiſtoria juris civilis Romani ac Germanici.* 6. *Elementa juris naturæ et gentium*, &c.

HEINETKEN, CHRISTIAN, an extraordinary child, the prodigy of the North, was born at Lubeck in 1721. He ſpoke his maternal tongue fluently at ten months. At one year old, he knew the principal events of the pentateuch; in two months more, he was maſter of the entire hiſtory of the Old and New Teſtaments; at two years and a half, he anſwered the principal queſtions in geography and in ancient and modern hiſtory; and he ſpoke Latin and French with great facility before the commencement of his fourth year. His conſtitution was ſo delicate, that he was not weaned till a few months before his death. M. Martini of Lubeck publiſhed a pamphlet in 1730, in which he endeavoured to give natural reaſons for the extraordinary capacity of this infant, who died in his fifth year.

HEINSIUS, DANIEL, profeſſor of politics and hiſtory at Leyden, and librarian to the univerſity there, was born at Gand in Flanders in 1580. He became a ſcholar to Joſeph Scaliger at Leyden, and was indebted to the encouragement and care of that great man for the perfection to which he attained in literature, and which at the beginning of his life there was little reaſon to hope from him. He diſtinguiſhed himſelf as a critic by his labours on many claſſical authors; and was highly honoured as well abroad as at home: Guſtavus Adolphus, king of Sweden, gave him a place among his counſellors of ſtate; the republic of Venice made him a knight of the order of St Mark; and Pope Urban VIII. made him great offers, if he would come, as he expreſſed it, "to reſcue Rome from barbariſm." He died in 1666, leaving ſeveral works of his own, both in poetry and proſe.

HEINSIUS, *Nicholas*, the ſon of Daniel Heinſius, was born at Leyden; and became as great a Latin poet, and a greater critic, than his father. His poems have been ſeveral times printed, but the beſt edition is that of Amſterdam in 1666. He gave editions of ſeveral of the claſſics, with notes; his Claudian is dedicated in a Latin poem to Queen Chriſtina of Sweden, and his Ovid to Thuanus. At his death, which happened in 1681, he diſclaimed all his works, and expreſſed the utmoſt regret at having left behind him ſo many "monuments of his vanity," as he called them. He was as much diſtinguiſhed by his great employments in the ſtate, as by his talents, learning, and good qualities.

HEIR, in *Law*, ſignifies the perſon who ſucceeds another by deſcent to lands, tenements, and hereditaments, being an eſtate of inheritance, or an eſtate in fee; becauſe nothing paſſes by right of inheritance but in fee. See the articles CONSANGUINITY, DESCENT, FEE, SUCCESSION, and LAW *Index*.

HEIR-Apparent, is a perſon ſo called in the lifetime of his anceſtor, at whoſe death he is heir at law.

HEIR-Preſumptive, is one who, if the anceſtor ſhould die immediately, would, in the preſent circumſtances of things, be his heir; but whoſe right of inheritance may be defeated by the contingency of ſome nearer heir being born.

HEIR-Loom (formed of heir and the Saxon *loom*, denoting *limb* or *members*) in our law-books, ſignifies ſuch goods and perſonal chattels as are not inventoried after the owner's deceaſe, but neceſſarily come to the heir along with the houſe. Heireſs || Helena.

Heir-loom comprehends divers implements; as tables, preſſes, cupboards, bedſteads, furnaces, wainſcot, and ſuch like; which in ſome countries have belonged to a houſe for certain deſcents, and are never inventoried after the deceaſe of the owner, as chattels are, but accrue by cuſtom, not by common law, to the heir, with the houſe itſelf. The ancient jewels of the crown are held to be heir-looms, and are not deviſable by will, but deſcend to the next ſucceſſor.

HEIRESS, a female heir to one who has an eſtate in lands, &c. See HEIR.

Stealing an HEIRESS. See *FORCIBLE Marriage*.

HEIRSHIP MOVEABLES, in *Scots Law*, the beſt of certain kinds of moveables, which the heir of line is entitled to take, beſides the heritable eſtate. See LAW *Index*.

HEISTER, LAURENCE, an eminent phyſician, ſurgeon, and anatomiſt, was born at Frankfort on the Mayne, in the year 1683. After being educated in the univerſities of Germany, he proſecuted the ſtudy of anatomy and ſurgery at Amſterdam, in 1706. Next year he acted as ſurgeon in the Dutch camp in Brabant, and afterwards ſtudied medicine at Leyden under the celebrated Boerhaave, at the expiration of which he took his degrees. In 1709, he was appointed phyſician-general to the Dutch military hoſpital, by which means he acquired vaſt experience, both in medicine and ſurgery. He was appointed profeſſor of anatomy and ſurgery at Altdorf in 1710, where he acquired great celebrity by his lectures and writings.

In 1720 he removed to the univerſity of Helmſtadt, where he continued during the remainder of his life. The czar Peter invited him to Ruſſia; but the eſteem in which he was held by different ſovereigns induced him to remain in Germany. His death happened in the year 1758, in the 75th year of his age. Dr Heiſter was uncommonly induſtrious, and wrote a prodigious number of books; but his principal fame was derived from his ſingular ſkill and ſucceſs in ſurgery. He is particularly known by his *Compendium Anatomicum*, which has been frequently reprinted, and tranſlated into different languages. The chief of his ſurgical publications is his Inſtitutions of Surgery, which was long conſidered as a ſtandard book of the kind, till it was ſuperſeded by more modern ſyſtems. As a phyſician his principal works are, *Obſervationes Medico-miſcellaneæ, Theoreticæ et Practicæ; De Medicinæ Mechanicæ Preſtantia;* and *Compendium Inſtitutionum et Fundamentorum Medicinæ*. A Collection of Medical, Chirurgical, and Anatomical Obſervations, was publiſhed after his death in 2 vols quarto.

HEISTERIA, a genus of plants belonging to the decandria claſs; and in the natural method ranking under the 12th order, *Holoraceæ*. See BOTANY *Index*.

HELENA, or ST HELENA, an iſland in the Atlantic ocean, belonging to the Engliſh Eaſt India Company, and ſituated in W. Long. 6. 30. S. Lat. 16. The greateſt length of the iſland is about eight miles, and its circumference is above 20. Some of the mountains are pretty high, covered with wood to the top, and exhibit marks of volcanic eruptions. The coun-

Helena. try, according to Mr Forſter, has a fine appearance; the ſoil is in many places a rich mould, from ſix to ten inches deep, and a variety of plants thrive in it luxuriantly. He found many plants here which he had not obſerved in other parts of the world. Among theſe were ſome called by the natives *cabbage-trees*, *gum-trees*, and *red wood*. The former thrive in moiſt places; but the latter are always found on the ridges of hills, where the ſoil is dry. The cabbage-tree has rather large leaves; but after many inquiries Mr Foſter could not find that it was uſed for any other purpoſe than that of fuel, and no reaſon could be aſſigned why it had obtained that name. It muſt not be confounded with the cabbage-tree of America, India, and the South ſeas, which is a ſpecies of palm.

The iſland is laid out entirely in gardens and paſturage. Beſides peaches, we are aſſured that the plantain and banana thrive here remarkably well. Cabbages, and other greens, which thrive extremely well, are devoured by caterpillars; and every ſpecies of corn is deſtroyed by rats. All the paſtures were overrun with furze; which, though in our country a very uſeleſs and even pernicious plant, was of ſingular advantage to the inhabitants of St Helena. Before the introduction of that plant, the ground was parched with the intenſe heat, and all kinds of graſs and herbage were ſhrivelled up. But the furze-buſhes, which throve as it were in deſpite of the ſun, preſerved a degree of moiſture in the ground; by which means the graſs ſprung up vigorouſly, and the country became covered with a rich and beautiful ſod. The furze is now no longer wanted, and the people aſſiduouſly root it out for fuel. The number of people on St Helena does not exceed 2000 perſons, including 500 ſoldiers, and 600 ſlaves; and it is ſaid that the number of females born on the iſland conſiderably exceeds that of the males. By the arrival of the India ſhips, which they ſupply with refreſhments, they are in return provided with all ſorts of manufactures and other neceſſaries; and the company annually order one or two of their ſhips to touch there in their way to India, in order to ſend them a ſufficient quantity of European goods and proviſions. Many of their ſlaves are employed in catching fiſh, which are very plentiful; and by the help of theſe, together with their poultry, cattle, roots, and ſalt proviſions, they ſubſiſt through the year. Their life (ſays Mr Forſter) ſeems to paſs along very happily; free from the multitude of cares which diſtreſs their countrymen in England, and bleſſed with quiet and content.

A botanic garden has been eſtabliſhed near the country houſe of the governor, and a well-informed gardener ſent by the company to take care of it. The ſea around the iſland abounds with eſculent fiſhes, 70 different ſpecies of which have been taken upon the coaſts. There are great numbers of whales around the iſland, where the ſouthern whale fiſhery, it is believed, might be carried on with great advantage to the nation.

The country, in general, is cultivated by ſlaves; but as theſe are now placed under the protection of the magiſtracy, and various regulations enacted in their favour, they may comparatively be ſaid to be comfortable and ſecure. Before theſe regulations took place, ten out of a hundred were known to die annually, whereas they are now on the increaſe, and the expences occaſioned by the replacing of thoſe who died formerly are thus avoided. Helena || Helenus.

There are ſome blacks who are in a ſtate of freedom, independent of the ſlaves. Theſe, at firſt, were obnoxious to the ſlave owners; but, upon examination, it was found that not one of them had been tried for a crime for ſeveral years, nor had any of them been upon the pariſh. By the humane interference of the company they ſhare the protection of the government, and are almoſt on a footing with the other free inhabitants, having the benefit of a jury when accuſed of crimes, as well as in civil caſes.

This country is ſo fertile, and the climate ſo exactly ſuited to the feelings of human nature, that perſons indifferent to the enjoyments of the world, or far advanced in years, could ſcarcely find another ſpot better calculated to prolong their exiſtence in eaſe, health, and comfort.

St Helena was firſt diſcovered by the Portugueſe in 1502, on St Helen's day; whence its name. They ſtocked it with different kinds of uſeful animals; but whether they ever ſettled a colony on it or not, is uncertain. The Portugueſe having either abandoned or never taken poſſeſſion of it, the Dutch became its maſters; and kept poſſeſſion of it till the year 1600, when they were driven out by the Engliſh. In 1673, the Dutch took it by ſurpriſe; but a ſhort time after it was recovered by the brave Captain Munden, who alſo took three Dutch Eaſt Indiamen then lying in the harbour. On this occaſion the Hollanders had fortified the landing place, of which there is only one on the iſland; and erected batteries of great guns to prevent a deſcent: but the Engliſh having knowledge of a ſmall creek, where only two men abreaſt could creep up, climbed to the top of the rock in the night; and appearing the next morning behind the batteries, the Dutch were ſo terrified, that they threw down their arms, and ſurrendered at diſcretion. This creek has been ſince fortified, and a battery of large cannon placed at the entrance of it; ſo that now the iſland is rendered perfectly ſecure againſt all regular approaches or ſudden attacks.

Accidents frequently happened in approaching to, or leaving the ſhore; but a wharf having been erected, the arrivals and departures of veſſels are rendered perfectly ſecure. Storms are little known at St Helena, thunder is a rare occurrence, and lightning is very ſeldom ſeen.

HELEN, in fabulous hiſtory, the daughter of Tyndarus and Leda, was married to Menelaus king of Sparta, but was ſtolen from him by Theſeus, 1235 B.C. She was reſtored ſoon after; but carried off again by Paris, the Trojan prince; which occaſioned the famous Trojan war. See TROY.

St HELEN's. See HELLEN's.

HELENIUM, BASTARD SUN-FLOWER; a genus of plants belonging to the ſyngeneſia claſs; and in the natural method ranking under the 49th order, *Compoſitæ*. See BOTANY *Index*.

HELENUS, in fabulous hiſtory, a celebrated ſoothſayer, ſon of Priam and Hecuba. He was greatly reſpected by all the Trojans. When Deiphobus was given in marriage to Helen in preference to himſelf, he reſolved to leave his country, and retired to Mount Ida, where Ulyſſes took him priſoner by the advice of Calchas. As he was well acquainted with futurity, the Greeks

Helenus || Helianthus.

Greeks made uſe of prayers, threats, and promiſes, to induce him to reveal the ſecrets of the Trojans; and either the fear of death, or gratification of reſentment, ſeduced him to diſcloſe to the enemies of his country, that Troy could not be taken whilſt it was in poſſeſſion of the Palladium, nor before Polydectes came from his retreat at Lemnos and aſſiſted to ſupport the ſiege. After the ruin of his country, he fell to the ſhare of Pyrrhus the ſon of Achilles, and ſaved his life by warning him to avoid a dangerous tempeſt, which in reality proved fatal to all thoſe who ſet ſail. This endeared him to Pyrrhus; and he received from his hand Andromache the widow of his brother Hector, by whom he had a ſon called *Ceſtrinus*. This marriage, according to ſome, was conſummated after the death of Pyrrhus, who lived with Andromache as with a wife. Helenus was the only one of Priam's ſons who ſurvived the ruin of his country. After the death of Pyrrhus he reigned over part of Epirus, which he called *Chaonia* in memory of his brother Chaon, whom he had inadvertently killed. Helenus received Æneas as he voyaged towards Italy, and foretold him ſome of the calamities which attended his fleet. The manner in which he received the gift of prophecy is doubtful.

HELEPOLIS, in the ancient art of war, a machine for battering down the walls of a place beſieged, the invention of which is aſcribed to Demetrius Poliorcetes.—Diodorus Siculus ſays, that each ſide of the Helepolis was 405 cubits in breadth and 90 in height; that it had nine ſtages, and was carried on four ſtrong ſolid wheels eight cubits in diameter; that it was armed with large battering rams, and had two roofs capable of ſupporting them; that in the lower ſtages there were different ſorts of engines for caſting ſtones; and in the middle they had large catapultas for diſcharging arrows, and ſmaller ones in thoſe above, with a number of expert men for working all theſe machines.

HELIADES, in *Mythology*, the daughters of the Sun and Clymenes, according to the poets. They were ſo afflicted, as they ſay, with the death of their brother Phaeton, that the gods, moved with compaſſion, transformed them into poplars on the banks of the river Eridanus.

HELIÆA, in Grecian antiquity, was the greateſt and moſt frequented court in Athens for the trial of civil affairs. See HELIASTÆ.

HELIACAL, in *Aſtronomy*, a term applied to the riſing and ſetting of the ſtars; or, more ſtrictly ſpeaking, to their emerſion out of and immerſion into the rays and ſuperior ſplendor of the ſun.—A ſtar is ſaid to riſe heliacally, when, after having been in conjunction with the ſun, and on that account inviſible, it comes to be at ſuch a diſtance from him as to be ſeen in the morning before ſunriſing; the ſun, by his apparent motion, receding from the ſtar towards the eaſt. On the contrary, the heliacal ſetting is when the ſun approaches ſo near a ſtar as to hide it with his beams, which prevent the fainter light of the ſtar from being perceived; ſo that the terms *apparition* and *occultation* would be more proper than *riſing* and *ſetting*.

HELIANTHUS, the GREAT SUNFLOWER; a genus of plants belonging to the ſyngeneſia claſs; and in the natural method ranking under the 49th order, *Compoſitæ*. See BOTANY *Index*.

Heliaſtæ.

HELIASTÆ, in antiquity, the judges of the court HELIÆA. They were ſo called, according to ſome authors, from a Greek word which ſignifies *to aſſemble in a great number;* and, according to others, from another word which ſignifies *the ſun*, becauſe they held their aſſemblies in an open place. They compoſed not only the moſt numerous, but likewiſe the moſt important of the Athenian tribunals; for their province was either to explain the obſcure laws, or to give new vigour and authority to thoſe which had been violated. The Theſmothetæ convoked the aſſembly of the Heliaſtæ, which ſometimes amounted to 1000, ſometimes to 1500, judges. Mr Blanchard is of opinion, that, to make this number, the Theſmothetæ ſometimes ſummoned thoſe of each tribe who had laſt quitted the public offices which they had exerciſed in another court.

However that may be, it appears that the aſſemblies of the Heliaſtæ were not frequent, as they would have interrupted the juriſdiction of the ſtated tribunals and the common courſe of affairs.

The Theſmothetæ paid to each member of this aſſembly, for his attendance, three oboli: which are equal to two Roman ſeſterces, or to half a drachma. Hence Ariſtophanes terms them *the brothers of the triobolus*. They were likewiſe condemned to pay a fine if they came too late; and if they did not preſent themſelves till after the orators had begun to ſpeak, they were not admitted. Their attendance was requited out of the public treaſury, and their pay was called *miſthos heliaſticus*.

The aſſembly met, at firſt, according to Ariſtophanes, at the riſing of the ſun. If the judges were obliged to meet under cover on account of froſt and ſnow, they had a fire; but there is not a paſſage in any ancient author which informs us of the place where theſe aſſemblies were held either in the rigorous or in the mild ſeaſons. We only learn, that there was a double encloſure around the aſſembly, that it might not be diſturbed. The firſt was a kind of arbour-work, from ſpace to ſpace, ſeparated by doors, over which were painted in red the ten or twelve firſt letters of the Greek alphabet, which directed the entrance of the officers who compoſed the tribunal, each of them entering under the letter which diſtinguiſhed his tribe. The beadles of the court, to whom they ſhowed the wand which had been ſent them by the Theſmothetæ as a ſummons to meet, examined its mark, to ſee if it was authentic, and then introduced them. The ſecond encloſure, which was at the diſtance of 20 feet from the former, was a rope or cord; that the people who ſtood round the firſt encloſure, and were deſirous to ſee what paſſed within the ſecond, might not be prevented from gratifying their curioſity at a proper diſtance. Thus the attention of the judges was not interrupted by the concourſe of the multitude, many of whom were heated by views of intereſt or of party.

To each of the members of the aſſembly were diſtributed two pieces of copper; one of which was perforated, not certainly that it might be diſtinguiſhed from the other by feeling, for theſe aſſemblies met at the riſing and were diſſolved at the ſetting of the ſun. Thoſe pieces of copper had been ſubſtituted for little ſea-ſhells, which were at firſt in uſe. The king was preſent at the aſſembly, at whoſe command it had been

Heliaſtæ

ſummoned. The Theſmothetæ read the names of thoſe who were to compoſe it, and each man took his place as he was called. The Theſmothetæ were then ſent for, whoſe function it was to obſerve prodigies and to ſuperintend the ſacrifices; and if they gave their ſanction, the deliberations were began, It is well known, that the officers called *Exegetæ* were often corrupted by thoſe who were intereſted in the debates of the aſſembly; and that they excited ſuch tumults as were raiſed by the Roman tribunes in the popular aſſemblies convoked by the conſuls.

Of all the monuments which remain relating to the Heliaſtæ, the moſt curious is the oath which thoſe judges took before the Theſmothetæ: Demoſthenes hath preſerved it in his oration againſt Timocrates, who having been bribed by thoſe who had been intruſted with the effects taken on board a veſſel of Naucratis, and refuſed to give an account of them, got a law paſſed, by which an enlargement was granted to priſoners for public debts on giving bail. Demoſthenes in making his oration againſt that law, ordered the oath of the Heliaſtæ to be read aloud, as a perpetual auxiliary to his arguments, and happily calculated to intereſt the multitude and inflame their paſſions. This oath we ſhall quote, that our readers may know how reſpectable a tribunal that of the Heliaſtæ was, and the importance of their deciſions.

"I will judge according to the laws and decrees of the people of Athens, and of the ſenate of 500. I will never give my vote for the eſtabliſhment of a tyrant, nor of an oligarchy. Nor will I ever give my approbation to an opinion prejudicial to the liberty or to the union of the people of Athens. I will not ſecond thoſe perſons who may propoſe a reduction of private debts, or a diſtribution of the lands or houſes of the Athenians. I will not recal exiles, nor endeavour to produce a pardon for thoſe who ſhall be condemned to die. Nor will I force thoſe to retire whom the laws and the ſuffrages of the people ſhall permit to remain in their country. I will not give my vote to any candidate for a public function who gives not an account of his conduct in the office which he has previouſly filled; nor will I preſume to ſolicit any truſt from the commonwealth without ſubjecting myſelf to this condition, which I mean as obligatory to the nine archons, to the chief of religious matters, to thoſe who are balloted on the ſame day with the nine archons, to the herald, the ambaſſador, and the other officers of their court. I will not ſuffer the ſame man to hold the ſame office twice, or to hold two offices in the ſame year. I will not accept any preſent, either myſelf or by another, either directly or indirectly, as a member of the Heliaſtic aſſembly. I ſolemnly declare that I am 30 years old. I will be equally attentive and impartial to the accuſer and the accuſed; I will give my ſentence rigorouſly according to evidence. Thus I ſwear, by Jupiter, by Neptune, and by Ceres, to act. And if I violate any of my engagements, I imprecate from theſe deities ruin on myſelf and my family; and I requeſt them to grant me every kind of proſperity, if I am faithful to my oath."

The reader ſhould peruſe what follows this oath, to ſee with what eloquence Demoſthenes avails himſelf of it, and how he applies its principles to the cauſe which he defends.

Here we have one of the motives of the meeting of this aſſembly. Ariſtotle informs us of another; which was by the public authority deputed to them, to elect a magiſtrate in the room of one dead. It is ſurpriſing that Pauſanias, who enters ſo often into details, gives us no particular account of this aſſembly. All that he ſays of it is, that the moſt numerous of the Athenian aſſemblies was called *Helicè*.

Heliaſtæ || Helicon.

We are told by Diogenes Laertius, in his life of Solon, that it was before one of theſe Heliaſtic aſſemblies that Piſiſtratus preſented himſelf, covered with wounds and contuſions (for thus he had treated himſelf and the mules which drew his car,) to excite the indignation of the people againſt his pretended enemies, who, jealous, as he alleged, of the popularity he had acquired by aſſerting the rights of his poorer fellow-citizens, in oppoſition to the men in power, had attacked him while he was hunting, and had wounded him in that barbarous manner. His deſign ſucceeded: a guard was appointed him; by the aſſiſtance of which he acquired the ſovereignty or tyranny of Athens, and kept it 33 years. The power of the aſſembly appeared remarkably on that occaſion; for Solon, who was preſent, oppoſed it with all his efforts, and did not ſucceed.

As to the manner in which the judges gave their ſuffrages, there was a ſort of veſſel covered with an oſier mat, in which were placed two urns, the one of copper, the other of wood. In the lid of theſe urns there was an oblong hole, which was large at the top, and grew narrower downwards, as we ſee in ſome old boxes of our churches. The ſuffrages which condemned the accuſed perſon were thrown into the wooden urn, which is termed *kyrios*. That of copper, named *akyros*, received thoſe which abſolved him.

Ariſtotle obſerves, that Solon, whoſe aim was to make his people happy, and who found an ariſtocracy eſtabliſhed by the election of the nine archons (annual officers, whoſe power was almoſt abſolute), tempered their ſovereignty, by inſtituting the privilege of appealing from *them* to the people, who were to be aſſembled by lot to give their ſuffrage; after having taken the oath of the Heliaſtæ, in a place near the Panathenæum; where Hiſſus had in former days, calmed a ſedition of the people, and bound them to unanimity by a oath. It has likewiſe been remarked, that the god Apollo was not invoked in the oath of the Heliaſtæ, as in the oaths of the other judges. We have obſerved, that he who took the oath of the Heliaſtæ, engaged that he would not be corrupted by ſolicitation or money. Thoſe who violated this part of their oath were condemned to pay a ſevere fine. The decemvirs at Rome made ſuch corruption a capital crime. But Aſconius remarks, that the puniſhment denounced againſt them was mitigated in later times; and that they were expelled the ſenate, or baniſhed for a certain time, according to the degree of their guilt.

HELICOID PARABOLA, or the *parabolic ſpiral*, is a curve ariſing from the ſuppoſition that the common or Apollonian parabola is bent or twiſted, till the axis comes into the circumference of a circle, the ordinates ſtill retaining their places and perpendicular poſitions with reſpect to the circle, all theſe lines ſtill remaining in the ſame plane.

HELICON,

Helicon || Heliodorus.

HELICON, in *Ancient Geography*, the name of a mountain in the neighbourhood of Parnaſſus and Cytheron, ſacred to Apollo and the muſes, who are thence called *Heliconides*. It is ſituated in Livadia, and now called *Zagura* or *Zaguya*.—Helicon was one of the moſt fertile and woody mountains in Greece. On it the fruit of the adrachnus, a ſpecies of the arbutus or of the ſtrawberry-tree, was uncommonly ſweet; and the inhabitants affirmed, that the plants and roots were all friendly to man, and that even the ſerpents had their poiſon weakened by the innoxious qualities of their food. It approached Parnaſſus on the north, where it touched on Phocis; and reſembled that mountain in loftineſs, extent, and magnitude.—Here was the ſhady grove of the muſes and their images; with ſtatues of Apollo and Bacchus, of Linus and Orpheus, and the illuſtrious poets who had recited their verſes to the harp. Among the tripods, in the ſecond century, was that conſecrated by Heſiod. On the left hand going to the grove was the fountain Aganippe; and about twenty ſtadia, or two miles and an half, higher up, the violet-coloured Hippocrene. Round the grove were houſes. A feſtival was celebrated there by the Theſpiéans with games called *Muſea*. The valleys of Helicon are deſcribed by Wheler as green and flowery in the ſpring; and enlivened by pleaſing caſcades and ſtreams, and by fountains and wells of clear water. The Bœotian cities in general, two or three excepted, were reduced to inconſiderable villages in the time of Strabo. The grove of the muſes was plundered under the auſpices of Conſtantine the Great. The Heliconian goddeſſes were afterwards conſumed in a fire at Conſtantinople, to which city they had been removed. Their ancient ſeat on the mountain, Aganippe and Hippocrene, are unaſcertained.

HELICONIA, a genus of plants belonging to the pentandria claſs. See BOTANY *Index*.

HELICTERES, the SCREW-TREE; a genus of plants belonging to the gynandria claſs, and in the natural method ranking under the 37th order, *Columniferæ*. See BOTANY *Index*.

HELIOCARPUS, a genus of plants belonging to the dodecandria claſs, and in the natural method ranking under the 37th order, *Columniferæ*. See BOTANY *Index*.

HELIOCENTRIC LATITUDE *of a Planet*, the inclination of a line drawn between the centre of the ſun and the centre of a planet to the plane of the ecliptic.

Heliocentric Place of a Planet, the place of the ecliptic wherein the planet would appear to a ſpectator placed at the centre of the ſun.

HELIOCOMETES, a phenomenon ſometimes obſerved about ſun-ſetting; being a large luminous tail or column of light proceeding from the body of the ſun, and dragging after it, not unlike the tail of a comet; whence the name.

HELIODORUS *of* PHOENICIA, biſhop of Trica in Theſſaly, better known by the romance he compoſed in his youth entitled *Æthiopics*, and relating the amours of Theagenes and Chariclea. Some ſay he was depoſed by a ſynod becauſe he would not conſent to the ſuppreſſing that romance. The fable has a moral tendency, and particularly inculcates the virtue of chaſtity. As it was the firſt of this ſpecies of writing, he is ſtyled *the Father of Romances*. He was alſo a good Latin poet. He lived in the 4th century.

Heliometer.

HELIOMETER, formed of ἥλιος *ſun*, and μέτρον *I meaſure*, the name of an inſtrument called alſo *aſtrometer*, invented by M. Bouguer in 1747, for meaſuring with particular exactneſs the diameters of the ſtars, and eſpecially thoſe of the ſun and moon.

This inſtrument is a kind of teleſcope, conſiſting of two object-glaſſes of equal focal diſtance, placed one of them by the ſide of the other, ſo that the ſame eye-glaſs ſerves for both. The tube of this inſtrument is of a conic form, larger at the upper end, which receives the two object-glaſſes, than at the lower, which is furniſhed with an eye-glaſs and micrometer. By the conſtruction of this inſtrument two diſtinct images of an object are formed in the focus of the eye-glaſs, whoſe diſtance, depending on that of the two object-glaſſes from one another, may be meaſured with great accuracy: nor is it neceſſary that the whole diſc of the ſun or moon come within the field of view, ſince, if the images of only a ſmall part of the diſc be formed by each object-glaſs, the whole diameter may be eaſily computed by their poſition with reſpect to one another: for if the object be large, the images will approach, or perhaps lie even over one another, and the object-glaſſes being moveable, the two images may always be brought exactly to touch one another, and the diameter may be computed from the known diſtance of the centres of the two glaſſes. Beſides, as this inſtrument has a common micrometer in the focus of the eye-glaſs, when the two images of the ſun or moon are made in part to cover one another, that part which is common to both the images may be meaſured with great exactneſs, as being viewed upon a ground that is only one half leſs luminous than itſelf; whereas, in general, the heavenly bodies are viewed upon a dark ground, and on that account are imagined to be larger than they really are. By a ſmall addition to this inſtrument, provided it be of a moderate length, M. Bouguer thought it very poſſible to meaſure angles of three or four degrees, which is of particular conſequence in taking the diſtance of ſtars from the moon. With this inſtrument M. Bouguer, by repeated obſervation, found that the ſun's vertical diameter, though ſomewhat diminiſhed by the aſtronomical refraction, is longer than the horizontal diameter; and, in aſcertaining this phenomenon, he alſo found, that the upper and lower edges of the ſun's diſc are not ſo equally defined as the other parts; on this account his image appears ſomewhat extended in the vertical direction. This is owing to the decompoſition of light, which is known to conſiſt of rays differently refrangible in their paſſage through our atmoſphere. Thus the blue and violet rays, which proceed from the upper part of the diſc at the ſame time with thoſe of other colours, are ſomewhat more refracted than the others, and therefore ſeem to us to have proceeded from a higher point; whereas, on the contrary, the red rays proceeding from the lower edge of the diſc, being leſs refracted than the others, ſeem to proceed from a lower point; ſo that the vertical diameter is extended, or appears longer, than the horizontal diameter.

Mr Servington Savery diſcovered a ſimilar method of

Heliophila || Helix.

of improving the micrometer, which was communicated to the Royal Society in 1753. See MICROMETER.

HELIOPHILA, a genus of plants belonging to the tetradynamia claſs of plants; and in the natural method ranking under the 39th order, *Siliquoſæ*. See BOTANY *Index*.

HELIOPHOBI, a name given to the white negroes or albinos, from their averſion to the light of the ſun. See ALBINO.

HELIOPOLIS, in *Ancient Geography*, ſo called by Herodotus and Diodorus Siculus, by Moſes *On*, and in Jeremiah *Bethſemes*; a city of Egypt, to the ſouth-eaſt of the Delta, and eaſt of Memphis; of a very old ſtanding, its origin terminating in fable. Here ſtood the temple of the ſun, held in religious veneration. The city ſtood on an extraordinary mount, but in Strabo's time was deſolate. It gave name to the *Nomos Heliopolites*.—There was another *Heliopolis* in Cœloſyria, near the ſprings of the Orontes; ſo called from the worſhip of the ſun, which was in great vogue over all Syria,

HELIOSCOPE, in *Optics*, a ſort of teleſcope, peculiarly fitted for viewing the ſun without hurting the eyes. See TELESCOPE.

As the ſun may be viewed through coloured glaſſes without hurt to the eyes, if the object and eye glaſſes of a teleſcope be made of coloured glaſs, as red or green, ſuch a teleſcope will become an helioſcope.

But Mr Huygens only uſed a plain glaſs, blacked at the flame of a candle on one ſide, and placed between the eye-glaſs and the eye; which anſwers the deſign of an helioſcope very well.

HELIOSTATA, in *Optics*, an inſtrument invented by the late learned Dr S. Graveſande, who gave it this name from its fixing, as it were, the rays of the ſun in an horizontal direction acroſs the dark chamber all the while it is in uſe. See OPTICS *Index*.

HELIOTROPE (*heliotropium*), among the ancients, an inſtrument or machine for ſhowing when the ſun arrived at the tropics and the equinoctial line. This name was alſo uſed for a ſun-dial in general.

HELIOTROPE is alſo a precious ſtone, of a green colour, ſtreaked with red veins. Pliny ſays it is thus called, becauſe, when caſt into a veſſel of water, the ſun's rays falling thereon ſeem to be of a blood-colour; and that, when out of the water, it gives a faint reflection of the figure of the ſun; and is proper to obſerve eclipſes of the ſun as a helioſcope. The heliotrope is alſo called *oriental jaſper*, on account of its ruddy ſpots. It is found in the Eaſt Indies, as alſo in Ethiopia, Germany, Bohemia, &c. Some have aſcribed to it the faculty of rendering people inviſible, like Gyges's ring.

HELIOTROPIUM, TURNSOLE, a genus of plants belonging to the pentandria claſs, and in the natural method ranking under the 41ſt order, *Aſperifoliæ*. See BOTANY *Index*.

HELISPHERICAL LINE, is the rhumb line in *Navigation*, being ſo termed, becauſe on the globe it winds round the pole helically or ſpirally, coming ſtill nearer and nearer to it.

HELIX, in *Geometry*, a ſpiral line. See SPIRAL.—The word is Greek, ἕλιξ, and literally ſignifies "a wreath or winding;" of ἑλισσω *involvo*, "I environ."

In architecture, ſome authors make a difference between the helix and the ſpiral. A ſtaircaſe, according to Daviler, is in a helix, or is helical, when the ſtairs or ſteps wind round a cylindrical newel; whereas the ſpiral winds round a cone, and is continually approaching nearer and nearer its axis. Helix, Hell.

HELIX is alſo applied, in *Architecture*, to the cauliculæ or little volutes under the flowers of the Corinthian capital; called alſo *urillæ*.

HELIX, in *Anatomy*, is the whole circuit or extent of the auricle or border of the ear outwards. In oppoſition to which, the inner protuberance ſurrounded thereby, and anſwering thereto, is called *anthelix*. See ANATOMY, N° 141.

HELIX, the *Snail*, a genus of ſhell-fiſh belonging to the order of vermes teſtacea. See CONCHOLOGY *Index*.

HELL, the place of divine puniſhment after death.

As all religions have ſuppoſed a future ſtate of exiſtence after this life, ſo all have their hell or place of torment in which the wicked are ſuppoſed to be puniſhed. The hell of the ancient heathens was divided into two manſions, the one called *Elyſium*, on the right hand, pleaſant and delightful, appointed for the ſouls of good men; the other called *Tartara*, on the left, a region of miſery and torment appointed for the wicked. The latter only was hell, in the preſent limited ſenſe of the word. See ELYSIUM.

The philoſophers were of opinion, that the infernal regions were at an equal diſtance from all the parts of the earth; nevertheleſs it was the opinion of ſome, that there were certain paſſages which led thither, as the river Lethe, near the Syrtes, and the Acheruſian cave in Epirus. At Hermoine it was thought, that there was a very ſhort way to hell; for which reaſon the people of that country never put the fare into the mouths of the dead to pay their paſſage.

The Jews placed hell in the centre of the earth, and believed it to be ſituated under waters and mountains. According to them, there are three paſſages leading to it; the firſt is in the wilderneſs, and by that Korah, Dathan, and Abiram, deſcended into hell; the ſecond is in the ſea, becauſe Jonah, who was thrown into the ſea, cried to God out of the belly of hell; the third is in Jeruſalem, becauſe it is ſaid the fire of the Lord is in Zion, and his furnace is in Jeruſalem. They likewiſe acknowledged ſeven degrees of pain in hell, becauſe they find this place called by ſeven different names in Scripture. Though they believed that infidels and perſons eminently wicked, will continue for ever in hell; yet they maintained, that every Jew who is not infected with ſome hereſy, and has not acted contrary to the points mentioned by the rabbins, will not be puniſhed therein for any other crimes above a year at moſt.

The Mahometans believe the eternity of rewards and puniſhments in another life. In the Koran it is ſaid, that hell has ſeven gates, the firſt for the Muſſulmans, the ſecond for the Chriſtians, the third for the Jews, the fourth for the Sabians, the fifth for the Magians, the ſixth for the Pagans, and the ſeventh for the hypocrites of all religions.

Among Chriſtians, there are two controverted queſtions in regard to hell; the one concerns locality, the other the duration of its torments. 1. The locality of hell, and the reality of its fire, began firſt to be controverted by Origen. That father, interpreting the

Scripture

Hellanicus || Helleborus

Scripture account metaphorically, makes hell to consist not in external punishments, but in a consciousness or sense of guilt, and a remembrance of past pleasures. Among the moderns, Mr Whiston advanced a new hypothesis. According to him, the comets are so many hells appointed in their orbits alternately to carry the damned into the confines of the sun, there to be scorched by its violent heat, and then to return with them beyond the orb of Saturn, there to starve them in these cold and dismal regions. Another modern author, not satisfied with any hypothesis hitherto advanced, assigns the sun to be the local hell. 2. As to the second question, viz. the duration of hell torments, we have Origen again at the head of those who deny that they are eternal; it being that father's opinion, that not only men, but devils, after a due course of punishment suitable to their respective crimes, shall be pardoned and restored to heaven. The chief principle upon which Origen built his opinion, was the nature of punishment, which he took to be emendatory, applied only as physic for the recovery of the patient's health. The chief objection to the eternity of hell torments among modern writers, is the disproportion between temporary crimes and eternal punishments. Those who maintain the affirmative, ground their opinions on Scripture accounts, which represent the pains of hell under the figure of a worm which never dies, and a fire which is not quenched; as also upon the words, "These shall go away into everlasting punishment, but the righteous into life eternal."

HELLANICUS of Mitylene, a celebrated Greek historian, born before Herodotus, flourished about 480 B. C. He wrote a history of the ancient kings and founders of cities, but which hath not come down to us.

HELLAS, in *Ancient Geography*, an appellation comprising, according to the more ancient Greeks and Romans, Achaia and Peloponnesus, but afterwards restrained to Achaia. It was bounded on the west by the river Achelous, on the north by mounts Othrys and Octa, on the east by the Egean sea, and on the south by the Saronic and Corinthian bays, and by the isthmus which joins it to Peloponnesus. It was called *Hellas*, from Hellen the son of Deucalion; or from Hellas, a district of Thessaly; whence *Hellenes*, the gentilitious name, denoting Greek. Now called *Livadia*.

HELLE, in fabulous history, a daughter of Athamas king of Thebes by Nephele. She fled from her father's house with her brother Phryxus, to avoid the cruel oppression of her mother-in-law Ino. According to some accounts she was carried through the air on a golden ram which her mother had received from Neptune, and in her passage she became giddy, and fell from her seat into that part of the sea which from her received the name of *Hellespont*. Others say that she was carried on a cloud, or rather upon a ship, from which she fell into the sea and was drowned. Phryxus, after he had given his sister a burial on the neighbouring coasts, pursued his journey, and arrived in Colchis.

HELLEBORE. See HELLEBORUS.

White HELLEBORE. See VERATRUM.

HELLEBORUS, HELLEBORE, a genus of plants belonging to the pentandria class, and in the natural method ranking under the 26th order, *Multisiliquæ*. See BOTANY *Index*.

Hellen || Hellenodicæ.

HELLEN, the son of Deucalion, is said to have given the name of Hellenists to the people before called *Greeks*, 1521 B. C. See GREECE.

HELLENISM, in matters of language, a phrase in the idiom, genius, or construction of the Greek tongue.

This word is only used when speaking of the authors who, writing in a different language, express themselves in a phraseology peculiar to the Greek.

HELLENISTIC LANGUAGE, that used by the Grecian Jews who lived in Egypt and other parts where the Greek tongue prevailed. In this language it is said the Septuagint was written, and also the books of the New Testament; and that it was thus denominated to show that it was Greek filled with Hebraisms and Syriacisms.

HELLENISTS (*Hellenistæ*), a term occurring in the Greek text of the New Testament, and which in the English version is rendered Grecians.

The critics are divided as to the signification of the word. Œcumenius, in his Scholia on Acts vi. 1. observes, that it is not to be understood as signifying those of the religion of the Greeks, but those who spoke Greek, τους ἑλληνιστι φθεγξαμενους. The authors of the Vulgate version, indeed, render it like ours, *Græci;* but Messieurs Du Port Royal more accurately, *Juifs Grecs*, Greek or Grecian Jews; it being the Jews who spoke Greek that are here treated of, and who are hereby distinguished from the Jews called *Hebrews*, that is, who spoke the Hebrew tongue of that time.

The Hellenists, or Grecian Jews, were those who lived in Egypt and other parts where the Greek tongue prevailed. It is to them we owe the Greek version of the Old Testament, commonly called the *Septuagint*, or that of the seventy.

Salmasius and Vossius are of a different sentiment with regard to the Hellenists. The latter will only have them to be those who adhered to the Grecian interests.

Scaliger is represented, in the Scaligerana, as asserting the Hellenists to be the Jews who lived in Greece and other places, and who read the Greek Bible in their synagogue, and used the Greek language *in sacris*: and thus they were opposed to the Hebrew Jews, who performed their public worship in the Hebrew tongue; and in this sense St Paul speaks of himself as a Hebrew of the Hebrews, Phil. iii. 5. i. e. a Hebrew both by nation and language. The Hellenists are thus properly distinguished from the *Hellenes* or Greeks, mentioned John xii. 20. who were Greeks by birth and nation, and yet proselytes to the Jewish religion.

HELLENODICÆ, Ἑλληνοδικαι, in antiquity, the directors of the Olympian games. At first there was only one, afterwards the number increased to two and to three, and at length to nine. They assembled in a place called Ἑλληνοδικαιον, in the Elean forum, where they were obliged to reside ten months before the celebration of the games, to take care that such as offered themselves to contend, performed their προγυμνασματα, or preparatory exercises, and to be instructed in all the laws of games by certain men called νομοφυλακες, i. e. "keepers of the laws." And the better to prevent all unjust practices, they were farther obliged to take an oath

Helleſpont || Helm.

oath, that they would act impartially, would take no bribes, nor diſcover the reaſon for which they diſliked or approved of any of the contenders. At the ſolemnity they ſat naked, having before them the victorial crown till the exerciſes were finiſhed, and then it was preſented to whomſoever they adjudged it. Nevertheleſs, there lay an appeal from the hellenodicæ to the Olympian ſenate.

HELLESPONT, a narrow ſtrait between Aſia and Europe, near the Propontis, which received its name from HELLE who was drowned there in her voyage to Colchis. It is celebrated for the love and death of Leander, and for the bridge of boats which Xerxes built over it when he invaded Greece. The folly of this great prince is well known in beating and fettering the waves of the ſea, whoſe impetuoſity fettered his ſhips, and rendered all his labours ineffectual. It is now called the *Dardanelles*. It is about 33 miles long, and in the broadeſt parts the Aſiatic coaſt is about one mile and a half diſtant from the European, and only half a mile in the narroweſt, according to modern inveſtigation, and the cocks are heard crowing from the oppoſite ſhores.

HELLEN'S, St, a town of the iſle of Wight, in Eaſt-Medina, has a bay which runs a conſiderable way within land, and in a war with France is often the ſtation and place of rendezvous for the royal navy. At the mouth of the bay is that cluſter of rocks called the *Mixen*. It had an old church ſituated at the extremity of the coaſt, which was endangered to be waſhed away, as was a great part of the church-yard, which occaſioned a new church to be built in 1719. The priory to which the old church belonged is now converted into a gentleman's ſeat; is in a remarkably pleaſant ſituation, and commands a fine proſpect of Portſmouth and the road at Spithead. St Hellen's appears to have been of more conſideration in former times than at preſent.

HELM, a long and flat piece of timber, or an aſſemblage of ſeveral pieces, ſuſpended along the hind-part of a ſhip's ſtern-poſt, where it turns upon hinges to the right or left, ſerving to direct the courſe of the veſſel, as the tail of a fiſh guides the body.

The helm is uſually compoſed of three parts, viz. the rudder, the tiller, and the wheel, except in ſmall veſſels, where the wheel is unneceſſary.

As to the form of the rudder, it becomes gradually broader in proportion to its diſtance from the top, or to its depth under the water. The back, or inner part of it, which joins to the ſtern poſt, is diminiſhed into the form of a wedge throughout its whole length, ſo as that the rudder may be more eaſily turned from one ſide to the other, where it makes an obtuſe angle with the keel. It is ſupported upon hinges; of which thoſe that are bolted round the ſtern-poſt to the after extremity of the ſhip, are called *googings*, and are furniſhed with a large hole on the after-part of the ſtern-poſt. The other parts of the hinges, which are bolted to the back of the rudder, are called *pintles*, being ſtrong cylindrical pins, which enter into the googings, and reſt upon them. The length and thickneſs of the rudder is nearly equal to that of the ſtern-poſt.

The rudder is turned upon its hinges by means of a long bar of timber, called the *tiller*, which is fixed horizontally in its upper end within the veſſel. The movements of the tiller to the right and left, accordingly direct the efforts of the rudder to the government of the ſhip's courſe as ſhe advances; which, in the ſea-language, is called *ſteering*. The operations of the tiller are guided and aſſiſted by a ſort of tackle, communicating with the ſhip's ſide, called the *tiller-rope*, which is uſually compoſed of untarred rope-yarns for the purpoſe of traverſing more readily through the blocks or pulleys. Helm.

In order to facilitate the management of the helm, the tiller-rope, in all large veſſels, is wound about a wheel, which acts upon it with the powers of a crane or windlaſs. The rope employed in this ſervice being conveyed from the fore-end of the tiller *k*, to a ſingle block *i*, on each ſide of the ſhip *, is farther communicated to the wheel, by means of two blocks ſuſpended near the mizen-maſt, and two holes immediately above, leading up to the wheel, which is fixed upon an axis on the quarter-deck, almoſt perpendicularly over the fore-end of the tiller. Five turns of the tiller-rope are uſually wound about the barrel of the wheel; and, when the helm is amidſhip, the middle turn is nailed to the top of the barrel, with a mark by which the helmſman readily diſcovers the ſituation of the helm, as the wheel turns it from the ſtarboard to the larboard ſide. The ſpokes of the wheel generally reach about eight inches beyond the rim or circumference, ſerving as handles to the perſon who ſteers the veſſel. As the effect of a lever increaſes in proportion to the length of its arm, it is evident that the power of the helmſman to turn the wheel will be increaſed according to the length of the ſpokes beyond the circumference of the barrel. * See *Deck*, Plate CLXIX.

When the helm, inſtead of lying in a right line with the keel, is turned to one ſide or the other, as in BD (fig. 1.), it receives an immediate ſhock from the water, which glides along the ſhip's bottom in running *aft* from A to B; and this fluid puſhes it towards the oppoſite ſide, whilſt it is retained in this poſition: ſo that the ſtern, to which the rudder is confined, receives the ſame impreſſion, and accordingly turns from B to *b* about ſome point *c*, whilſt the head of the ſhip paſſes from A to *a*. It muſt be obſerved, that the current of water falls upon the rudder obliquely, and only ſtrikes it with that part of its motion which acts according to the ſine of incidence, puſhing it in the direction of NP, with a force which not only depends on the velocity of the ſhip's courſe, by which this current of water is produced, but alſo upon the extent of the ſine of incidence. This force is by conſequence compoſed of the ſquare of the velocity with which the ſhip advances, and the ſquare of the ſine of incidence, which will neceſſarily be greater or ſmaller according to circumſtances; ſo that if the veſſel runs three or four times more ſwiftly, the abſolute ſhock of the water upon the rudder will be nine or 16 times ſtronger under the ſame incidence: and, if the incidence is increaſed, it will yet be augmented in a greater proportion, becauſe the ſquare of the ſine of incidence is more enlarged. This impreſſion, or, what is the ſame thing, the power of the helm, is always very feeble, when compared with the weight of the veſſel; but as it operates with the force of a long lever, its efforts to turn the ſhip are extremely advantageous. For the helm being applied to a great diſtance from Plate CCL.

the

Helm. the centre of gravity G, or from the point about which the veſſel turns horizontally, if the direction PN of the impreſſion of the water upon the rudder be prolonged, it is evident that it will paſs perpendicularly to R, widely diſtant from the centre of gravity G: thus the abſolute effort of the water is very powerful. It is not therefore ſurpriſing, that this machine impreſſes the ſhip with a conſiderable circular movement, by puſhing the ſtern from B to *b*, and the head from A to *a*; and even much farther whilſt ſhe ſails with rapidity, becauſe the effect of the helm always keeps pace with the velocity with which the veſſel advances.

Amongſt the ſeveral angles that the rudder makes with the keel, there is always one poſition more favourable than any of the others, as it more readily produces the deſired effect of turning the ſhip, in order to change her courſe. To aſcertain this, it muſt be conſidered, that if the obliquity of the rudder with the keel is greater than the obtuſe angle ABD, ſo as to diminiſh that angle, the action of the water upon the rudder will increaſe, and at the ſame time oppoſe the courſe of the ſhip in a greater degree; becauſe the angle of incidence will be more open, ſo as to preſent a greater ſurface to the ſhock of the water, by oppoſing its paſſage more perpendicularly. But at that time the direction NP of the effort of the helm upon the ſhip will paſs with a ſmaller diſtance from the centre of gravity G towards R, and leſs approach the perpendicular NL, according to which it is abſolutely neceſſary that the power applied ſhould act with a greater effect to turn the veſſel. Thus it is evident, that if the obtuſe angle ABD is too much incloſed, the greateſt impulſe of the water will not counterbalance the loſs ſuſtained by the diſtance of the direction NP from NL, or by the great obliquity which is given to the ſame direction NP of the abſolute effort of the helm with the keel AB. If, on the contrary, the angle ABD is too much opened, the direction NP of the force of the action of the helm will become more advantageous to turn the veſſel, becauſe it will approach nearer the perpendicular NL; ſo that the line prolonged from NP will increaſe the line GR, by removing R to a greater diſtance from the centre of gravity G: but then the helm will receive the impreſſion of the water too obliquely, for the angle of incidence will be more acute; ſo that it will only preſent a ſmall portion of its breadth to the ſhock of the water, and by conſequence will only receive a feeble effort. By this principle it is eaſy to conceive, that the greateſt diſtance GR from the centre of gravity G, is not ſufficient to repair the diminution of force occaſioned by the too great obliquity of the ſhock of the water. Hence we may conclude, that when the water either ſtrikes the helm too directly, or too obliquely, it loſes a great deal of the effect it ought to produce. Between the two extremes there is therefore a mean poſition, which is the moſt favourable to its operations.

The diagonal NP of the rectangle IL repreſents the abſolute direction of the effort of the water upon the helm. NI expreſſes the portion of this effort which is oppoſed to the ſhip's head-way, or which puſhes her aſtern, in a direction parallel to the keel. It is eaſily perceived, that this part NI of the whole power of the helm contributes but little to turn the veſſel; for, if IN is prolonged, it appears that its direction approaches to a very ſmall diſtance GV from the centre of gravity G; and that the arm of the lever BN=GV, to which the force is applied, is not in the whole more than equal to half the breadth of the rudder: but the relative force NL, which acts perpendicular to the keel, is extremely different. If the firſt NI is almoſt uſeleſs, and even pernicious, by retarding the velocity; the ſecond NL is capable of a very great effect, becauſe it operates at a conſiderable diſtance from the centre of gravity G of the ſhip, and acts upon the arm of a lever GE, which is very long. Thus it appears, that between the effects NL and NI, which reſult from the abſolute effort NP, there is one which always oppoſes the ſhip's courſe, and contributes little to her motion of turning: whilſt the other produces only this movement of rotation, without operating to retard her velocity. Helm.

Geometricians have determined the moſt advantageous angle made by the helm with the line prolonged from the keel, and fixed it at 54° 44′, preſuming that the ſhip is as narrow at her floating-line, or at the line deſcribed by the ſurface of the water round her bottom, as at the keel. But as this ſuppoſition is abſolutely falſe, in as much as all veſſels augment their breadth from the keel upward to the extreme breadth, where the floating-line or the higheſt water-line is terminated; it follows, that this angle is too large by a certain number of degrees. For the rudder is impreſſed by the water, at the height of the floating-line, more directly than at the keel, becauſe the fluid exactly follows the horizontal outlines of the bottom; ſo that a particular poſition of the helm might be ſuppoſed neceſſary for each different incidence which it encounters from the keel upwards. But as a middle poſition may be taken between all theſe points, it will be ſufficient to conſider the angle formed by the ſides of the ſhip, and her axis, or the middle line of her length, at the ſurface of the water, in order to determine afterwards the mean point, and the mean angle of incidence.

It is evident that the angle 54° 44′ is too open, and very unfavourable to the ſhip's head-way, becauſe the water acts upon the rudder there with too great a ſine of incidence, as being equal to that of the angle which it makes with the line prolonged from the keel below: but above, the ſhock of the water is almoſt perpendicular to the rudder, becauſe of the breadth of the bottom, as we have already remarked. If then the rudder is only oppoſed to the fluid, by making an angle of 45° with the line prolonged from the keel, the impreſſion, by becoming weaker, will be leſs oppoſed to the ſhip's head-way, and the direction NP of the abſolute effort of the water upon the helm drawing nearer to the lateral perpendicular, will be placed more advantageouſly, for the reaſons above mentioned. On the other hand, experience daily teſtifies, that a ſhip ſteers well when the rudder makes the angle DBE equal to 35° only.

It has been already remarked, that the effect of moving the wheel to govern the helm increaſes in proportion to the length of the ſpokes; and ſo great is the power of the wheel, that if the helmſman employs a force upon its ſpokes equivalent to 30 pounds, it will produce an effect of 90 or 120 pounds upon the

Helm. tiller. On the contrary, the action of the water is collected into the middle of the breadth of the rudder, which is very narrow in comparison with the length of the tiller; so the effort of the water is very little removed from the fulcrum B upon which it turns; whereas the tiller forms the arm of a lever 10 or 15 times longer, which also increases the power of the helmsman in the same proportion that the tiller bears to the lever upon which the impulse of the water is directed. This force then is by consequence 10 or 15 times stronger; and the effort of 30 pounds, which at first gave the helmsman a power equal to 90 or 120 pounds, becomes accumulated to one of 900 or 1800 pounds upon the rudder. This advantage then arises from the shortness of the lever upon which the action of the water is impressed, and the great comparative length of the tiller, or lever, by which the rudder is governed; together with the additional power of the wheel that directs the movements of the tiller, and still farther accumulates the power of the helmsman over it. Such a demonstration ought to remove the surprise with which the prodigious effect of the helm is sometimes considered, from an inattention to its mechanism: for we need only to observe the pressure of the water, which acts at a great distance from the centre of gravity G, about which the ship is supposed to turn, and we shall easily perceive the difference there is between the effort of the water against the helmsman, and the effect of the same impulse against the vessel. With regard to the person who steers, the water acts only with the arm of a very short lever NB, of which B is the fulcrum: on the contrary, with regard to the ship, the force of the water is impressed in the direction NP, which passes to a great distance from G, and acts upon a very long lever EG, which renders the action of the rudder extremely powerful in turning the vessel; so that, in a large ship, the rudder receives a shock from the water of 2700 or 2800 pounds, which is frequently the case when she sails at the rate of three or four leagues by the hour; and this force being applied in E, perhaps 100 or 110 feet distant from the centre of gravity G, will operate upon the ship, to turn her about, with 270,000 or 308,000 pounds; whilst, in the latter case, the helmsman acts with an effort which exceeds not 30 pounds upon the spokes of the wheel.

Helm || Helmintho-logy.

After what has been said of the helm, it is easy to judge, that the more a ship increases her velocity with regard to the sea, the more powerful will be the effect of the rudder; because it acts against the water with a force, which increases as the square of the swiftness of the fluid, whether the ship advances or retreats; or, in other words, whether she has head-way or stern-way: with his distinction, that in these two circumstances the effects will be contrary. For if the vessel retreats, or moves astern, the helm will be impressed from I to N; and instead of being pushed, according to NP, it will receive the effort of the water from N towards R; so that the stern will be transported to the same movement, and the head turned in a contrary direction.

When the helm operates by itself, the centre of rotation of the ship, and her movement, are determined by estimating the force of this machine; that is to say, by multiplying the surface of the rudder by the square of the ship's velocity.

There are several terms in the sea-language relating to the helm; as, *Bear up the helm;* that is, Let the ship go more large before the wind. *Helm a mid-ship*, or *right the helm:* that is, Keep it even with the middle of the ship. *Port the helm*, Put it over the left side of the ship. *Starboard the helm*, Put it on the right side of the ship.

HELMET, an ancient defensive armour worn by horsemen both in war and in tournaments. It covered both the head and face, only leaving an aperture in the front secured by bars, which was called the *visor*.

In atchievements, it is placed above the escutcheon for the principal ornament, and is the true mark of chivalry and nobility. Helmets vary according to the different degrees of those who bear them. They are also used as a bearing in coats of arms. See HERALDRY.

HELMINTHOLITHUS, in *Natural History*, a name given by Linnæus to petrified bodies resembling worms.

Of these he reckons four genera. 1. Petrified lithophyta. 2. Petrified shells. 3. Petrified zoophytes. 4. Petrified reptiles.

HELMINTHOLOGY.

INTRODUCTION.

1 Definition. UNDER this head we propose to give the natural history of those animals which Linnæus has arranged under the class of VERMES, forming the last class of the animal kingdom. The title which we have adopted for this article is derived from the Greek ἑλμινς, *an earth-worm*, and λογος *a discourse*.

In this article we are to consider, not only those animals which are commonly known by the name of worms, but all those which have the same general character of being *slow in motion, of a soft substance, extremely tenacious of life, capable of reproducing such parts of their body as may have been taken away or destroyed, and inhabiting moist places.*

2 Division. Linnæus has divided the class into five orders.

3 Intestina. 1. *Intestina*, consisting of animals which are very simple in their structure, and most of which live within other animals; such as the worms which infest the intestines of man, quadrupeds, &c. though many of them are found in moist clay, and other damp situations.

4 Mollusca. 2. *Mollusca*, containing such animals as have naked bodies, or are not furnished with shells, but are provided with *tentacula* or arms, being mostly inhabitants of the sea.

3. *Testacea*,

Introduction.

3. *Teſtacea*, differing from the former in little more than their being furniſhed with calcareous, ſhelly coverings, which they carry about with them, conſtituting the great variety of ſhell-fiſh, ſnails, &c.

5 Teſtacea.

4. *Zoophyta*, containing ſuch creatures as ſeem to bear a reſemblance both to plants and animals; being fixed to one place by a ſort of root, and ſhooting up into ſtems like plants, but poſſeſſing beſides the powers of animation, and partially of locomotion.

6 Zoophyta.

7 Infuſoria.

5. *Infuſoria*, compriſing thoſe animated beings generally called *animalcules*, that are found in moſt watery liquors; eſpecially in the infuſions of vegetable ſubſtances.

Of theſe five orders, only four fall to be particularly conſidered in this article, the *teſtacea* having been already fully treated of under CONCHOLOGY.

8 Helmintho-logy the moſt imperfect part of natural hiſtory.

The animals which we are about to deſcribe are generally conſidered as the loweſt in the ſcale of animated being. The ſimplicity of their form, the humility of their ſtation, and the low degree of ſenſe and motion which moſt of them enjoy, render them an object of little attention to mankind in general, excepting in ſo far as they contribute to the ſupply of their wants, or render themſelves formidable, by the pain and diſtreſs which they occaſion to thoſe bodies which nature ſeems to have deſtined for their habitation. But to the eye of the naturaliſt, every part of nature becomes intereſting, and this humble claſs of beings has, in later times, attracted a conſiderable ſhare of attention.

9 Difficulty of the ſtudy.

Still, however, this part of natural hiſtory is much more imperfect than any other, and ſo it will probably long remain, partly from the difficulty of proſecuting our enquiries, and partly from the little intereſt which a ſuperficial obſervation of many of theſe animals is calculated to excite. It will not be thought extraordinary that they are leſs known than other animals, when we conſider, that the examination of them does not offer ſo many allurements as that of inſects, birds, and the more ſhowy part of the animal creation, and is beſides impeded by much greater difficulties. Many of them cannot be obtained without diving to the bottom of the ſea, or braving pain and danger in the purſuit. The *furia infernalis* attacks the ſearcher in the marſhy plains of Bothnia, and the *ſepia octopus* ſtretches forth his gigantic arms, to entangle and drag him to his watery den. Hence the opportunities of examination are often rare; and from the changes which many of the ſpecies undergo, we cannot always be certain whether one which we may meet with hereafter be a new ſpecies, or one which we have ſeen before.

This circumſtance has occaſioned ſeveral varieties to be deſcribed as diſtinct ſpecies, and the ſame ſpecies to be repeated under different names, to the great confuſion of the naturaliſt. Again; the conſiſtence of their bodies is, in many caſes, ſo ſoft, that they can ſcarcely be preſerved in our cabinets, and thus the obſerver is deprived of one of the chief ſources of information and reference, which, in other departments of the ſcience, is ſo well calculated to aſſiſt his ſtudies. Introduction

10 Advantages attending the ſtudy.

The ſtudy of helminthology, however, holds out many inducements to the admirer of nature's works, as it affords an ample field for the gratification of his curioſity, and may even be rendered ſubſervient to the advancement of more ſolid and uſeful knowledge.

If we conſider the number of animals, which naturaliſts have included under the general name of *worms;* if we obſerve the ſimplicity of form in ſome of them, and the complicated ſtructure of others; in fine, if we reflect on the various modes in which they are propagated, and on the ſurpriſing faculty, which many of them poſſeſs, of ſpontaneous reproduction: the imagination will be aſtoniſhed with their number and variety, and confounded by their wonderful properties. The waters are peopled with myriads of animated beings, which, though inviſible to our unaſſiſted eyes, are endowed with organs as perfect as the largeſt animals, ſince, like theſe, they reproduce their like, and hold in the ſcale of nature a rank as little equivocal, though leſs obvious and obtruſive. The elegance of form and beauty of colour, which ſome of the *molluſca* and *zoophyta* poſſeſs, muſt render them an object of admiration to the moſt indifferent obſerver.

The phyſiologiſt will derive conſiderable aſſiſtance in explaining ſome obſcure functions of the animal economy, from a comparative view of them in this humble claſs of beings; while the phyſician, by acquiring a knowledge of the habitudes of ſuch of them as infeſt the bodies of man, will be the better able to aſcertain their preſence, expel them from their habitation, or counteract their effects. The geologiſt, though he cannot admit the hypotheſis of Buffon, that all the limeſtone of this earth has been formed from the relicks of corals and ſhell-fiſh, will yet here trace the origin of many of the ſecondary ſtrata, and from the wonderfully rapid production of coral reefs, which we ſhall notice towards the concluſion of this article, will find little difficulty in accounting for the evolution of new land from the boſom of the deep.

We ſhall divide the ſequel of this article into two chapters, the firſt of which will contain a general view of the claſſification of the genera, and in the ſecond will be given the claſſification and natural hiſtory of the ſpecies. The latter will be ſub-divided into four ſections, correſponding to the four orders of *inteſtina*, *molluſca*, *zoophyta*, and *infuſoria*. As we are able to devote but a ſmall portion of our work to this ſubject, we ſhall confine any particular deſcription to thoſe ſpecies which are of moſt importance; and to relieve the tedioufneſs of ſyſtematic arrangement, we ſhall mention every thing worth notice under the genus or ſpecies then under conſideration.

CHAP. I. CLASSIFICATION OF THE GENERA.

LINNÆUS, whoſe extenſive genius has diſplayed itſelf ſo eminently in almoſt every department of natural hiſtory, has, perhaps, failed more in this part of the ſcience than in any other. In the earlier editions of the *Syſtema Naturæ*, the individuals deſcribed are comparatively few, and the characters of many of them are imperfect or erroneous. Theſe imperfections muſt be attributed to the ſmall progreſs which helminthology had made in the beginning of laſt century, as the diſcoveries of ſucceeding naturaliſts have contributed not only to increaſe the number of genera and ſpecies far beyond what were known at that time, but alſo to improve their diſtinguiſhing characters.

M. Bruigiere, to whom this part of the *Encyclopedie Methodique* was allotted, made ſeveral alterations in the arrangement of Linnæus, whoſe general claſſification he has followed in the tabular view of the ſubject prefixed to the plates of helminthology. M. Bruigiere's work is entitled to much praiſe, and it is to be regretted that he did not live to complete his undertaking.

11 Claſſification of Cuvier.

The arrangement of theſe animals given by Cuvier, is in great eſteem on the continent, and will probably, when fully completed by future diſcoveries of that celebrated naturaliſt, ſuperſede the Linnæan claſſification. Cuvier has given a tabular view of his claſſification, at the end of the firſt volume of his Comparative Anatomy, and a more detailed account in his *Tableau Elementaire d'Hiſtoire Naturelle*. He arranges the *vermes* of Linnæus under three heads; MOLLUSCA, WORMS, and ZOOPHYTES. The following is a tranſlation of the tables.

I. MOLLUSCA.

A. *Head furniſhed with Tentacula that ſerve for Feet.*

Family 1. CEPHALOPODA.

a. Naked.

SEPIA, comprehending the *ſepia*, *loligo*, and *octopus*.

b. Teſtaceous.

ARGONAUTA.
NAUTILUS.

B. *Head free, and crawling on the belly.*

Fam. 2. GASTEROPODA.

a. Having no ſhell, or having the ſhell concealed by the fleſh.

CLIO.
SCYLLÆA.
DORIS.
TRITONIA.
ÆOLIA.
PHYLLIDIA.
THETIS.
LIMAX.
TESTACELLA.
SEGARETUS.
APLYSIA.

b. With an apparent Shell.

α. In ſeveral pieces. Multivalves.

CHITON.

β. Conical. Conivalves.

PATELLA, comprehending *fiſſurella*, *patella*, *crepidula*, and *calyptræa*.

γ. Spiral. Spirivalves.

1. *With the Aperture entire.*

HALYOTIS.
NERITA, comprehending *nerita* and *narica*.
TURBO, comprehending *turbo*, *cycloſtoma*, and *turretella*.
VERMITUS.
TROCHUS, comprehending *pyramidalis*, *trochus*, *monodonta*, and *ſolarium*.
BULLA.
HELIX, comprehending *planorbis*, *helix*, *ampullaria*, *mellania*, *bulimus*, *achatina*.

2. *With the Aperture ſloped towards the bottom.*

VOLUTA, comprehending *voluta*, *mitra*, *columbella*, *marginella*, *ancilla*, and *oliva*.
OVULA.
CYPRÆA.
CONUS.
TEREBELLUM.

3. *With the Aperture ending in a Canal.*

MUREX, comprehending *cerithium*, *pleurotoma*, *fuſus*, *faſciolaria*, *pyrula*, *murex*, and *turbinella*.
STROMBUS, comprehending *ſtrombus*, *pterocera*, and *roſtellaria*.
BUCCINUM, comprehending *caſſidea*, *harpa*, *buccinum*, *terebra*, *purpura*, and *naſſa*.

C. *Having no diſtinct Head.*

Fam. 3. ACEPHALA.

a. Having no Shells, but furniſhed with a menbranous leathery cloak.

ASCIDIA.
SALPA.
PTEROTRACHEA.
THALIA.

b. With a cloak, and furniſhed with Shells.

α. Open anteriorly, having no reticulated Feelers, nor ciliated arms.

1. *Inequivalves.*

OSTREA.
LAZARUS.
SPONDYLUS.
PLACUNA.
ANOMIA.
PECTEN.

2. *Equivalves,*

2. *Equivalves, having a Foot fitted for crawling, without tubes.*

ANODONTITES.
UVA.

3. *Equivalves with a Foot conſtructed for ſpinning, without tubes.*

LIMA.
PERNA.
AVICULA, comprehending *avicula* and *malleus*.
MYTILUS, comprehending *mytilus*, and *modeolus*.
PINNA.

4. *Having tubes in the cloke, ſerving for an anus, and for reſpiration, and a Foot frequently fitted for ſpinning.*

TELLINA.
CARDIUM, comprehending *cardium* and *iſocardia*.
MACTRA, comprehending *mactra*, *lutraria*, and *craſſatella*.
VENUS, comprehending *venus*, *meretrix*, *cyclas*, *paphia*, and *capſa*.
DONAX.
CHAMA, comprehending *cardita*, *tridacna*, and *hippopus*.
ARCA, comprehending *arca*, *pertunculus*, and *nucula*.

β. *Open at one extremity, which is perforated by the foot, and prolonged towards the other end into a double tube.*

SOLEN, comprehending *ſolen* and *ſanguilonaria*.
MYA, comprehending *mya*, *glycimeris*, and *cyrtodaria*.
PHOLAS, comprehending *pholas* and *giœnia*.
TEREDO, comprehending *teredo* and *fiſtulana*.

γ. *Open before, having neither foot nor tubes, but two ciliated arms rolled into a ſpiral form.*

TEREBRATULA, comprehending *terebratula*, *calceola*, and *hyalœa*.
LINGULA.
ORBICULA.

δ. *Open before, having neither feet nor tubes, except one proceeding from the body, and furniſhed with feelers that are horny, articulated, and arranged in pairs.*

ANATIFA.
BALANUS.

II. WORMS.

A. *Having external organs fitted for reſpiration.*

a. Furniſhed with briſtles on the ſide of the body.

APHRODITA.
TEREBELLA.
NEREIS.
SERPULA.
PENICILLUS.
SILIQUARIA.
AMPHITRITE.
DENTALIUM.

B. *Having no external organs of reſpiration.*

a. With briſtles on the ſides of the body.

NAIS.
LUMBRICUS.
THALOSOEMA.

b. Having no briſtles on the ſides of the body.

HIRUDO.
FASCIOLA.
PLANARIA.
GORDIUS.

Cuvier is uncertain whether he ſhould place the following genera in the ſame claſs with the preceding, or arrange them under a new claſs, next to the zoophytes.

Family 1.

TÆNIA.
HYDATIGENA.
LIGULA.
LINGUATULA.

Family 2.

ASCARIS, and the other *inteſtinalia*.

III. ZOOPHYTES.

A. *Not attached.*

a. Having a calcareous or leathery covering, and the inteſtines floating in the internal cavity. Echinodermata.

ECHINUS, comprehending *echinus*, *briſſus*, and *ſpatagus*.
ASTERIAS.
HOLOTHURIA.
SIPUNCULUS.

b. Having a fleſhy or gelatinous covering, and the inteſtines adhering within the body. Urtica marina.

ACTINIA, comprehending *actinia* and *zaanthus*.
MEDUSA, comprehending *meduſa*, *beroë*, and *rhizoſtoma*.

c. Very ſmall, and found ſwimming in liquors. Infuſoria.

ROTIFER.
BRACHIONUS.
TRICHOCERCUS.
TRICHODA.
LEUCOPHRUS, and the reſt of the *animalcula infuſoria*.

c. Having a gelatinous body, and propagating by ſhoots or branches. Polypa.

HYDRA.
VORTICELLA.

B. *Attached to a ſolid trunk.*

a. Having the medullary ſubſtance traverſing a horny

axis,

Genera.

axis, and terminating the branches, in the form of Polypes. Zoophyta properly ſo called.

FLOSCULARIA.
TUBULARIA.
CAPSULARIA.
SERTULARIA.

b. Having the polypes not connected to a medullary axis, but each incloſed in a horny or calcareous cell. Eſcara.

CELLULLARIA.
FLUSTRA.
CORALLINA.

c. Having the ſolid axis covered with ſenſible fleſh, from the hollows of which the polypes proceed. Ceratophyta.

ANTIPATHES.
GORGONIA.
CORALLIUM.
ISIS.
PENNATULA.
VERTICILIUM.
UMBELLULA.

Genera.

d. Having cavities in the ſtony baſis, for receptacles to the Polypes. Lithophyta.

MADREPORA.
MILLEPORA.

e. Having a ſpongy friable or fibrous baſis. Sponges.

ALCYONIUM.
SPONGIA.

Since the publication of theſe tables, M. Cuvier has made ſeveral alterations and additions to the claſs of MOLLUSCA, which are the ſubject of ſeveral excellent memoirs publiſhed in the *Annales de Muſeum National;* in particular he has formed a new order in this claſs, to which he gives the following characters. *Body free, ſwimming; head diſtinct; having no other member but fins.* In this order he arranges three genera, the old genus CLIO, and two new ones, which he calls HYALE and PNEUMODERME.

As the arrangement of Linnæus is ſtill that which is moſt generally received, eſpecially in this country, and is therefore moſt familiar to our readers, we ſhall follow it in this article.

12 Generic characters.

GENERIC CHARACTERS.

13 Of the inteſtina.

ORDO I. INTESTINA; animalia ſimplicia, nuda, artubus deſtituta.

ORDER I. INTESTINA; animals ſimple, naked, and deſtitute of limbs.

* *Intra alia animalia degentia, oculis nullis.*

* *Living within other animals, without eyes.*

Gen. 1. ASCARIS. Corpus teres, utrinque attenuatum; capite trinodi.

2. TRICHURIS. Corpus teres, poſterius filiforme; capite roſtrato.

3. FILARIA. Corpus filiforme totum.

4. UNCINARIA. Corpus filiforme, elaſticum; capite labiato, labiis membranaceis; cauda (*feminæ*) aciformi, (*maris*) uncis duobus veſicæ pellucidæ incluſis armata.

5. SCOLEX. Corpus minimum, gelatinoſum, opacum; capite exſertili et retractili, auriculis 4 pellucidis.

6. LIGULA. Corpus lineare, æquale, elongatum.

7. LINGUATULA. Corpus depreſſum, oblongum; ore anteriori oſtiis 4 cincto.

8. STRONGYLUS. Corpus teres, elongatum; anterius globoſo-truncatum, apertura circulari margine ciliata; poſterius (*feminæ*) acuminatum, (*maris*) cucullatum.

9 ECHINORHYNCHUS. Corpus teres; proboſcide cylindrica retractili aculeis uncinatis coronata.

10. HÆRUCA. Corpus teres; capite aculeis coronato.

11. CUCULLANUS. Corpus poſterius acuminatum; anterius obtuſum; ore orbiculari.

12. CARYOPHYLLÆUS. Corpus teres, læve, ore amplo.

13. FASCIOLA. Corpus depreſſum, ovatum, poro terminali et laterali.

A. Body round, tapering both ways; head furniſhed with three protuberances.

T. Body round, filiform behind; head furniſhed with a proboſcis.

F. Body entirely filiform.

U. Body filiform, elaſtic; head with membranaceous angular lips; tail of the female needle-ſhaped, of the male armed with two hooks incloſed in a pellucid veſicle.

S. Body minute, gelatinous, opake; head exſertile and retractile, with 4 pellucid auricles.

L. Body linear, equal, and long.

L. Body depreſſed, oblong; mouth placed on the fore part, and ſurrounded with 4 paſſages.

S. Body round, long; the fore part globular and truncate, with a circular aperture fringed at the margin; hind part of the female pointed, of the male hooded.

E. Body round; proboſcis cylindrical, retractile, and crowned with hooked prickles.

H. Body round; head crowned with prickles.

C. Body pointed behind; the fore part obtuſe, with an orbicular mouth.

C. Body round, ſmooth, with a large dilated mouth.

F. Body depreſſed, ovate, with a terminal and lateral pore.

Genera.

14. TÆNIA. Corpus articulatum, depreſſum; anterius tubulo 4-fido inſtructum.

15. FURIA. Corpus lineare, aculeis reflexis, utrinque ciliatum.

*** Extra alia animalia habitantia.*

† Poro laterali nullo.

16. GORDIUS. Corpus æquale, filiforme totum, teres, læve.

17. HIRUDO. Corpus anterius et poſterius truncatum, ore caudaque progrediendo dilatata.

‡ Poro laterali pertuſa.

18. LUMBRICUS. Corpus teres, annulatum; aculeis conditis.

19. SIPUNCULUS. Corpus teres, roſtro cylindrico anguſtato.

20. PLANARIA. Corpus depreſſum, poro ventrali.

14 Of the molluſca.

ORDO II. MOLLUSCA. Animalia ſimplicia, artubus inſtructa.

** Ore ſupero.*

21. ACTINIA. Apertura unica communi, dilatabili, nuda, baſi affixa.

22. CLAVA. Apertura unica communi, dilatabili, verticali, tentaculis clavatis cincta.

23. PEDICELLARIA. Corpus pedunculatum, fixum; pedunculo rigido.

24. MAMMARIA. Apertura unica, cirris nullis, lævis.

25. ASCIDIA. Aperturis duabus, altera humiliori affixa.

26. SALPA. Aperturis duabus, utraque terminali.

27. DAGYSIA. Aperturis duabus; corpus angulatum.

*** Ore antico.*

28. PTEROTRACHEA. Corpus pervium, gelatinoſum, pinna mobili ad abdomen vel caudam.

29. DERRIS. Corpus teres, acuminatum articulatum; tentacula 2.

**** Corpore pertuſo foraminula laterali.*

30. LIMAX. Tentacula 4. Anus communis cum poro laterali.

31. LAPLYSIA. Tentacula 4; anus ſupra poſteriora.

32. DORIS. Tentacula 2; anus ſupra poſteriora.

33. TETHIS. Foramina lateralia ſiniſtra gemina.

***** Corpore tentaculis anticis cincto.*

34. HOLOTHURIA. Tentacula carnoſa.

35. TEREBELLA. Tentacula capillaria.

****** Corpore brachiata.*

36. TRITON. Brachia 12, bipartita, quibuſdam cheliferis.

T. Body flat, jointed, furniſhed before with 4 orifices.

F. Body linear, with each ſide ciliated with reflected prickles.

*** Not inhabiting other animals.*

† Having no lateral pore.

G. Body equal, filiform, round, and ſmooth.

H. Body truncate at each extremity; head and tail dilated when in motion.

‡ Perforated with a lateral pore.

L. Body round, annulate, furniſhed with minute hidden prickles.

S. Body round, with a cylindrical mouth, narrower than the head.

P. Body flattened, with a ventral pore.

ORDER II. MOLLUSCA. Animals ſimple, furniſhed with limbs.

** With the mouth placed above.*

A. Body fixed, with a ſingle terminal dilatable aperture ſurrounded by tentacula.

C. Body fixed, with a ſingle dilatable vertical aperture, ſurrounded with clavate tentacula.

P. Body fixed and furniſhed with a rigid peduncle.

M. Body looſe, ſmooth, with a ſingle aperture without cirri.

A. Body fixed, with two apertures, one of which is terminal, the other placed a little beneath.

S. Body looſe, with two apertures, one at each end.

D. Body looſe, angular, open at each end.

*** Mouth placed before.*

P. Body pervious, gelatinous, with a moveable fin at the head or tail.

D. Body round, tapering, articulate; feelers 2.

**** Body with a lateral perforation.*

L. Feelers 4; vent common with the lateral pore.

L. Feelers 4; vent placed above the lower extremity.

D. Feelers 2; vent above the lower extremities.

T. Body with two ſmall pores on the left ſide.

***** Body ſurrounded with feelers on the fore part.*

H. Feelers fleſhy.

T. Feelers capillary.

****** Body furniſhed with arms.*

T. Arms 12, divided, ſome of them cheliferous.

Genera.

37. SEPIA. Brachia 8—10, inſtructa cotylis.
38. CLIO. Brachia 2, aliformia, extenſa.
39. ONCHIDIUM. Brachia 2, dilatata ad latera capitis.
40. LOBARIA. Corpus ſupra convexum, ſubtus planum, lobatum.
41. LERNÆA. Brachia 2—3, teritia, tenuia.
42. SCYLLÆA. Brachia 6, paribus remotis.

****** *Corpore pedato.*

43. APHRODITA. Corpus ovale, ocellatum; tentacula duo, ſetacea, annulatum.
44. AMPHITRITE. Corpus tubo extruſum, annulatum; tentacula pinnata, oculi 0.
45. SPIO. Corpus tubo extruſum, articulatum; tentacula duo ſimplicia; oculi duo.
46. NEREIS. Corpus elongatum repens; pedunculis lateralibus pennicillatis; tentacula ſimplicia.
47. NAIS. Corpus elongatum, repens; pedunculis ſetaceis ſimplicibus; tentacula nulla; oculi nulli vel 2.

††† *Ore infero, utplurimum centrale.*

48. PHYSSOPHORA. Corpus gelatinoſum, è veſicula aërea pendens.
49. MEDUSA. Corpus gelatinoſum, læve.
50. LUCERNARIA. Corpus gelatinoſum, rugoſum, brachiatum.
51. ASTERIAS. Coriaceum, muricatum.
52. ECHINUS. Corpus cruſtaceum, aculeatum.

15 Of the Zoophyta.

ORDO IV. ZOOPHYTA. Animalia compoſita, more vegetabilium, efflorescentia.

* *Stirpe calcarea. Lithophyta.*

53. TUBIPORA. Corallium tubis cylindricis.
54. MADRIPORA. Corallium, ſtellis concavis.
55. MILLEPORA. Corallium, poris ſubulatis.
56. CELLEPORA. Corallium, cellulis cavis.
57. ISIS. Stirps lapidea.

** *Stirpe molliore.*

58. ANTIPATHES. Stirps cornea, ſpinulis obſita, carne gelatinoſa tecta.
59. GORGONIA. Stirps cornea, carne celluloſa ſeu vaſculoſa tecta.
60. ALCYONIUM. Stirps ſuberoſa.
61. SPONGIA. Stirps ſtupoſa, flexilis, bibula.
62. FLUSTRA. Stirps poroſiſſima.
63. TUBULARIA. Stirps tubularis, filiformis.
64. CORALLINA. Stirps articulis filiformibus calcareis.
65. SERTULARIA. Stirps articulis filiformibus fibroſis.
66. PENNATULA. Stirps coriacea, penniformis.
67. HYDRA. Stirps medulloſa, nuda.

Genera.

S. Arms 8—10, beſet with ſuckers.
C. Arms 2, dilated, extended like wings.
O. Arms 2, dilated, and placed at the ſides of the head.
L. Body convex above, flat below, lobate.

L. Arms 2—3, round and ſlender.
S. Arms 6, each pair at a diſtance.

****** *Body furniſhed with feet.*

A. Body oval, furniſhed with eyes; feelers 2, ſetaceous, annulate.
A. Body proceeding from a tube, and annulate; feelers feathered; eyes wanting.
S. Body proceeding from a tube, and jointed; feelers 2, ſimple; eyes 2.
N. Body long, creeping, with lateral pencilled peduncles; feelers ſimple.
N. Body long, creeping; peduncles furniſhed with ſimple briſtles; feelers none; eyes 0 or 2.

††† *Mouth beneath, commonly central.*

P. Body gelatinous, hanging by an air bubble.

M. Body gelatinous, ſmooth.
L. Body gelatinous, wrinkled, furniſhed with arms.

A. Body coriaceous, flat, generally radiate and muricate with papillæ.
E. Body cruſtaceous, and covered with moveable ſpines.

ORDER IV. ZOOPHYTES. Compound animals, ſhooting up like vegetables.

* *With a calcareous ſtem. Lithophyta.*

T. Coral, with cylindrical tubes.
M. Coral, with concave ſtars.
M. Coral, with ſubulate pores.
C. Coral, with hollow cells.
I. Stem ſtony.

** *With a ſofter ſtem.*

A. Stem horny, beſet with ſmall ſpines, and covered with a fleſhy gelatinous coat.
G. Stem horny, and covered with a cellular or fleſhy vaſcular coat.
A. Stem like cork.
S. Stem ſtringy, flexile, and bibulous.
F. Stem extremely porous.
T. Stem tubular, filiform.
C. Stem jointed, filiform, calcareous.

S. Stem jointed, filiform, fibrous.

P. Stem leathery, reſembling a quill.
H. Stem medullous, naked.

ORDO

Species. Inteſtina. ORDO V. INFUSORIA. Animalia minima ſimpliciora.

† *Organis externis.*

68. BRACHIONUS. Corpus teſta tectum, apice ciliatum.
69. VORTICELLA. Corpus nudum, apice ciliatum.
70. TRICHODA. Corpus altera parte crinitum.
71. CERCARIA. Corpus rotundatum caudatum.
72. LEUCOPHRA. Corpus undique ciliatum.

†† *Organis externis nullis.*

73. GONIUM. Corpus angulatum.
74. COLPODA. Corpus ſinuatum.
75. PARAMESIUM. Corpus oblongum.
76. CYCLIDIUM. Corpus orbiculare vel ovatum.
77. BURSARIA. Corpus cavum.
78. VIBRIO. Corpus elongatum.
79. ENCHELIS. Corpus cylindraceum.
80. BACILLARIA. Corpus ex trabeculis in varias formas accommodatis compoſitum.
81. VOLVOX. Corpus ſphericum.
82. MONAS. Corpus punctiforme.

Species. Inteſtina. ORDER V. INFUSORIA. Animals extremely minute and ſimple.

† *Furniſhed with external organs.*

B. Body covered with a ſhell, and ciliate at the tip.
V. Body naked, and ciliate at the tip.
T. Body hairy on one ſide.
C. Body rounded and furniſhed with a tail.
L. Body everywhere ciliate.

†† *Without external organs.*

G. Body angular.
C. Body ſinuate.
P. Body oblong.
C. Body orbicular or ovate.
B. Body hollow.
V. Body elongated.
E. Body cylindraceous.
B. Body compoſed of ſtraight ſtraw-like filaments, in poſition.
V. Body ſpherical.
M. Body a mere point.

CHAP. II. CLASSIFICATION AND NATURAL HISTORY OF THE SPECIES.

SECT. I.

ORDER I. INTESTINA.

LINNÆUS gave the name of *inteſtina* to this order, from the circumſtances of their living in concealed ſituations: while others have denominated theſe worms *inteſtinal*, from the ordinary habitation of many of them; viz. the inteſtines of other animals. As all of this order, however, do not live in theſe ſituations, the term is not ſtrictly proper. It would perhaps be better to follow the example of Goeze, and arrange all the paraſitical worms in a ſeparate order.

The moſt eſteemed works on the ſubject of the *inteſtina*, are thoſe of Pallas, *De infeſtis viventibus intra viventia;* Muller, *Hiſtoria vermium;* Bloch, a work in German, afterwards tranſlated into French; Goeze, who alſo publiſhed in German; Werner, Lamarck, Latreille; and two papers by our countrymen Mr Carliſle and Dr Hooper, which will be mentioned particularly hereafter.

Anatomiſts have not examined a ſufficient number of theſe animals, to render an account of their general ſtructure either accurate or intereſting; but we ſhall take occaſion to detail that of ſome of the more important ſpecies under their proper heads.

There is nothing in the economy of animals more obſcure, than the origin of thoſe inteſtinal worms which inhabit within other animals. Were they found to live out of theſe animals, it might eaſily be ſuppoſed that their ovula were taken with the food and drink into the body, and there gradually evolved into perfect worms. This, however, is not the caſe; moſt of them do not ſeem capable of living for any length of time in any other ſituation than within a living animal body, which appears to be the proper place for their growth and reſidence. We might hence be led to another ſuppoſition; that theſe worms are really formed from the matter within the inteſtines, which had previouſly no regular organization, were not this idea widely different from all analogy in the production of animals, where there has been any proper opportunity of examining this production. The origin, therefore, of theſe animals is a ſubject of much obſcurity. Dr Baillie is of opinion, that when the whole evidence in ſupport of both hypotheſes is compared, the grounds for believing that, in ſome orders of animals, equivocal generation takes place, appear ſtronger than thoſe for a contrary opinion *.

* *Morbid Anatomy*, chap. viii.

1. ASCARIS.

15 Aſcaris.

Body round, elaſtic, and tapering towards each extremity; head furniſhed with three veſicles; tail either ſubulate or obtuſe; inteſtines ſpiral, white, and pellucid.

This tribe is one of the moſt numerous of theſe paraſitical worms, late diſſections having diſcovered ſpecies of it in a great variety of animals, quadrupeds, birds, fiſhes, inſects, and even worms themſelves. The moſt important are thoſe which inhabit the human inteſtines; and to theſe we ſhall chiefly confine our attention, availing ourſelves of the excellent paper on theſe worms inſerted by Dr Hooper in the 5th volume of the Memoirs of the Medical Society of London.

Species. Inteſtina. *lumbricoides.*

A. *Infeſting Man.*

Head ſlightly curved inwards, with a tranſverſe contraction beneath it; mouth triangular. Fig. 1. and 2.

When full grown, they are from 12 to 15 inches in length; and in circumference equal to that of a gooſe quill.

Plate CCLI.

The head is to be diſtinguiſhed from the tail by a ſmall contraction, very obvious when the worm is lying down; it is trilobated, having three veſicles and a triangular aperture, between which is the mouth. Theſe three globoſe papillæ are joined together at their baſis, and are of the ſame colour as the reſt of the worm.

The tail may be known from the head by its very acute termination, cloſe to which is a large orifice, the extremity of the inteſtinal canal, which may betermed the anus.

The body is that part between the two extremities, forming nearly the whole of the worm; it puts on a rugoſe appearance, and has a line very apparent running on each ſide, and extending from one end to the other. Between theſe two lines are two other lines running parallel with the former, ſcarcely viſible. Near the middle of the body (rather towards the head) is a circular depreſſion of about one fourth of an inch in extent, in which is a very ſmall punctiform aperture. This depreſſed band is irregular in its appearance, when the body of the worm is diſtended, although it would appear to be wanting when collapſed, in which ſtate it moſtly eſcapes from the inteſtines.

They generally infeſt the ſmall inteſtines, and of theſe more frequently the courſe of the jejunum and ileum. Sometimes they are known to aſcend through the duodenum into the ſtomach, and are frequently ſeen to creep out at the mouth and noſtrils; it happens but rarely that they deſcend into the large inteſtines, and only after the exhibition of worm medicines, or from other cauſes, which increaſe the periſtaltic motion. They have alſo been detected, after death, in the common biliary duct, and inſtances are related where they have remained a conſiderable time in the gall bladder.

They are in general very numerous, and Dr Hooper relates an inſtance of above two hundred having been voided in the courſe of a week. Thirty or forty is a very common number, but now and then only one is found.

When recently excluded they are tranſparent, and appear as if they had been ſucking water tinged with blood; this colour, however, ſoon diſappears, and they become at length of a light and opaque yellow.

When voided they are in general very feeble and ſoon die, but when ſuddenly expelled, they ſometimes appear very lively. Their motion is ſerpentine, but is not produced by the diminution of the length of the animal by contraction. The head is ſent forward by the worm curling itſelf into circles, and ſuddenly extending itſelf with conſiderable force to ſome diſtance.

This ſpecies does not, like moſt of this order appear to be hermaphrodite, but the male and female are ſaid to be diſtinct worms.

The covering or external membrane of the worm, which may be conſidered as the cuticle, is very ſtrong, elaſtic, thin, ſmooth, and tranſparent; and eaſily ſeparates from the parts beneath, if the worm be macerated a few days after death in water.

Under the cuticle lies the cutis, or true ſkin, which is conſiderably thicker than the former, and retains the marks of the muſcles which it covers. It is alſo very ſtrong, elaſtic, and tranſparent.

When the cutis is removed, the muſcles, obſervable through the ſkin of the worm, preſent themſelves. They do not entirely ſurround the worm, as from their appearance one would be induced to believe; but are, in fact, two diſtinct orders acting in oppoſition to each other; for the two longitudinal lines, which extend from one extremity of the worm to the other, are each of them compoſed of two diſtinct tendons, ſeparable from one another. Theſe tendons ſerve for the attachment of the circular muſcles, which cover the worm from the head to the tail.

Upon removing carefully the ſemilunar muſcles from the head to the depreſſed band, a number of minute veſicles are to be ſeen (by means of a glaſs) filled with a ſubmucous fluid, which iſſues out upon puncturing them.

This cellular or parenchymatous apparatus, cloſely embraces the inteſtinal tube from the head to the depreſſed band; but from thence to the tail, there is merely a fibrous connecting ſubſtance, ſimilar to what is generally called cellular membrane.

When the muſcles are removed from the depreſſed band to the tail of the worm, an extremely delicate membrane preſents itſelf, analogous to the peritoneum, for it embraces the abdominal viſcera, and lines the cavity of the abdomen.

The cavity of the abdomen extends from the depreſſed band near the middle of the worm to the tail; it is moſtly diſtended with a tranſparent fluid, and contains the inteſtinal tube and an apparatus ſuppoſed to be ſubſervient to generation, which conſtitute the abdominal viſcera.

The inteſtinal canal begins at the obtuſe extremity or head, from the external triangular mouth ſituated between the three globoſe papillæ, and is continued for a ſmall ſpace downwards (nearly half an inch) in a parallel form. Having attained the ſize of a crow quill, it paſſes in a ſtraight direction (and gradually enlarges as it advances) through the whole length of the worm, to within the eighth part of an inch, where it becomes ſuddenly narrower, and terminates in the anus.

This canal is generally filled with a greeniſh-coloured fluid, of the conſiſtence of mucus, and not very unlike to the meconium of infants.

If a portion of this tube be macerated for a few days in water, it exhibits diſtinct coats, the external of which is a production of the peritoneum; it is externally covered with filaments, which connect it to the abdominal parietes. The ſecond viſcus is conſidered by ſome as peculiar only to the female worm, but all agree, that it is for the purpoſe of generation. It begins near the middle of the worm, where the cavity of the abdomen commences, by a ſlender tube, which is continued from the punctiform aperture, ſituated in the depreſſed band between the two longitudinal lines. This tube, which is termed the vagina, ſoon becomes much larger, when it commences uterus, and divaricates into two large crura, which, for the ſpace of four or five inches, are continued of an uniform diameter; they then on a ſudden,

Species. Inteſtina.

ſudden, become much diminiſhed in ſize, and appear like opake threads, embracing in every direction, the inteſtinal tube. Theſe are by Weruer conſidered as the fallopian tubes.

This convoluted apparatus is compoſed of very fine tranſparent membranes. It is never found empty, but is always diſtended with an opaque fluid, in which are a number of globular bodies, or ovula, containing young worms.

It has been ſuppoſed by ſome that theſe worms are viviparous; an opinion which ſeems to have ariſen from miſtaking the nature of an appearance that not unfrequently takes place; viz. a protruſion of the gyrated apparatus above deſcribed, the filaments of which look very much like young worms. A convincing proof of their being oviparous is afforded by the fact, that ovula, differing in no reſpect from thoſe found in the uterus of the worm, have been found in the mucus of the inteſtines by which they are ſurrounded.

This ſpecies was long conſidered as the ſame with the common *earth worm*, to be mentioned preſently. There are, however, many ſtriking differences, which will be enumerated under that ſpecies.

* *vermicularis.* Head ſubulate; ſkin at the ſides of the body very finely wrinkled. Vid. fig. 3. and 4.

When full grown, it is about half an inch long, and in thickneſs reſembles a fine piece of thread. The body forms about a third part of the length of the animal, beginning immediately from the head, and terminating in the tail, which is diſtinguiſhed by its gradually diminiſhing. The worm is wrinkled, annular, and pellucid. The tail terminates in a fine point; and when viewed with a magnifying glaſs, appears furniſhed with wrinkles or thick firm rings, and at its beginning there is a ſmall opening through which the excrements paſs.

They are moſt commonly ſituated in the rectum, and are continually paſſing away. They are frequently met with in the cœcum and colon, and have been found in the ſtomach and ſmall inteſtines, lying hid between their coats. They are generally in conſiderable numbers, eſpecially in the rectum of children; when they inhabit other parts, their numbers are leſs conſiderable, though above an hundred have been known to be vomited from the ſtomach of a young woman in the courſe of a day †.

† *Med. Soc. Mem.* vol. v. p. 248.

Their natural colour is a pale yellow, though they are often obſerved of a pale green, or occaſionally of a brown colour.

When the animal wiſhes to ſhift his place, he firſt moves his head, which he turns in every direction, ſometimes in a circle, at others ſo as to form the figure eight; moſt commonly its tail appears fixed, while it turns its body ſometimes to one ſide, and ſometimes to another. They are extremely lively, and have been ſeen to bury themſelves almoſt inſtantaneouſly in the ſoft fæces of children, when they are expoſed to the air. By ſome they are ſaid to jump from one place to another; and hence the name *aſcarides*, or *leaping worms*, from ασκαριζειν, *to leap*.

Theſe animals are certainly male and female, and, unlike the laſt ſpecies, they are viviparous.

The integuments of this ſpecies reſemble thoſe of the laſt, but there do not appear to be any longitudinal bands on its ſurface. The cavity, in which the bowels are ſituated, begins at a very ſmall diſtance from the head, and terminates at the commencement of the tail. The only viſcera in the male worm are the gullet, the ſtomach, and the inteſtine. The *gullet* begins at the mouth, from which it gradually enlarges for a ſmall ſpace, till it terminates in the ſtomach. This is a roundiſh bag, forming with the gullet, an organ ſhaped like the peſtle of a mortar. The inteſtinal canal is continued, more or leſs contracted or dilated, till it terminates in the anus. The contents of this canal are always of a dark brown colour.

Species. Inteſtina.

Beſides theſe organs, the female has an apparatus appropriated to generation. It begins by a ſlender tube leading from a very ſmall opening that is ſituated nearly in the middle of the body of the worm. It ſoon becomes much larger, embraces the inteſtinal tube in every direction, and fills up the cavity of the worm. It is nearly of an equal ſize throughout, and when viewed with a microſcope, it appears like a bladder diſtended with living worms.

Various mammalia are alſo infeſted with aſcarides, of which the following ſpecies are enumerated.

mammalium.

A. veſpertilionis, found in the long-eared bat; phocæ, found in ſeveral ſpecies of ſeal; bifida, inhabiting the phoca Greenlandica, or Greenland ſeal; * canis, in the inteſtines of the dog; viſceralis, in the kidneys of the ſame animal; lupi, in the wolf; vulpis, in the fox; leonis, found under the ſkin of the lion; tigridis, in the inteſtines of the tiger; felis and cati, both found in the cat; martis, in the inteſtines of the martin; bronchialis, in the lungs, and renalis, in the kidneys of the ſame animal; mephitidis, in the viſcera of the ſkink; gulonis, in the glutton; talpæ, in the mole; muris, in the mouſe; hirci, in the goat; vituli, in the lungs of cattle; * equi, in the horſe; ſuis, in the inteſtines of ſwine, and apri, in the lungs of the boar.

The following ſpecies are found in birds.

avium.

A. Aquilæ, in the eagle; albicillæ, in the inteſtines of the falco albicilla; buteonis, in the buzzard; milvi, in the kite; ſubbuteonis, in the hobby; hermaphrodita, in the pſittacus æſtivus; cornicis, of the crow; coracis, in the ſkin about the throat of the roller; cygni, in the ſwan; anatis, in the wild duck; fuligulæ, in the tufted duck; * carbonis, in the corvorant; * pelicani, in the ſhag; lari, in the gull; ciconiæ, in the ſtork; tardi, and the papilloſa, in the inteſtines of the buzzard; gallopavium, in the turkey; galli, in young fowls; gallinæ, in the hen; phaſiani, in the phaſianus pictus; tetraonis, in the grouſe; columbæ, in the houſe pigeon; alaudæ, in the lark; ſturni, in the ſtarling, and turdi, in the thruſh.

The following infeſt reptiles.

reptilium.

A. teſtudinis, the round tortoiſe; lacertæ, the newt; bufonis, the toad; pulmonalis, the lungs of the toad; rubetræ, alſo in the toad and natter jack; trachealis, in the lungs of the toad; ranæ and inteſtinalis, found in the inteſtines of frogs; dyſpneos, in the lungs of frogs, ſo as to impede their reſpiration; and inſons, alſo found in the lungs of frogs, but without impeding their breathing.

The following infeſt fiſh.

piſcium.

Anguillæ, found in the eel; *marina, in herrings, bleaks, and other fiſh; blennii, in the blenny; rhombi, in the pearl; percæ, in the perch; globicola, found in the three-ſpined ſtickle-back; * lacuſtris, in the ſtickle-back and pike; ſiluri, in the ſilurus glanis;

Species. Intestina

farionis, in the trout; truttæ, in the trout; marænæ, in the salmo maræna; acus, in the common pike; halecis, in the herring; argentinæ, in the argentine or silver fish; gobionis, in the liver of the gudgeon; rajæ, in the tail-ray; squalæ, in the shark; and lophii, in the gullet of the frog fish.

lumbrici. One species, viz. A. lumbrici, is found in lumbrici, between the skin and humours, though it is so small, as to be visible only by means of a microscope.

The species of ascaris already known, amount to about eighty.

"We are not to suppose (says Mr Bingley) that these worms are created for the purpose of producing disease in the animals they inhabit, but rather, that nature has directed that no situation should be vacant, where the work of multiplying the species of living creatures could be carried on. By thus allowing them to exist within each other, the sphere of increase is considerably enlarged. There is, however, little doubt that worms, and more especially the tape worms (*to be presently described*), do sometimes produce diseases in the body they inhabit; but we are at the same time very certain, that worms do exist abundantly in many animals without at all disturbing their functions, or annoying them in the slightest degree; and we ought to consider all the creatures rather as the concomitants than the causes of disease †."

† *Animal Biography*, vol. iii. p. 490.

17 Trichuris.

2. TRICHURIS.

Body round, elastic, and variously twisted; head much thicker than the other part, and furnished with a slender, exsertile proboscis; tail long, capillary, and tapering to a fine point.

* *hominis.* Body above slightly crenate, smooth beneath, and very finely streaked on the fore part. Vid. fig. 5. and 6.

The body, when full grown, equals in breadth the one-sixteenth of an inch. In length the whole worm measures nearly two inches, two-thirds of which are tail, hence the French call it *le ver à queue*.

The large extremity of the trichuris is the head, out of which proceeds a kind of proboscis, not always visible, for the animal has the power of ejecting and drawing within itself this instrument at pleasure.

The body may be said to begin at the basis of the proboscis; it is the thickest part of the worm, and the most so at the extremity, where the proboscis is received. It gradually diminishes in size as it proceeds, and forms about one-third of its length.

The tail commences where the body terminates. It is twice as long as the body, and appears like a fine hair, gradually becoming smaller, and at length terminates in a very fine point.

Upwards of twenty have been seen in some fæces of a child six years old, and according to the account of Blumenbach, they are, in general, in considerable number.

Wrisberg, Blumenbach, and others, have found these worms in the intestinum rectum, in the inferior part of the ileum, and also in the jejunum, mixed with their pultaceous contents. They have seldom, if ever, been seen after death, but in the cœcum. In colour it resembles the *ascaris vermicularis*.

Goeze has given a drawing of a female trichuris, and says it has no proboscis, which he supposes to be the male organ of generation; but as there is no material difference in the viscera of particular individuals, Dr Hooper is inclined to doubt the fact.

Species. Intestina.

This curious and singular animal is supplied, like the foregoing genus, with annular muscles, cutis, and cuticle.

The proboscis, which is undoubtedly the head of the worm, appears to be formed of a transparent substance, and contains a canal which is continued through the pulpy or funnel-like portion to the stomach and intestine.

The stomach and intestine are formed by a long canal, which proceeds in a direct line from the head to the very extremity of the worm. It is largest at its beginning, and continues of the same size throughout the body of the animal; and when arrived at the place where the tail commences, it suddenly becomes considerably less in diameter, and terminates in the anus.

The remaining viscus, or ovarium, is a convoluted canal, similar to that of the female vermicular ascaris, but is seldom found embracing the intestinal tube. The contents of this canal are ovula and a limpid fluid. There have seldom been seen any young worms *.

* *Mem. Med. Soc.*

Besides the above species, five others have been described; viz. T. equi, found in the intestines of the horse; apri, in the boar; muris, in the mouse; vulpis, in the fox; and lacerta, in the lacerta apus.

mammalium.

18 Filaria.

3. FILARIA.

Body round, filiform, equal, and quite smooth; mouth dilated, with a roundish concave lip.

The most important species of this genus is the F. medinensis, or guinea worm. Gmelin has arranged the animal as a filaria, though Linnæus makes it a species of gordius, in which he is followed by Bruigiere and Barbut. Mr Bingley, in his Animal Biography, chooses to consider it as the same with the *furia infernalis* of Linnæus, a species to be mentioned by and bye. The French call it *dragonneau*, and the older medical writers, *dracunculus*. It is characterised by having the body entirely of a pale yellow colour. It inhabits both the Indies and the coast of Guinea, and is said commonly to make its appearance in the morning dew. It enters the feet and other exposed parts of the slaves, and occasions very troublesome symptoms.

medinensis or guinea worm.

It attacks most parts of the body; but is generally confined to the lower extremities, particularly to the feet and ancles. The disease is more painful and dangerous when seated in parts thinly covered with flesh, such as near the joints, tendons, and ligaments, and less so in muscular parts. It is always difficult to extract the worm from the ancles, tarsus, and metatarsus, and sometimes impossible from the toes. The consequences frequently are, tedious suppurations, contractions of the tendons, diseased joints, and gangrene. When pulled, the worm often excites a pain which it is not easy to describe, and which, in these parts, is extremely exquisite. It seems to attach itself to the nerves, ligaments, and tendons, and when pulled even with the slightest force, excites excruciating pain. The track of the animal appears to be for the most part confined

Species. Inteſtina.

fined to the cellular membrane, and probably ſeldom extends deeper, or penetrates into the interſtices of the muſcles.

* *Edinburgh Med. Journ.* vol. i. p. 145.

The diſeaſe produced by this animal is a ſpecies of inflammation, which ſometimes is very troubleſome, and now and then is ſaid to terminate in mortification. The worm ſometimes appears at firſt like a hair, and becomes thicker as it is drawn from below the ſkin. It generally has a ſharp point, and is otherwiſe all of the ſame thickneſs. It may ſometimes be felt below the ſkin, like the ſtring of a violin. Various cauſes are aſſigned for the generation of this worm, but in the countries where it is uſually found, it is thought to be generated by drinking impure water. It is more probable that it inſinuates itſelf from without.

The method commonly employed for extracting this animal is, to ſearch for its extremity in the inflamed part, where there is uſually an ulcer, and this is to be drawn out gently, and wrapt round a piece of linen rag, when the pulling is continued very gently till the worm makes ſo much reſiſtance that there is great danger of breaking it, an accident which is ſaid to be attended with very bad conſequences, as the remaining part of the worm becomes more irritating, and produces a more violent degree of inflammation. When no more will eaſily come away, the part already extracted, rolled round the rag, is left to dry, the part covered from the air, and the operation is repeated occaſionally till the whole worm is withdrawn.

mammalium. Four ſpecies of filaria are found in ſome of the mammalia, viz. F. equi. in the cellular membrane of the horſe; leonis, in the lion; martis in the martin; and leporis, in the hare.

avium. Five infeſt birds, viz. F. falconis, the hawk; ſtrigis, the owl; cornicis, the crow; ciconiæ, the ſtork; and gallinæ, the inteſtines of poultry.

infectorum. The following infeſt perfect inſects, viz. F. ſcarabæi, the ſcarabæus ſemitarcus; ſilphæ, in the ſilpha obſcura; carabi, in the carabus; grylli, in the cricket, and monoculi, in the monoculus apus.

Thirteen are found in the larvæ of various ſpecies of inſects.

There are about 28 ſpecies of this genus diſtinguiſhed in the *Syſtema Naturæ*.

19 Uncinaria.

4. Uncinaria.

Body filiform, elaſtic, the fore part obſcurely tuberculate, with membranaceous angular lips; tail of the female ending in a fine point, of the male armed with two cuſpidate hooks encloſed in a pellucid veſicle.

Of this genus there are only two ſpecies; viz. *melis*, found in the inteſtines of the badgers; and *vulpis*, in thoſe of the fox.

20 Scolex.

5. Scolex.

Body gelatinous, variouſly ſhaped, broadiſh on the fore part and pointed behind; ſometimes linear and long, ſometimes wrinkled and ſhort, round, flexuous, or depreſſed; the head protruſile and retractile.

This genus alſo contains two ſpecies; viz. pleuronectidis, and lophii, both found in ſeveral ſpecies of fiſh.

Species. Inteſtina.

6. Ligula.

21 Ligula.

Body linear, equal, long; the fore part obtuſe; the hind part acute, with an impreſſed dorſal ſuture.

There are two ſpecies of this genus, viz. *inteſtinalis* and *abdominalis*, infeſting ſeveral varieties of fiſh.

7. Linguatula.

22 Linguatula.

Body depreſſed, oblong; mouth placed before, ſurrounded with four paſſages.

Of this genus there is only one ſpecies, viz. ſerrata, found in the lungs of the hare.

8. Strongylus.

23 Strongylus.

Body round, long, pellucid, glabrous; the fore part globular, truncate, with a circular aperture fringed at the margin; the hind part of the female entire and pointed, of the male dilated into looſe, diſtant, pellucid membranes.

There are two ſpecies, viz. equinus, found in great numbers in the inteſtines of the horſe, and ovinus in thoſe of ſheep.

9. Echinorynchus.

24 Echinorynchus.

Body round; proboſcis cylindrical, retractile, and crowned with hooked prickles.

This is a very numerous genus, and is found in a great variety of animals, generally in their inteſtines, to which they are found very firmly fixed, often remaining on the ſame ſpot during the whole life of the animal. They are commonly gregarious, and are to be diſtinguiſhed from the tænia, to be preſently deſcribed, by their having the body round, and deſtitute of joints.

Four ſpecies infeſt the mammalia, viz. E. phocæ, found in great numbers in the inteſtines of the harp and rough ſeal, ſo as ſometimes nearly to devour them; tubifer, in the ſtomach of the harp ſeal; gigas, in ſwine, eſpecially thoſe kept in ſtyes; and balenæ, in the inteſtines of the whale. *mammalium.*

14 infeſt birds, viz. E. butconis, the buzzard; ſcopis, in the ſtrix ſcopo; aluconis, in the ſtrix aluco; ſtrigis, in the tawny owl; pici, in various ſpecies of picus; borealis, in the cider duck; boſchadis, in the common duck; anatis, in the velvet duck; mergi, in the mergus minutus; alcæ, in the auk; ardeæ, and gazæ, in the ardea alba, or white heron; vanillæ, in the lapwing, and merulus, in the blackbird and tree ſparrow. *avium.*

Two infeſt reptiles, viz. E. ranæ, the frog; and falcatus, the ſalamander. *reptilium.*

28 infeſt fiſh; viz. E. anguillæ, the eel; xiphia, the ſword-fiſh; candidus, found in ſeveral ſpecies of fiſh; lineolatus, in the cod; longicolli, in the torſk; pleuronectis, in the turbot; attenuatus, in the flounder; annulatus, in the father-laſher, torſk, and bream; plateſſoidæ, in the pleuronectes plateſſoides; percæ, in the perch; cernuæ, in the ruffe; cobites, in the bearded loach; ſalmonis, in the ſalmon; ſublobatus, and quadriroſtris, found alſo in ſalmon; truttæ, in the trout; *piſcium.*

murenæ,

Species. Inteſtina. murænæ, in the ſalmo murænas; lucii, in the pike; argentinæ, in the argentine; aloſa, in the ſhad; barbi, in the barbel; carpionis, in the carp; idbari, in the cyprinus idbarus; affinis, in the roach; rutili, alſo found in the roach, but ſeldom; bramæ, in the bream; lophii, in the frog-fiſh, and ſturionis, in the ſturgeon. There are in all about 48 ſpecies.

25 Hæruca.

10. HÆRUCA.

Body round, the fore part two-necked, and ſurrounded with a ſingle row of prickles; proboſcis none.

There is only one ſpecies, viz. H. muris, found in the inteſtines of the mouſe.

26 Cucullanus.

11. CUCULLANUS.

Body ſharp, pointed behind, and obtuſe before; mouth orbicular, with a ſtriate hood.

There are eight ſpecies, three of which are found in various mammalia, viz. C. talpæ, and ocreatus in the mole; and muris in the mouſe.

mammalium. One infeſts birds, viz.

C. buteonis, commonly found in the buzzard.

ranæ. piſcium. One, viz.

C. ranæ, is found in the inteſtines of the frog.

Several varieties under the common name of lacuſtris, and two others, called aſcaroides, and murinus, are found in various ſpecies of fiſh.

27 Caryophyllæus.

12. CARYOPHYLLÆUS.

Body round; mouth dilated and fringed.

There is only one ſpecies, called caryophyllæus piſcium, found in various ſpecies of fiſhes.

28 Faſciola.

13. FASCIOLA.

Body flattiſh, with an aperture or pore at the head, and generally another at a diſtance beneath, ſeldom a ſingle one.

Cuvier remarks, that the body of the faſciola is extremely flat. They appear to be hermaphrodite, and are oviparous. They are found in almoſt every ſpecies of animals.

hominis. One is found in man, though rarely, viz. faſciola hominis.

mammalium. Twelve in various ſpecies of the mammalia, viz. vulpis, in the inteſtines of the fox; putorii, in thoſe of the polecat; melis, in thoſe of the badger; veſpertilionis, in the inteſtines of the long-eared bat; * hepatica, in the livers of ſheep; boum, in thoſe of cattle; porcorum, in the liver of ſwine; apri, in that of the boar; cervi, in that of deer; equi, in the liver of horſes; and elaphi, in the ſtomach of the ſtag.

hepatica or *fluke.* Of theſe, the moſt important is the faſciola hepatica, or fluke, which is ſo common in the liver of ſheep, in which it is ſuppoſed to be the principal cauſe of the rot. —This ſpecies is about an inch long, broadeſt on the fore-part, which is furniſhed with a large mouth. It terminates in a tube; the back is marked with a row of about eight longitudinal furrows. It is generally found fixed by two points, one at one extremity, and another at about the middle of the abdomen. It bears ſome reſemblance to the ſeed of the common gourd, whence it is often called the *gourd worm.*

Species. Inteſtina.

The opinion of flukes being the cauſe of the rot, has been ably controverted by ſeveral writers, eſpecially by Dr Harriſon. On this ſubject, ſee the article FARRIERY, N° 526. This opinion is ſuppoſed to be corroborated by a circumſtance related in the firſt volume of the Monthly Magazine, page 101. of a jelly-like ſubſtance being found among the graſs, in a paſture that was notorious for rotting ſheep. This ſubſtance bore a ſtriking reſemblance to the flukes found in the liver of rotten ſheep; but we are afterwards told, that having been waſhed into a ditch, and attended to daily, it was, in proceſs of time transformed into a ſmall ſnail, with an aſh-coloured ſpiral ſhell. It is therefore probable that it was not flukes; and indeed there is no well authenticated inſtance of theſe animals having been found out of the bodies of ſheep, except when it could be proved, that they had been vomited by thoſe animals.

Nine ſpecies of faſciola are found in birds, viz. *avium.*

F. bilis, in the gall duct of the eagle; buteonis, in the buzzard; milvi and ſtrigis, in the inteſtines of the kite; puſilla, found in the thorax of the ſtrix alba; anatis, in the duck; anſeris, in the gooſe; gruis in the crane, and ardeæ, in the bittern.

Three ſpecies infeſt reptiles, viz. *reptilium.*

F. ſalamandri, the ſalamander; ranæ, the common frog, and uncinulata, the eſculent frog.

21 inhabit various kinds of fiſh, viz.

F. Binodis, diſticha, anguillæ, ſcabra, eglefini, blennii, ſcorpii, plateſſæ, luciopercæ, percæ, lugæna, clavata, varica, eriocis, farionis, trutta, umblæ, lucii, halecis, * bramæ, jeſis. *piſcium.*

One, viz.

F. loliginis, inhabits the ſepia loligo, or cuttle fiſh. *loliginis.*

29 Tænia.

14. TÆNIA.

Body uſually flat, and compoſed of numerous articulations; head with four orifices for ſuction, which are ſeated a little below the mouth; mouth terminal, continued by a ſhort tube into two ventral canals, and generally crowned with a double ſeries of retractile hooks.

The ſpecies of this genus, which are very numerous, are diſtributed into three ſections, according to the ſituation which they inhabit in various animals, &c.

A. *Found in other parts beſides the inteſtines, and furniſhed with a veſicle behind.*

The ſpecies of this ſection are commonly known to medical writers by the name of hydatids, from the bladders, of which they are chiefly compoſed, being filled with a watery fluid.

The following inhabit various ſpecies of mammalia; T. viſceralis, piſiform, incloſed in a veſicle, broad on the fore part, and pointed behind.—Found in the liver, placenta, kidneys, ſacs containing dropſical fluids, and other morbid tumours in man. *viſceralis* or *hydatids.*

There is no gland in the human body in which hydatids are ſo frequently found as the liver, except the kidneys, where they are ſtill more common. Hydatids of the liver are uſually found in a cyſt, which is frequently of conſiderable ſize, and is formed of very firm materials,

Species. Inteſtina.

materials, ſo as to give to the touch almoſt the feeling of cartilage. This cyſt, when cut into, is obviouſly laminated, and is much thicker in one liver than another. In ſome livers, it is not thicker than a ſhilling, and in others, it is near a quarter of an inch in thickneſs. The laminæ which compoſe it are formed of a white matter, and on the inſide there is a lining of a pulpy ſubſtance, like the coagulable lymph. In a cyſt may be found one hydatid, or a greater number of them. They lie looſe in the cavity, ſwimming in a fluid; or ſome of them are attached to the ſide of the cyſt. They conſiſt of a round bag, which is compoſed of a white, ſemi-opaque, pulpy matter, and contain a fluid capable of coagulation. Although the common colour of hydatids be white, yet they are ſeen occaſionally of a light amber. The bag of the hydatid conſiſts of two laminæ, and poſſeſſes a good deal of contractile power. In one hydatid, this coat or bag is much thicker and more opaque than in another, and even in the ſame hydatid different parts of it will often differ in thickneſs. On the inſide of an hydatid, ſmaller ones are ſometimes found, which are commonly not larger than the heads of pins, but ſometimes they are even larger than a gooſeberry. Theſe are attached to the larger hydatid, either at ſcattered irregular diſtances, or ſo as to form ſmall cluſters; and they are alſo found floating looſe in the liquor of the larger hydatids. Hydatids of the liver are often found unconnected with each other; but ſometimes they have been ſaid to incloſe each other in a ſeries, like pill-boxes. The moſt common ſituation of hydatids of the liver, is in its ſubſtance, and incloſed in a cyſt; but they are occaſionally attached to the outer ſurface of the liver, hanging from it, and occupying more or leſs of the general cavity of the abdomen.*

* *Baillie's Morbid Anatomy*, chap. ix.

celluloſa.

Another ſpecies called celluloſa, is found in the cellular membrane of man.

mammalium.

The following infeſt others of the mammalia, viz. T. ſimiæ, found in the diaphragm of the ape; veſpertilionis, in the liver of the bat; vulpis in the fox; putorii, in the pole-cat; urſi, in the bear; gulonis, in the glutton; hydatigena, in various ſpecies of rat; murina, in the liver of the mouſe; cordata, in mice and hares; piſiformis, in the liver of hares; utricularis, in the gravid uterus of the ſame animal; ferarum, in deers and antelopes; caprina, in the goat; ovilla, in the liver and omentum of ſheep; cerebralis, within the ſkull of ſheep, conſtituting the diſeaſe called *ſturdy* or *turnſick*; (ſee FARRIERY, N° 521.) vervecina, in the peritoneum of fat ſheep; granuloſa, in the liver of ſheep; bovina, in cattle; apri, in the boar; globoſa, chiefly found in the bowels of ſwine; and pinna, in the cellular ſubſtance of ſwine.

reptilium.

Two infeſt reptiles, viz.

T. ſalamandri, the ſalamander; and ſerpentum, in various ſerpents.

One viz.

truttæ.

T. truttæ, is found in the liver of the trout.

The origin and real nature of hydatids are not fully aſcertained. There is no doubt at all, that the hydatids in the livers of ſheep are animalcules; they have been often ſeen to move when taken out of the liver, and put into warm water; and they retain this power of motion for a good many hours after a ſheep has been killed. The analogy is great between hydatids in the liver of a ſheep, and in that of a human ſubject. In both they are contained in ſtrong cyſts, and in both they conſiſt of the ſame white pulpy matter. There is undoubtedly ſome difference between them in ſimplicity of organization; the hydatid in the human liver being a ſimple, uniform bag, and the hydatid in that of the ſheep having a neck and mouth appended to the bag. This difference need be no conſiderable objection to the opinion above ſtated. Life may be conceived to be attached to the moſt ſimple form of organization. In proof of this, hydatids have been found in the brains of ſheep, reſembling almoſt exactly thoſe in the human liver, and which have been ſeen to move, and therefore are certainly known to be animalcules. The hydatids of the human liver indeed, have not, as far as we know, been found to move when taken out of the body and put into warm water; were this to have happened, no uncertainty would remain.

Species. Inteſtina.

An excellent paper on the ſubject of hydatids, by Dr John Hunter, is contained in the Medical and Chirurgical Tranſactions.

B. *Having no terminal veſicle, and found only in the inteſtines of other animals.*

30 Tape worms.

This ſection comprehends the tæniæ properly ſo called, or tape-worms, which are the moſt troubleſome of all the ſpecies that inhabit the inteſtinal canal. Of theſe, the following two ſpecies that are confined to man, merit our particular attention.

ſolium.

Articulations long and narrow, with marginal mouths, one on each joint, and generally alternate; ovaries arboreſcent. *Vide* fig. 7. and 8.

This ſpecies is frequently bred in the inteſtines of the inhabitants of Germany, and occaſionally, but rarely, in thoſe of the inhabitants of Great Britain. It conſiſts of a great many diſtinct portions, which are connected together ſo as to aſſume a jointed appearance; theſe joints are commonly of a very white colour, but are occaſionally browniſh, which depends on a fluid of this colour that is found in their veſſels. The worm is uſually very long, extending often many yards, and ſeldom paſſes entire from the bowels. This circumſtance has prevented the extremities of the tænia from being often ſeen.

Boerhaave mentions his having met with a tænia 30 ells in length, and Pliny ſays he has ſeen them upwards of 30 feet long. According to Dr Hooper, the exact length depends upon the manner in which the death of the animal has been occaſioned. If expelled by irritating medicines, it will not be ſo long by nearly one-half as if its death had been occaſioned by emollients; as in the former inſtance it would be very much contracted, but in the latter very much relaxed.

The head of this tænia is ſomewhat of a ſquare form with a narrowed projection forwards; in the middle of this projecting part, there is a diſtinct circular aperture around the edge of which grow curved-ſhaped proceſſes. Near the angles of the ſquare edge of the head, are ſituated four round projecting apertures at equal diſtances from each other; this head is placed upon a narrow jointed portion of the worm, of conſiderable length, and which gradually ſpreads itſelf into the broader joints, of which the body of the worm is compoſed.

The body of the tænia conſiſts of thin, flat, pretty long joints, on one edge of which there is a projection, with

Species. Inteſtina.

with a very obvious aperture. In the ſame worm ſome of theſe joints appear conſiderably longer than others; this probably depends on one joint being contracted, while another is relaxed. The apertures which we have juſt mentioned are generally placed on the edge of the contiguous joints; but this is not uniformly the caſe; they are ſometimes placed on the ſame edges of two, or even ſeveral contiguous joints. When theſe joints are examined attentively, there are frequently ſeen, in each of them, veſſels filled with a browniſh fluid, and diſpoſed in an arboreſcent form. Around the edges of each joint, there is alſo a diſtinct ſerpentine canal. The laſt joint of a tænia reſembles very much a common joint rounded off at its extremity, and without any aperture.

The joints of this ſpecies are very eaſily ſeparated from each other whilſt the animal is alive. This ſeparation is effected either by the periſtaltic motion of the inteſtines, or perhaps ſpontaneouſly. Each joint thus detached from the mother worm, has the power of retaining, for a conſiderable time, its living principle, and is called, from its reſemblance to the ſeed of the gourd, *vermis cucurbitinus*. This phenomenon has given riſe to many warm diſputes; ſeveral authors have denied their being portions of tænia, and have affirmed that they were diſtinct worms. The ſeparated joints do not appear capable of retaining their ſituation for any length of time, but are ſoon forced down the inteſtinal tube, and at length creep out, or are expelled per anum. There are ſeveral caſes faithfully recorded, where the perſons, if their veracity can be depended upon, (and they had no intereſt in deceiving) have voided, during the time they were troubled with the worm, upwards of fifteen thouſand.

This worm is not in general ſolitary, as is commonly ſuppoſed, for ſeveral of them have been ſeen coming away at the ſame time.

They are always found in the ſmall inteſtines, commonly occupying their whole extent.

The motion of theſe worms is undulatory. The firſt joint towards the head contracts; the ſucceeding ones follow ſucceſſively, and the worm is at length drawn conſiderably forwards, exactly in the ſame manner in which the earth-worm is ſeen to move, only conſiderably ſlower. By this means the food taken in at the mouth of the worm is very ſoon conveyed all along the alimentary canal, and may ſometimes be ſeen moving along with conſiderable rapidity.

There can be very little doubt, that the tænia is hermaphrodite. The oſcula are obſerved to be viſcera, ſubſervient to the propagation of the ſpecies, as it can be proved, that they give exit to the ovula.

lata. Articulations ſhort and broader than thoſe of the laſt, with a mouth in the centre of each joint; ovaries ſtillate round the mouth.

It is compoſed of a head, a chain of articulations, and a tail formed of a round joint, as in the laſt ſpecies. The head is ſimilar to that of the other ſpecies.

The joints are more uniform in their appearance than thoſe of the tænia ſolium. They are conſiderably more broad than long, and their oſcula are not placed on the margin, but in the middle of the flattened ſurface, and only on one ſide. We have never ſeen them change their ſide, but have always obſerved them on the ſame ſide throughout the whole extent of the worm.

Species. Inteſtina.

In every other reſpect the deſcription of this ſpecies agrees with that above given of the other, except that the ovaria are in the form of a roſe or ſtar, hence they are called by ſome writers, *ovaria roſacea*, and others, *ſtigmates roſaceæ*; and that the tranſverſe canals by which there is in the other ſpecies a communication between the longitudinal canals are in this wanting.

The number of this ſpecies is uncertain, but there are ſeldom more than three or four.

Its length is commonly leſs than that of the laſt ſpecies, ſeldom exceeding five yards.

It is always ſituated in the ſmall inteſtines, and it appears that it feeds on no other food than pure chyle.

It is for the moſt part of a darker hue than the former ſpecies, though they have been ſeen as white as milk.

This ſpecies is very ſeldom met with in this country, but is endemic in Switzerland and Ruſſia, and very common in Germany and ſome other parts of Europe.

For a more particular account of the anatomical ſtructure of tæniæ, we refer our readers to a paper by Mr Carliſle, in the ſecond volume of the Lin. Tranſ. and Dr Hooper's paper in the fifth volume of the Memoirs of the Medical Society of London. For an account of the ſymptoms produced by theſe worms and the aſcarides, and the method of treatment, ſee WORMS, MEDICINE *Index*: and for the remedies employed in theſe caſes, ſee ANTHELMINTICS, MATERIA MEDICA *Index*.

The following ſpecies inhabit various mammalia, viz.

mammalium. Catenæformis, of which there are ſeven varieties found in the dog, the wolf, the fox, the cat, the ſquirrel, and the dormouſe; cucurbitina, in the dog; ſerrata, in the dog and cat; maniliformis, in the cat; lineata, in the wild cat; muſtelæ, in the weazel, martin, and polecat; filamentoſa, in the inteſtines of the mole; erinacei, in the hedge-hog; ſtraminea, in the mus cricetus; magna and quadriloba, in the horſe; and capriña, in the goat.

avium. The following infeſt birds, viz.

Pſittaci, in the pſittachus brachyurpus; cornicis, in the crow; ſerpentiformis, in crows, rooks, and magpies; caryocactus, in the nut-cracker; crateriformis, in the ſpotted wood-pecker; torqueta, in the duck; ſcolopacis and filum, in the woodcock; infundibuliformis, in the buzzard, ducks, and poultry; ſturni, in the ſtarling; paſſeris, in the ſparrow; and hirundinis, in the martin ſwallow.

noduloſa. One, viz.

T. Noduloſa, infeſts various ſpecies of fiſh.

C *Head unarmed with hooks.*

mammalium. Of this ſection the following infeſt the mammalia, viz;

Dentata, ſometimes ſaid to be found in mankind; phocæ, in the great ſeal; baſſilaris, in the mole; pectinata, in the hare and rabbit; ovina, in ſheep; equina in the horſe; and ſuis, in the Ethiopian hog.

avium. The following are found in birds, viz.

Globifera, in the buzzard, lanner, and thruſh; perlata, in the buzzard; flagellum, in the kite; candelabraria, in the Aluco owl; crenata, in the ſpotted woodpecker; lanceolata, in the merganſer and ſmew; ſetigera,

Species. Inteſtina.

gera, and anſeris, in the gooſe; anatis, in various ſpecies of duck; lævis, in the duck, &c.; cuneata, in various ſpecies; alcæ, in the auk; tordæ, in the razor-bill; tardæ, in the buſtard; linea in partridges; and maculata, in the red-wing.

One, viz.;

bufonis. Bufonis, is found in the toad and ſalamander.

The following infeſt fiſh, viz.

piſcium. Anguillæ, in the eel; rugoſa, in the cod; ſcorpii, in the armed bullhead; percæ, in the ſea perch; erythrinæ, in the Norway perch; cernuæ, in the ruffe; ſolida and gaſteroſtei in the ſtickle-back; ſiluri, in the ſilurus glanis; ſalmonis, in the ſalmon; frœlichii, in the ſalmo weſtmanni; rectangulum, in the barbel; torruloſa, in the cyprinus jeſes, and laticeps, in the bream.

Gmelin, in his edition of the *Syſtema Naturæ*, enumerates 86 ſpecies of the tænia.

31 Furia.

15. Furia.

Body linear, equal, filiform, and ciliate on each ſide, with a ſingle row of reflected prickles preſſed cloſe to the body.

infernalis. There is only one ſpecies, viz. infernalis.

From the account given of this animal in the *Syſt. Nat.* it appears to be a very formidable creature. It inhabits the extenſive marſhy plains of Bothnia; is about an inch long, and of a pale red or brown colour, generally with a black tip. It mounts up the ſedges and ſhrubs, and being driven by the wind through the air, enters through the ſkin of men and horſes in ſuch parts as are expoſed and ſituated obliquely; leaving a black mark where it had entered. It firſt excites a ſenſation like the prick of a needle, which is followed by violent itching and acute pain. An inflammation and commonly gangrene is the conſequence, attended with fever, faintings and delirium, and frequently terminating in a ſhort time in death, unleſs the worm is ſpeedily extracted, which is a work of conſiderable difficulty. The part where the worm entered is to be ſcarified, and anointed with oil of birch, or covered with a poultice of curds or cheeſe.

32 Gordius.

16. Gordius.

Body round, equal, filiform, and ſmooth. Body pale brown (or yellowiſh) with dark extremities. *Water hair-worm.*

aquaticus. This worm is about the thickneſs of a horſe's hair, and when full grown, is ten or twelve inches in length. Its ſkin is ſomewhat gloſſy, and of a pale yellowiſh white, except the head and tail, which are black. It is common in our freſh waters, and particularly in ſuch where the bottom is compoſed of ſoft clay, through which it paſſes as a fiſh does through water.

Its popular name aroſe from the idea that it was produced from the hair of horſes and other animals that were accidentally dropped into the water; an idea that is yet prevalent among the lower claſs of people.

Its Linnæan name of gordius originated in the habit that it has of twiſting itſelf into ſuch peculiar contortions as to reſemble a complicated gordian knot. In this ſtate it often continues for a conſiderable time, and then ſlowly diſengaging itſelf, extends its body to the full length. Sometimes it moves in the water with a tolerable quick undulative motion like that of a leech; and at other times its motions are the moſt ſlow and and languid imaginable. When the water in which it ſwims happens to be dried up, it ſoon loſes every appearance of life; the ſlender body ſhrivels, and it may be kept in this ſtate a conſiderable time. But whenever it is put into water its body ſoon reaſſumes its former appearance; in leſs than half an hour it begins to move, and in a few minutes more it is as active and lively as ever. How long it may be preſerved in this dried ſtate without loſing its life, or how often it might admit of being revived, has not been aſcertained. When kept in a veſſel of water, it will ſometimes appear motionleſs and as if dead for ſeveral hours, and afterwards will reſume its vigour, and ſeem as healthy as before.

Species. Inteſtina.

It is a very remarkable circumſtance, that its bite, which it ſometimes inflicts on being taken out of the water, has been known to produce the complaint called a whitlow. This is mentioned by Linnæus as a popular opinion in Sweden, and it has ſince his time been confirmed by various other perſons.

This gordius is ſometimes found in the earth as well as in water, and particularly in gardens of a clayey ſoil, after rain.

Beſides this ſpecies four others are enumerated, viz. Argillaceus, filum, lacteus, and arenarius; but it is probable that the firſt of theſe, which is ſaid to pierce through clay, to give paſſage to water, is merely a variety of the aquaticus.

33 Hirudo.

17. Hirudo.

Body oblong, truncate at both ends, unarmed and cartilaginous, moving by dilating the head and tail, and contracting itſelf into an arch.

medicinalis. Elongated, of an olive black colour, with ſix yellow ferruginous lines above, and yellow ſpots below. *Medicinal leech.*—This ſpecies is generally two or three inches long, when lying in its natural ſtate, though it is capable of very great dilatation. The body is compoſed of numerous annular wrinkles, which may be ſeen projecting, and by which the animal can expand or contract its body at pleaſure. The head is ſmaller than the tail. This latter terminates in a circular muſcle or ſucker, which, when applied to any ſubſtance eaſily adheres; probably by the animal's drawing up the middle, and thereby exhauſting the air below. By means of the tail it faſtens itſelf with eaſe and ſecurity, while it extends the other parts of its body in any direction; and it is ſo firmly fixed, that it can move about without any danger of being carried away by the current. When the animal is deſirous of changing its place, it extends its body forwards, fixes its head in the ſame manner as it did its tail, which latter it then looſens, draws up, and then faſtens near its head, ſo as to form a freſh point from which to continue its movements.

Its head is furniſhed with three teeth, of a ſubſtance reſembling cartilage, which are ſo ſituated as to converge when the animal bites, and to leave a triangular mark on the ſkin. Theſe teeth are ſo ſtrong that by means of them the animal can pierce the ſkin of an ox or a horſe, as well as that of man; and through the holes which it forms, it ſucks the blood. This appears to be done by contracting the muſcles of its throat, ſo

Species. Inteſtina.

as to make the blood ruſh through the vacuum formed above the wound, into the ſtomach of the leech. This ſtomach is a kind of membranaceous ſkin, divided into 24 ſmall cells. If ſuffered to retain the blood which it has ſucked, this is ſaid to remain in the ſtomach of the animal, for months together, almoſt without coagulating, and to afford ſupport to the animal during the whole of that time. It appears to paſs off through the pores of the ſkin by tranſpiration, the matter fixing on the ſurface of the body, and afterwards coming off in ſmall filaments. Mr Bingley affirms in proof of this, that if a leech be immerſed in oil (where it will keep alive for ſeveral days), and afterwards put into water, a ſlough will be ſeen to looſen from its ſkin, exactly of the ſhape of the animal.

It is viviparous, and produces only one at a time, which is commonly in the month of July. It inhabits clear running waters, but may be kept for a conſiderable time in veſſels partly filled with water, which ſhould be changed occaſionally, when it becomes putrid. In general, if the number of leeches kept together is not great, the water need not be changed oftener than once a month in winter, and once every fortnight in ſummer; and we have known inſtances where ſeveral leeches have, when neglected, lived for ſeveral months in the ſame water. If, however, the number be large, they frequently die, which is thought to be owing to their fighting and killing each other.

34 Method of applying leeches.

When leeches are to be applied for the purpoſe of extracting blood from any part of the body, the moſt lively, and thoſe of a moderate ſize, ſhould be ſelected for that purpoſe; and they ſhould be ſuffered to remain out of the water in a covered veſſel for ſome time before they are applied. The beſt method of applying them is, to put them within a hollow glaſs tube, ground ſmooth at one end, open at both extremities, and bended ſo as to admit of its being applied to any part occaſionally. The leech will commonly ſoon fix, but the ſkin to which it is to be applied ſhould always be waſhed thoroughly clean, and ſhould be freed from hair. If the animal is averſe to fix, it may often be enticed to do ſo by rubbing the part of the ſkin with a little freſh cream, or new milk. When the leech has gorged itſelf with blood, it commonly drops off ſpontaneouſly; but if it ſhould be too long in quitting its hold, it may be ſpeedily made to do ſo by inſerting a little ſalt, pepper, vinegar, or other acrid ſubſtance, between the margin of its head and the ſkin. As a leech, after it has been uſed for drawing blood, will not, for a long time, ſuck again, if ſuffered to retain the blood it has drawn, various methods have been contrived to evacuate the blood. The common method is, to ſprinkle a little ſalt upon its mouth, which commonly makes it diſgorge a great quantity of blood; but we are not certain whether more animals are not killed in this way than by ſuffering the blood to remain. The moſt effectual, and we believe the ſafeſt method of making them diſgorge the blood is, to lay hold of them by the tail, and ſtrip them between the fingers, after which they ſhould be put into clean water.

The beſt method of conveying leeches to a diſtance is, to put them into a ſtrong, wide-mouthed glaſs bottle, and to put with them a piece of ſponge thoroughly wetted with water, tying a piece of bladder pricked with holes over the mouth of the bottle.

Species. Inteſtina.

It is ſaid that leeches, when kept in bottles, will become very reſtleſs juſt before a change of weather is about to take place. This may be the caſe, but from many obſervations which we have made, we believe that they afford very uncertain preſages of the ſtate of the atmoſphere.

Elongated, of an olive brown colour, with an ochre-yellow marginal band. *Horſe-leech.* — *ſanguiſuga.*

This is larger than the former; its ſkin is ſmooth and gloſſy; its back of a duſky colour, and the belly of a yellowiſh green; its body is depreſſed. It inhabits ſtagnant waters. It is to be carefully diſtinguiſhed from the former ſpecies, as it will not anſwer the purpoſes of ſurgery.

Beſides theſe two ſpecies, the following are deſcribed in the *Syſtema Naturæ*, viz.; indica, lineata, *octoculata, * ſtagnalis, complanata, * viridis, * heteroclyta, * geometra, teſſelata, marginata, groſſa, hippogloſſi, * crenata, * muricata, and branchiata. In all 17 ſpecies.

18. LUMBRICUS.

35 Lumbricus.

Body round, annulate; generally with an elevated, fleſhy belt near the head, and commonly rough, with minute concealed prickles, placed longitudinally, and furniſhed with a lateral aperture.

There are 16 ſpecies of this genus, viz.; * terreſtris, * marinus, vermicularis, variegatus, tubifex, lineatus, ciliatus, tubicola, echeicrus, thallaſſina, edulis, * oxyarus, fragilis, armiger, corretus, ſabellaris.

Of theſe, the only one of which we ſhall make particular mention, is the terreſtris, *common earth-worm, ſtris.* or *dew-worm.* Body red, with eight rows of prickles. — * *terre-*

This worm has neither bones, brains, eyes, nor feet. It has a number of breathing holes ſituated along its back, near each ring. Its heart is placed near the head, and may be obſerved to beat with a very diſtinct motion. The body is formed of ſmall rings, furniſhed with a ſet of muſcles that enable it to act in a ſort of ſpiral direction; and by this means it is capable, in the moſt complete manner, of creeping on the earth, or penetrating into its ſubſtance. Mr Bingley explains the motion of theſe animals by that of a wire wound about a cylinder, where, when one end is drawn on and held faſt, the other, upon being looſed, will immediately follow. Theſe muſcles enable the worm to contract or dilate its body with great force. The rings are each armed with ſmall, ſtiff, ſharp prickles, which the animal is able to open out or cloſe upon its body; and from beneath the ſkin there is ſecreted a ſlimy matter, which, by lubricating the body, greatly facilitates its paſſage through the earth.

36 Differences between the earth-worm and the aſcaris lumbricoides.

It is of conſequence to point out the difference between this worm and the *aſcaris lumbricoides*, or long round worm of the human inteſtines, deſcribed at page 338, as they have been ſuppoſed to be merely varieties of the ſame animal. The common earth-worm has its extremities much blunter than thoſe of the *inteſtinal;* its mouth conſiſts of a ſmall, longitudinal fiſſure, ſituated on the under ſurface of a ſmall rounded head, there being no appearance of the three veſicles ſo evident in the aſcaris. On the under ſurface of the earth-worm there is a large ſemilunar fold of ſkin, into which the head retreats; but this is entirely wanting in the aſcaris; the anus of the earth-worm opens at the very extremity.

Species. Inteſtina.

tremity of the tail, and not as in the aſcaris, at a conſiderable diſtance from the tail. The aſcaris alſo wants the tranſverſe rugæ which are ſo ſtrongly marked in the earth-worm, as well as the broad yellowiſh band by which the body of the latter is ſurrounded.

The internal ſtructure of theſe two ſpecies of worms is alſo extremely different. In the earth-worm, there is a large and complete ſtomach, conſiſting of two cavities; and the inteſtinal canal in the latter is likewiſe larger, and more formed into ſacculi than the aſcaris. The parts ſubſervient to generation in theſe two ſpecies of worms differ very much from each other; in the aſcaris there is a diſtinction of ſex, the parts of generation being different in the male and in the female; in the common earth-worm the organs of generation are the ſame in each individual, as this worm is hermaphrodite. The appearance, too, of the organs of generation, is extremely different at firſt ſight in the one ſpecies of animal and the other. There is an oval maſs ſituated at the anterior extremity of the earth-worm, reſembling a good deal the medullary matter of the brain *.

* *Baillie's Morbid Anatomy.*

Dew-worms, though in appearance a ſmall and deſpicable link in the chain of nature, yet, if loſt, might make a lamentable chaſm. For, to ſay nothing of half the birds and ſome quadrupeds which are almoſt entirely ſupported by them, worms ſeem to be the great promoters of vegetation (which would proceed but ill without them) by boring, perforating, and looſening the ſoil, and rendering it pervious to rains and the fibres of plants, by drawing ſtraws and ſtalks of leaves and twigs into it; and moſt of all, by throwing up ſuch infinite numbers of lumps called worm-caſts, which form a fine manure for grain and graſs. Worms probably provide new ſoil for hills and ſlopes when the rain waſhes the earth away; and they affect ſlopes, probably to avoid being flooded.

Gardeners and farmers expreſs their deteſtation of worms; the former, becauſe they render their walks unſightly, and make them much work; and the latter, becauſe they think worms eat their green corn. But theſe men would find, that the earth, without worms, would ſoon become cold, hard-bound, and void of fermentation, and conſequently ſterile; and beſides, in favour of worms, it ſhould be hinted that green corn, plants and flowers, are not ſo much injured by them as by many ſpecies of inſects in their larva or grub-ſtate, and by unnoticed myriads of thoſe ſmall ſhell-leſs ſnails called ſlugs, which ſilently and imperceptibly make amazing havock in the field and garden. †

† *Bingley's Animal Biography*, vol. iii. p. 500.

37 Sipunculus.

19. SIPUNCULUS.

Body round and elongated; mouth cylindrical at the end, and narrower than the body; aperture at the ſide of the body warty.

There are two ſpecies; viz. S. * nudus and ſaccatus.

* *nudus.*

Body covered with a cloſe ſkin, and globular at the lower end. *Naked tube worm.*—This animal is about eight inches long, and nearly of a conical figure from head to tail, having the baſe uſually about nine lines, and the other extremity about four lines in diameter. The broader part of the body is the head, and is furniſhed with a mouth, in which there is a tube made of a ſtrong membrane, and armed with three fleſhy-pointed papillæ, about the ſize of a grain of millet. This trunk is at one end every where connected with the rim of the mouth, but is looſe at the other end. It may be extended to the length of an inch, or entirely withdrawn at the pleaſure of the animal, probably for the purpoſe of ſeizing its food, and carrying it to its mouth. When the tube is out of the mouth, the papillæ are on the outſide, but they occupy the inſide of the mouth when the tube is within. Hence the food laid hold of by the diſengaged part of the trunk cannot eſcape; as the further the trunk is drawn back into the mouth, it is arreſted by ſo many more papillæ, which like prongs are ready to detain it. At the diſtance of an inch and a half from the mouth there is an oblong aperture, ſurrounded with a prominent lip, and ſituated tranſverſely.

Species. Inteſtina.

The whole body of this animal is of a ſallow white, inclining to a clay colour, and is adorned with deep ſtreaks; ſome of which are longitudinal, and others circular. Sometimes this animal will extend itſelf to almoſt the length of a foot, while at other times it contracts into a very ſmall volume, by enlarging the narrower portion of its body near the point, which is ſpherical.

It inhabits deep ſeas, from which it is never caſt on the ſhore, but it ſometimes enters the fiſhermen's nets along with their fiſh.

Body covered with a looſe ſkin, and rounded at the lower end. Vid. fig. 9. *ſaccatus.*

This animal differs little from the former, except in the looſe ſkin in which the animal is encloſed as in a bag. It inhabits the American and Indian ſeas.

38 Planaria.

20. PLANARIA.

Body gelatinous, flattiſh, with a double ventral pore; mouth terminal.

The animals comprehended under this genus nearly reſemble the leeches, and like them live in freſh water. They are very numerous, but, as nothing remarkable is known reſpecting them, we ſhall merely enumerate their names.

A. *Without eyes.*

Stagnatus, nigra, brunea, ciliata, gulo, punctata, flaccida, roſea, angulata, rubra, viridis, operculata, ſubulata, quadrangularis, bicornis, griſea, fulva, viridata.

B. *Having a ſingle eye.*

Glauca, lineata, nictitans.

C. *Having two eyes.*

Fuſca, lactea, tonica, tentaculata, crenata, helluo, obſcura, roſtrata, atomata, cornuta, radiata, ſtrigata, groſſa, linearis, terreſtris, tetragona, capitata, caudata, auriculata, filaris, lingua.

D. *Having three eyes.*

Geſſerenſis.

E. *Having four eyes.*

Marmorata, candida, truncata.

Species. Mollusca.

F. *Having more than four eyes.*

Tremellaris.

There are in all forty-two ſpecies.

This Order comprehends twenty genera, and about 406 ſpecies.

SECT. II.

ORDER II. MOLLUSCA.

WE have already, in the ſecond part of the article ANATOMY, chap. viii. given a ſufficient account of the general ſtructure of the animals of this order, and of the ſeveral ſubdiviſions of it, as given by Cuvier, to whoſe writings and thoſe of La Marck, the lovers of natural hiſtory are chiefly indebted for the preſent ſtate of our knowledge reſpecting thoſe animals. Cuvier includes under the molluſca all thoſe animals which inhabit ſhells, as well as thoſe which are naked. The latter only can be conſidered here, and we ſhall chiefly confine ourſelves to ſome of the more remarkable ſpecies.

39 Actinia.

21. ACTINIA.

Body oblong, cylindrical, fleſhy, and contractile, fixed by the baſe; mouth terminal, expanſile, ſurrounded with numerous tentacula, and without any other aperture.

This genus comprehends moſt of thoſe extraordinary animals which have been deſcribed under the title of *animal flowers*, *ſea-marygolds*, &c. an account of which has been already given under the article *ANIMAL-Flower*. We ſhall here therefore only enumerate the ſpecies, which are 23 in number; viz. rufa, * craſſicornis, * plumoſa, * anemonoides, judaica, * effæta, coccinea, undata, viduata, * truncata, nodoſa, ſpectabilis, digitata, gigantea, alba, viridis, priapus, candida, bicornis, vulva, * caryophyllus, iris, fiſcella, puſilla, * cereus, * bellis, * gemmacea, * meſembryanthemum, ſociata, aſter, anemone, helianthus, * dianthus, calendula, doliolum, * maculata.

40 Clava.

22. CLAVA.

Body fleſhy, gregarious, club-ſhaped, and fixed by a round peduncle, having a ſingle vertical aperture.

There is but one ſpecies; viz. paraſitica; characteriſed by its having a whitiſh, pellucid peduncle, and an opaque red club that is covered with erect, conical, pellucid ſpines. It is found in the Baltic ſea, upon ſea weeds, ſhell-fiſh, and floating timber. It poſſeſſes the power of dilating and contracting the mouth.

41 Pedicellaria.

23. PEDICELARIA.

Body ſoft, and ſeated on a rigid fixed peduncle, having a ſingle aperture.

There are three ſpecies; viz. P. globifera, triphylla, and tridens, all which are found in the North ſeas, chiefly among the ſpines of echini.

42 Mammaria.

24. MAMMARIA.

Body ſmooth, and without rays, having a ſingle aperture.

There are three ſpecies; viz. M. mammilla, varia, and globulus. Found alſo in the North ſeas and on the ſhores of Greenland. Species. Mollusca.

43 Aſcidia.

25. ASCIDIA.

Body fixed, roundiſh, and appearing to iſſue from a ſheath, having two apertures, generally placed near the upper extremity, one below the other.

There are about 35 ſpecies of Aſcidia; viz. papilloſa, gelatinoſa, * inteſtinalis, quadridentata, * ruſtica, echinata, mentula, venoſa, prunum, conchilega, parallelogramma, virginea, canina, patula, aſpera, ſcabra, orbicularis, corrugata, lepadiformis, complanata, tuberculum, villoſa, clavata, pedunculata, * mammillaris, globularis, fuſca, gelatina, cryſtallina, octodentata, patelliformis, pyura, aurantium, globularis, faſciculata.

Of theſe we ſhall deſcribe only two, the papilloſa, and the inteſtinalis.

papilloſa. Body rough, and covered with ſcarlet tubercles.—This animal is generally about three inches long, and ſomething leſs than two broad; its ſhape is oval. On the upper part it is furniſhed with two mammillary protuberances, one of which is ſeated on the top of the body, and has an orifice in the form of a croſs. The other is placed a little below the former, and has a triangular orifice opening tranſverſely. The lips of either orifice are encompaſſed with ſeveral ſetaceous hairs, of a clay colour, and one line in length, but obſerving no regular order. The whole ſurface of the body is rough, being covered over with ſmall knobs or oblong nipples of a ſcarlet colour. The extremity oppoſite to the organs, or the baſis, is furniſhed with peduncles of various forms, by means of which this animal firmly adheres to rocks or other bodies, ſo that it cannot be forced from its ſituation without injuring the peduncles.

The ſkin, which is thick and hard like the hide of a quadruped, conſtitutes by far the greater part of the animal's bulk; and there is ſcarcely any thing diſtinguiſhable within, except a ſmall part that commences a little below the orifice of the upper papilla, from which it proceeds downwards, and is inſerted into the lower orifice, having the appearance of an inteſtine. From the appearance of this organ, it is ſuppoſed that the upper orifice is the mouth, and the lower the anus. This ſpecies is not uſed for food, though ſome of them are ſaid to be eatable.

inteſtinalis. Body elongated, membranaceous, ſmooth, and whitiſh, appearing like the inteſtines of a quadruped.—If the membrane of which nearly the whole of this animal's body conſiſts, be divided longitudinally, there appears another membranaceous canal deſcending from the upper organ, almoſt to the baſe, where it bends back, and proceeds towards the lower organ, into which it is inſerted. This canal is commonly filled with a blackiſh fluid. Theſe organs are ſometimes ſtrongly contracted, and at others as much relaxed. They do not appear like thoſe of the former ſpecies, to be able to draw in and throw out the water.

The animals belonging to this genus have the power of ſquirting out the water they receive, as if from a fountain; and it is probable that they derive their nouriſhment from the animalcula which the water contains.

26. SALPA.

Species. Mollusca.

26. Salpa.

44 Salpa. Body long, floating, gelatinous, tubular, and open at each extremity, with an inteſtinal tube placed obliquely.

The outer covering of theſe animals has two openings, one very large, ſerving for the introduction of the water in which they live between their branchiæ, and the other ſmaller, which appears to be the anus. They have no head or feet. They are found in all our ſeas. Many of the ſpecies are remarkable for the regularity which they obſerve in their mode of ſwimming. They are gregarious, and one always follows at the tail of another, in ſuch a manner as to touch each other, and to form two lines, one above the other, each individual of the upper line being ſupported by two of the lower.

The ſpecies are arranged under two ſubdiviſions.

A. *Furniſhed with an appendage.*

This ſection contains four ſpecies; viz. maxima, pinnata, democratica, and mucronata.

B. *Having no terminal appendage.*

This ſection contains ſeven ſpecies; viz. punctata, confœderata, faſciata, ſipho, africana, ſolitaria, and polycratica.

45 Dagyſia.

27. Dagysia.

Body looſe, floating, angular, tubular, and open at each extremity.

There is only one ſpecies of this genus; viz. notata, characteriſed as having the body marked at one end with a brown ſpot. It is about three inches long, and one thick, and is found in the ſea on the coaſts of Spain. Theſe animals adhere to each other by their ſides, and in other reſpects very nearly reſemble thoſe of the laſt genus.

46 Pterotrachia.

28. Pterotrachia.

Body detached, gelatinous, with a moveable fin at the abdomen or tail; eyes two, placed within the head.

There are four ſpecies; viz. coronata, hyalina, pulmonata, and aculeata.

47 Derris.

29. Derris.

Body cylindrical, compoſed of articulations; mouth terminal, feelers two.

There is only one ſpecies; viz. * ſanguinea, which is found on the coaſt of Pembrokeſhire.—This animal has a tapering body to a point behind, and is capable of great flexibility; it is covered with a tranſparent membranous coat, through which the internal parts are viſible. The head is extended beyond the outer ſkin, and is leſs than the reſt of the fore part of the body. The tentacula are white, and ſeated at the top of the head. The mouth conſiſts of two lips, the upper one hooked and moveable, the lower one ſtraight and fixed. It moves by an undulating motion of the whole body.

Species. Mollusca.

30. Limax.

48 Limax. Body oblong, creeping, with a fleſhy kind of ſhield above, and a longitudinal flat diſk beneath; aperture placed on the right ſide within the ſhield; feelers four, ſituated above the mouth, with an eye at the tip of each of the larger ones.

This genus comprehends thoſe animals which are commonly called *ſlugs*, or naked ſnails, which are well known to commit ſuch ravages in our fields and gardens, eſpecially in wet weather.

There are 15 ſpecies; viz. lævis, * ater, albus, * rufus, * flavus, * maximus, hyalinus, * agreſtis, cinctus, marginatus, reticulatus, aureus, fuſcus, tenellus, and * lanceolatus.

The moſt curious ſpecies of this genus ſeems to be what has been called the *ſpinning ſlug*, which is a variety of the *limax agreſtis*.—This animal is of a grayiſh white colour with a yellowiſh ſhield, and is commonly about three-fourths of an inch long. It inhabits woods and other ſhady places. The following account of it has been given by Mr Hoy, in the firſt volume of the Linnæan Tranſactions. *agreſtis.*

About the year 1789, Mr Hoy obſerved, in a plantation of Scotch firs, ſomething hanging from one of the branches, which, as it ſeemed uncommon, he approached, and found it to be this animal. It was hanging by a ſingle line or thread attached to its tail. This was, upwards, very fine; but near the animal it became thicker and broader, till at length it exactly correſponded with the tail. The ſlug was about four feet below the branch, and nearly at the ſame diſtance from the ground; which it gradually approached at the rate of an inch in about three minutes. This rate, though ſlow, is not ſo much ſo as might be expected, conſidering that the animal is not furniſhed with any particular receptacle, as in ſome inſects, for the gelatinous liquid from which its ſilken lines are formed. The line by which it deſcended was drawn from the ſlimy exudation gradually ſecreted from the pores that covered its whole body. A great degree of exertion ſeemed neceſſary to produce a ſufficient ſupply of the liquid, and to force this towards the tail. It alternately drew back its head, and turned it as far as poſſible, firſt to one ſide and then to the other, as if thereby to preſs its ſides, and thus promote ſecretion. This motion of the head in an horizontal direction made the whole body turn round; by which the line that would have otherwiſe remained ſomewhat flat became round. This motion alſo, in addition to the weight of the animal, tended, no doubt, materially to lengthen the line.

In addition to Mr Hoy's account, Dr Latham obſerves, that the ſecretion from which the thread is formed, does not come from the back or ſides of the animal, but from its under part. That it did not proceed from any orifice in the tail was evident, for in ſome inſtances the animal was ſuſpended by the tip, and in others from the ſide full one eighth of an inch from the tip. The flow of the viſcous ſecretion towards the tail appeared to be excited by an undulating motion of the belly, ſimilar to that of crawling.

After theſe animals have ſpun for ſome time, their ſpinning power ſeems to be for a while loſt, but in all

Species. Molluſca.

all thoſe on which experiments have been made, it has been recovered again by keeping them for a few hours among wet moſs.

49 Laplysia.

31. Laplysia.

Body creeping, covered with reflected membranes, with a membranaceous ſhield on the back covering the lungs; aperture placed on the right ſide; vent above the extremity of the back; ſeelers four, reſembling ears. Vid. fig. 10.

An animal of this genus has been called the ſea-hare, a name which is derived from the ancients; and the animal to which it is given appears to have been known at a very early period, and perhaps on that account its hiſtory is obſcured with many fabulous narrations.

Fiſhermen ſeem in all ages to have attributed ſome noxious properties to thoſe marine animals which do not ſerve for the nouriſhment of man; and the writings of naturaliſts are ſtill filled with the reports of theſe ignorant men reſpecting ſeveral productions of the ſea, as the ſea-nettle, ſtar-fiſh, and in particular the ſea-hare. Theſe relations have been multiplied and prodigiouſly increaſed with reſpect to the marvellous, whenever the figure, the colour, or ſmell of the animal have any thing extraordinary or forbidding in them, as is the caſe with the ſea-hare. Hence we find a long liſt of noxious and aſtoniſhing properties attributed to this animal. Not only are its fleſh, and the water in which it has been ſteeped, of a poiſonous nature, but even its very aſpect is deadly. A woman who would wiſh to conceal her pregnancy, cannot reſiſt the ſight of a female ſea-hare, which produces nauſea and vomiting, and finally miſcarriage, unleſs a male of the ſame ſpecies, dried and ſalted, is given her to eat; for it is one of the ſuperſtitious ideas entertained by the common people in moſt countries, that every noxious ſpecies of animal carries within itſelf a remedy for the ill effects which it may occaſion. It happens, indeed, unfortunately for the preſent ſtory, that in the ſea-hare there is no diſtinction of ſex. If theſe animals in Italy (for the above ſtories are taken from Pliny) are ſo deadly to mankind, it is quite otherwiſe in the Indian ſeas; for there it is man who is ſuch a deadly foe to the ſea-hare, that he cannot take it alive, ſince it is deſtroyed by his very touch!

Theſe ridiculous fables reſpecting an innocent animal, are ſtill believed by many people, and others as ridiculous have been added to them. Mr Barbut relates that a ſailor happening to take a *laplyſia* in the Mediterranean, it gave him ſuch inſtantaneous and excruciating pain as to cauſe an inflammation, and the poor man loſt his arm! and ſo ſenſible are the fiſhermen of the poiſonous quality of the mucus which oozes from its body, that they will not on any account touch it.

In an excellent memoir on the laplyſia, contained in the 2d vol. of *Annales de Muſeum National*, Cuvier gives the following general deſcription of the animals compoſing the genus.

They bear a conſiderable reſemblance to the ſlugs; their body is oval, flattened below, ſo as to form a long and ſtraight foot, and ſwelling out above; more or leſs pointed behind, and diminiſhing a little before, ſo as to form a ſort of neck, that is ſuſceptible of various degrees of elongation, and at whoſe extremity is ſituated the head. Species. Molluſca.

The head is the only ſuperior part that advances beyond the borders of the diſc that forms the foot. The other borders of this diſc are contracted, ſo as to form a kind of palliſade, ſurrounding the ſides and back part of the body. This fleſhy wall is contracted and raiſed more or leſs, and is folded into numerous undulations at the pleaſure of the animal, who can fold the one part over the other, or can cauſe them to ſeparate, ſo as to give them all manner of ſhapes. Between the borders we perceive a part almoſt ſemicircular, attached only by the right ſide, entirely moveable like a fleſhy cover, the border of which is flexible, and ſometimes forms a ſort of gutter, to conduct the water to the organs of breathing, which are in fact under this cover. At the poſterior extremity of its attachment is the anus, and between the anterior extremity of the ſame attachment, and that which correſponds to the membranaceous border of the body on the right ſide, is a hole, through which are paſſed the eggs of the animal, and that peculiar liquor which has been regarded as poiſonous. But beſides this liquor, which is whitiſh, and is rarely voided, the animal produces another kind much more abundant, and of a very deep purple red.

The mouth is ſituated below the head lengthwiſe, and the anterior border of the head forms on each ſide a membranous production that is conical, compreſſed, capable of being more or leſs prolonged, and forms a tentaculum. Behind the head, further back, there is on each ſide another conical tentaculum, which the animal can elongate or ſhorten at pleaſure, but which he cannot withdraw within the body, like the ſnail. The extremity of this is a little folded longitudinally into two parts, ſo as to reſemble the external ear of a quadruped. Before the baſe of this organ is the eye, which ſeems nothing but a little black point.

The parts above deſcribed are common to all the laplyſiæ, but differ in the ſeveral ſpecies in proportion and colour.

In the laſt edition of the *Syſtema Naturæ*, only two ſpecies of laplyſia are mentioned; viz. depilans, which appears to be the original ſea-hare mentioned by Pliny, and which owes its trivial name to the belief that the fetid liquor which it exudes is capable of taking off the hair from any part which it touches; and faſciata. Beſides theſe, Cuvier enumerates and figures three others, viz. camelus, punctata, and alba.

50 Doris.

32. Doris.

Body creeping, oblong and flat beneath; placed below, on the fore-part; vent behind on the back, and ſurrounded by a fringe; ſeelers 2—4, ſeated on the upper part of the body in front, and retractile within their proper receptacles.

This genus is divided by Gmelin into two ſections.

A. *Having four tentacula.*

Of this there are ſeven ſpecies; viz. faſciculata, minima, radiata, pennata, peregrina, affinis, and * argo.

B. *Having two tentacula.*

Of this ſection there are 17 ſpecies; viz. * verrucoſa,

Species. Mollusca.

ſa, clavigera, quadrilineata, papilloſa, auriculata, lacinulata, cervina, coronata, tetraquetra, * bilamellata, olivelata, muricata, piloſa, lævis, arboreſcens, frondoſa, and ſtellata.

In a long and intereſting memoir by Cuvier on the genus doris, printed in the 4th vol. of *Annales de Muſeum National*, that celebrated naturaliſt ſhews that only ſeven of the ſpecies enumerated by Gmelin (viz. argo, ſtellata, bilamellata, lævis, olivelata, muricata, and piloſa), really belong to this genus, and that the reſt ſhould be arranged under other genera.

Cuvier admits thirteen ſpecies, ſix of them new; and diſtributes them into two ſections.

a. Flat doris,

Comprehending ten ſpecies; viz. ſolea, ſcabra, maculoſa, verrucoſa, limbata, tuberculata, ſtellata, piloſa, tomentoſa, and lævis.

b. Priſmatic doris,

Three ſpecies; viz. lacera, atro-marginata, and puſtuloſa.

We regret that our limits will not permit us to tranſlate the valuable obſervations contained in this memoir, to which we refer the reader for the deſcription of the above ſpecies, and of their general anatomical ſtructure.

argo. One of the moſt remarkable of the ſpecies is the *argo*, or *ſea argus*, which we ſhall here deſcribe. The whole body of the argus is obliquely flat, or perpendicularly compreſſed; its thickneſs in the middle is ſix lines, whence growing gradually thinner, at the edge it is no more than half a line thick. It is three inches and five lines in length, and two inches broad. The back ſhines with a ſcarlet dye, and the belly is of an agreeable clay colour, and both are curiouſly marked with white and black ſpots. The whole ſubſtance of the body is coriaceous and ſolid, and if cut through the middle, appears every where tinged with a ſaffron colour. Round the circumference of the body it is pliant, whence, at the animal's pleaſure, it is formed into various folds and plaits. The head, which in all other animals is eaſily known by the peculiarity of its ſtructure, in the argus is not determinable when its back is turned to the ſpectator, for the oval ſhape of the body, of nearly the ſame diameter throughout the circumference, makes no diſtinction of head. The tentacula too, which appear toward each extremity, are ſo much alike in this ſituation, as not to ſerve for diſtinguiſhing the head; but if the animal be turned, it will appear that the head is ſituated in that part from which the tapered tentacula riſe. One half of theſe tentacula is white, and ſunk into ſmall round cavities, formed to the depth of two lines in the ſubſtance of the head. Their apex is prominent from the cavity, and is every where marked with black dots, which are ſuppoſed to be ſo many eyes, and afforded the reaſon for denominating this animal *argus*.

If the tentacula are touched, they are immediately withdrawn entirely within their cavities. On the upper part of the head is a mamillary prominence, ſituated near the belly, at about half an inch from the edge, and in the middle is ſeen a ſmall oval aperture, which is the mouth of the argus.

One of the moſt remarkable parts of the animal, and that which diſtinguiſhes it from all others, remains to be deſcribed. Species. Mollusca.

On that part of the back which is oppoſite to the head, four lines diſtant from the border, is an oval aperture eight lines in length, and five broad. From the middle of this hole ariſes a fleſhy trunk of a whitiſh colour, four lines long, one and a half broad, which divides into two larger branches, the right hand one ſubdivided into eight, the left into ſix leſſer branches, which at length end in ſmall ſlender twigs. Beſides theſe, another large branch ariſing from the middle of the firſt trunk, runs off towards the head. On every one of the branches and twigs there are many black ſpots diſcernible by the naked eye, which contribute not a little to the beauty of this blooming part; but whether thoſe punctures were hollow, has not been aſcertained, even with the aſſiſtance of the microſcope; though they are probably ſo many open mouths of veſſels and breathing points. While the argus remains in the ſea-water, it keeps this wonderful aſſemblage of lungs expanded; when out of the water, and touched with the finger, it contracts it into the form of a crown; and if the handling and irritation be continued for any time, it conceals the lungs entirely within the oval aperture, which is alſo then contracted into a narrower compaſs. Being put again into ſalt water, the aperture ſoon enlarges, and the branches of the lungs concealed within gradually puſh out again, lengthen, and expand.

33. Tethis. 51 Tethis.

Body detached, rather oblong, fleſhy, and without peduncles; mouth with a terminal cylindrical proboſcis, under an expanded membrane or lip; apertures two, on the left ſide of the neck.

There are only two ſpecies; viz. leporina, and fimbria, the latter of which is a very elegant looking animal, about ſix inches long, with a white body, having a fringed border, variegated with black and clay colour, and in ſome places glittering with gold coloured ſpots. It is found in the Adriatic.

34. Holothuria. 52 Holothuria.

Body detached, cylindrical, thick, and open at the extremity; mouth ſurrounded by fleſhy branched tentacula.

There are 23 ſpecies of this genus, viz. elegans, frondoſa, phantapus, tremula, phyſalis, thalia, caudata, denudata, * pentactis, papilloſa, ſpallanzani, priapus, ſquamata, penicillus, fuſus, inhærens, lævis, minuta, forcipata, zonaria, vittata, maxima, and impatiens.

Of theſe we ſhall deſcribe the holothuria tremula, which has the following ſpecific character.

Upper ſurface covered with numerous conical papil- *tremula.*
læ; lower with cylindrical ones; tentacula faſciculate. (Vid. fig. 11.)—This ſpecies commonly meaſures eight inches in length when dead; but alive it extends itſelf to more than a foot, or contracts its body into a ball. Its figure is cylindrical, the diameter of which is every way equal to an inch and a few lines. The back of a dark brown, proudly bears a variety of fleſhy pyramid-like nipples, of a dark colour likewiſe at their baſis, but white at their apex. They are obſerved to be of two

Species. Mollusca.

two different sizes; the larger occupy the length of the back, in number 14 on each side, at the distance of six lines from each other, when the holothuria is contracted; but the intervening space is fully eight lines when the animal is extended. Others, like these, are placed here and there promiscuously. The less are scattered in like manner, without order, in every part of the back. Out of them all exsude a whitish mucilage, serving to lubricate the body. Hence all these nipples seem to be so many glands furnished with an excretory duct, the aperture of which is so minute as not to be discoverable by the help of a common glass. That they are, moreover, provided with various muscles, follows from hence, that the holothuria can raise and obliterate them at pleasure. While the larger papillæ are quite erect, their axis, and the diameter of their base, measures three lines. The belly, or part opposite to the back, in the holothuria, is of a pale brown, and set all over with cylindrical tentacula, in such numbers, that the head of a pin could scarcely find room between them. Their diameter is not much above a line, and their length is that of four lines. They are of a shining whiteness, except the extremity, which is of a dusky dark colour, and shaped like a socket. By the help of these tentacula, the holothuria fixes its body at the bottom of the sea, so as not to be easily removed by tempests, which would otherwise happen very frequently, as this animal dwells near the shores, where the water scarcely rises to the height of a fathom. Now, if it adheres to other bodies by means of its ventral tentacula, their point must necessarily have the form of a socket, as the cuttle-fish, sea-urchins, and star-fish have theirs shaped, by which they lay hold of any other body.

From this situation of the holothuria at the bottom of the sea, which it also retains when kept in a vessel filled with sea water, it must be evident to any one, that we have not groundlessly determined which was its back, and which its belly, which otherwise in a cylindrical body would have been a difficult task. But as all animals uniformly walk or rest upon their bellies, and the holothuria has likewise that part of its body turned to the earth on which the cylindrical tentacula are to be seen, it is clear that part is the abdomen or belly of this animal. However, both the abdominal and dorsal tentacula are raised and obliterated at the animal's pleasure, from which it is reasonable to conclude, that they are furnished with elevating and depressing muscles, and particularly because all the foresaid tentacula disappear after the animal's death; and hence it farther appears, that many naturalists have given a representation of a dead holothuria, since they have assigned it no tentacula *.

* *Barbut's Genera Vermium.*

53 Terebella.

35. Terebella.

Body oblong, creeping, naked, often inclosed in a tube, furnished with lateral fascicles or tufts and branchiæ; mouth placed before, furnished with lips, without teeth, and protruding a clavate proboscis; feelers numerous, ciliate, capillary, seated round the mouth.

There are 11 species, viz. cirrata, lapidaria, * conchilega, complanata, carunculata, rostrata, flava, rubra, aphroditois, bicornis, and stellata.

lapidaria. Of these the terebella lapidaria, or stone-piercer; called by the French *Pinceau de Mer*, the sea pencil, is thus described by Barbut. "From the midst of the hairs issues the head of this small animal, supported by a long neck, and putting forth two small branching horns. The mouth, which is round, is armed with small teeth, like those of the echini marini, with which it masticates its food. The hairs are very fine, soft as silk, and form a tuft, from the middle of which issues the neck, and then its head. The body is shaped like that of a worm, is very long, and terminates at one end in a point, which very much resembles the stick end of a painting brush. The small head of our terebella appears underneath, drawn back as in the snail. It walks or crawls by the help of five small feet, placed on each side of the large part of its body, at the rising of the tuft of hairs, and close to each other."

Species. Mollusca.

54 Triton.

36. Triton.

Body oblong; mouth with an involute spiral proboscis, having 12 tentacula, 6 on each side, divided nearly to the base, the hind ones being cheliferous.

There is only one species. viz. littoreus, found on the shores of Italy.

55 Sepia.

37. Sepia.

Body fleshy, receiving the breast in a sheath, having a tubular aperture at its base; arms 8, beset with numerous warts or suckers; and besides, in most species, 2 pedunculated tentacula; head short; eyes large; mouth resembling a parrot's beak. *Cuttle-fish.*

Cuvier divides the genus sepia into two, which he calls *seiche*, comprehending most of the species enumerated by Linnæus under sepia, and *poulpe*, comprising two species. The former have a sac, with a kind of fin on each side, and they contain towards the back a peculiar body of a friable or cartilaginous substance, transparent in the living animal, which is placed within the flesh, without adhering to it; and proceeding from one side to the other without any articulation. The head is round, and provided with two large moveable eyes, the organization of which is almost as perfect as that of the eyes of warm-blooded animals. The mouth is situated at the top of the head, and has two similar jaws, in form and substance resembling the beak of a parrot, and surrounded with eight conical tentacula, furnished with suckers, by means of which the animal fixes itself to the rocks or other substances, so firmly, that it is often easier to tear away one of these arms than to induce the animal to quit its hold. The two others are very long, and have no suckers except at their extremity. These last seem to serve the animal for anchors to hold by.

Just before the neck there is a sort of funnel, which closes up the entrance of a sac, and seems to be the anus. These animals have internally a liver, a muscular gizard, a cœcum, and a short intestinal canal. The circulation in these animals is carried on by very singular organs; there is a heart placed at the bottom of a sac, by which the blood is distributed to every part of the body, by means of arteries, and to which it is returned by veins, through a large *vena cava*, which divides itself for the purpose of conveying the blood to two

Species. Mollusca.

two other hearts, one on each side, which distribute it to the gills, from whence it is passed to the first heart.

The female produces eggs that are assembled together in the form of a bunch of grapes.

These animals, when they perceive the approach of danger, emit a quantity of inky fluid, furnished by a particular vessel, and by thus obscuring the water, render their escape more easy, while from the bitterness of this liquid their foe is induced to give over the pursuit. There seems little doubt that the opinion of Swammerdam, that this liquor furnishes the Indian or China ink, is just; for if this ink be dissolved in water, in any considerable quantity, it very soon acquires a very high degree of putridity, which seems to prove that it is formed of some animal substance; and none seems better calculated for the purpose than this black liquor.

The second genus of Cuvier differs from the sepia, properly so called, in wanting the solid bony substance in the back, and the two long arms; but the eight tentacula are much longer in the individuals of this genus than in those of the sepia.

The male cuttle-fish always accompanies the female; and when she is attacked, he braves every danger, and will attempt her rescue at the hazard of his own life; but as soon as the female observes her partner to be wounded, she immediately makes off. When dragged out of the water, these animals are said to utter a sound like the grunting of a hog.

The hard substance, or bone as it is called, in the back of the cuttle-fish, when dried and powdered, is employed to form moulds, in which silversmiths cast their small articles, such as spoons, rings, &c.; and it also forms that useful article of stationary called *pounce*.

In the *Systema Naturæ* there are described eight species of sepia, viz. * octopus, * officinalis, unguiculata, hexapus, * media, * loligo, * sepiola, and tunicata.

officinalis. Of these, the officinalis was in great esteem among the ancients as an article of food, and is still used as such by the Italians.

octopus. The sepia octopus, or eight-armed cuttle-fish, which inhabits the seas of warm climates, is a most formidable animal, being sometimes of such a size as to measure 12 feet across its centre, and to have each of its arms between 40 and 50 feet long. It is said that he will sometimes throw these arms over a boat or canoe, which he would infallibly drag to the bottom, with those who are in it, did not the Indians, who are aware of this danger, carry with them a hatchet to cut off the arms.

56 Clio.

38. Clio.

Body naked, free, and floating, furnished with a fin on each side; head distinct, and having gills at the surface of the fins.

The above character of clio is that of Cuvier, who has written an able account of this and two other genera of his new order of mollusca, which he calls *pteropoda*, or *mollusca pinnata*, in the 4th vol. of *Ann. de Mus. Nat.*

Gmelin enumerates six species of clio, viz. caudata, pyramidata, retusa, borealis, helicina, and limacina.

Species. Mollusca.

39. Onchidium.

57 Onchidium.

Body oblong, creeping, flat beneath; mouth placed before; feelers two, situated above the mouth; arms two, at the sides of the head; vent behind, and placed beneath.

There are two species, viz. typhæ, which is described by Dr Buchanan in the 5th vol. of the Linnæan Transactions; and peronii, described by Cuvier in a late number of the *Ann. de Mus. Nat.*

58 Lobaria.

40. Lobaria.

Body lobate, convex above, flat below.

There is only one species, viz. quadriloba, characterised as having a tail with four lobes. It is found in the north seas.

59 Lernæa.

41. Lernæa.

Body oblong, somewhat cylindrical, naked; tentacula or arms, two or three on each side and round, by which it affixes itself; ovaries two, projecting like tails from the lower extremity.

There are 15 species, viz. branchialis, * cyprinacea, * salmonea, * asellina, * huchonis, clavata, unciata, gobina, radiata, nodosa, cornuta, pectoralis, lotæ, cyclopterina, and pinnarum.

60 Aphrodita.

42. Aphrodita.

Body creeping, oblong, covered with scales, and furnished with numerous bristly fasciculate feet, on each side; mouth terminal, cylindrical, retractile; feelers two, setaceous, annulate; eyes four.

There are 9 species, viz. * aculeata, * scabra, * squamata, imbricata, plana, * lepidota, cirrosa, violacea, and longa.

Of these we shall describe the first, the aculeate aphrodite, by some called the *sea mouse*. It is of an oval form, grows to the length of between four and five inches; the belly is covered with a naked skin and somewhat prominent in the middle: its substance is somewhat firm. It is clothed with hairy filaments, which are short on the middle of the back, but longer at the sides; they are all somewhat rigid and firm; those on the back stand erect, like the quills of a porcupine; those on the sides lie flat, and are of a great variety of colours; a beautiful blue and lively green are very distinct in them, but a golden yellow seems the most predominant colour: on the back they are of a darker colour, and in many places of a grayish brown. It dwells in the European ocean, and lives upon shell-fish. It has 32 fasciculated projectors, resembling feet, on each side. *aculeata.*

61 Amphitrite.

43. Amphitrite.

Body projecting from a tube and annulate; peduncles or feet small, numerous; feelers two, approximate, feathered; eyes none.

There are seven species, viz. reniformis, penicillus, ventilabrum,

Species. Mollusca. ventilabrum, auricoma, cristata, chrysocephala, and plumosa.

62 Spio.

44. Spio.

Body projecting from a tube, jointed, and furnished with dorsal fibres; peduncles rough, with bristles, and placed towards the back; feelers two, long, simple; eyes two, oblong.

There are two species, viz. seticornis and filicornis.

63 Nereis.

46. Nereis.

Body long, creeping, with numerous lateral peduncles on each side; feelers simple, rarely none; eyes two or four, rarely none.

The species are 29 in number, and are divided into three sections.

A. *Mouth furnished with a claw;*

Containing versicolor, * noctiluca, fimbriata, armillaris, mollis, * delagica, tubicola, norwegica, pinnata, corniculata, pusilla, incisa, and aphroditoides.

B. *Mouth furnished with a proboscis;*

Containing * cærulea, * viridis, maculata, crassa, stellifera, punctata, alba, flava, longa, prismatica, bifrons, cæca, ebranchiata, lamelligera, and ciliata.

C. *Mouth furnished with a tube;*

Containing one species, viz. prolifera.

One of the most remarkable of these species is the noctiluca, of which we shall here give a short account.

Noctiluca. Body blue green, with 23 segments, so small as to be scarcely visible to the naked eye.—This is one of those phosphorescent animals that illuminate the ocean in the dark. Their numbers and wonderful agility, added to their shining quality, do not a little contribute to these illuminations of the sea; for myriads of those animalcula are contained in a small cup of sea water. Innumerable quantities of them lodge in the cavities of the scales of fishes; and to them, probably, the fishes owe their noctilucous quality. "I have observed with great attention (says Barbut) a fish just caught out of the sea, whose body was almost covered with them; and have examined them in the dark: they twist and curl themselves with amazing agility, but soon retire out of our contracted sight; probably their glittering dazzling the eye, and their extreme minuteness eluding our researches. It is to be observed, that when the unctuous moisture which covers the scales of fishes is exhausted by the air, these animals are not to be seen, nor are the fishes then noctilucous, that matter being perhaps their nourishment when living, as they themselves afford food to many marine animals. They do not shine in the day-time, because the solar rays are too powerful for their light, however aggregate, or immense their number."

64 Nais.

47. Nais.

Body creeping, long, linear, depressed, and pellucid; peduncles, with small bristles on each side; no tentacula; eyes two or none.

There are 10 species, viz. vermicularis, * serpentina, * proboscidea, elinguis, * digitata, barbata, cæca, littoralis, marina, and quadricuspidata. Species. Mollusca. 65 Physsophora.

48. Physsophora.

Body gelatinous, pendent from an aërial vesicle, with gelatinous sessile members at the sides; numerous tentacula beneath.

There are three species, viz. hydrostatica, rosacea, and filiformis.

66 Medusa.

49. Medusa.

Body gelatinous, orbicular, and generally flat underneath; mouth central, beneath.

These animals have been denominated *sea nettles*, from the opinion that the larger species, when touched, excite a tingling sensation, and slight redness of the skin. They are supposed to form the chief food of the cetaceous fish; and many of them shine with great brilliancy in the water. The form of their body, while at rest, is that of the segment of a sphere, of which the convex surface is smooth, and the flat part provided with several tentacula. The body is transparent, and so gelatinous, that it is reduced almost to nothing, by evaporation, when left dry upon the shore. Several coloured lines may be seen within; but there is nothing which gives marks of a circulation going on. The lines, indeed, towards the borders are more numerous, but they seem to be appendages of the alimentary cavity. These animals swim very well, and appear to perform that motion by rendering their body alternately more or less convex; and thus striking the water. When left upon the shore, they lie motionless, and look like large flat cakes of jelly.

The species are distributed into two sections.

A. *Body with ciliated ribs.*

This contains four species, viz. infundibulum, pileus, cucumis, and ovum.

B. *Body smooth.*

This contains 40 species, viz. porpita, * cruciata, hyscella, * æquorea, * aurita, capillata, * pilearis, marsupialis, hemispherica, pelagica, noctiluca, * fusca, * purpura, * tuberculata, * undulata, * lunulata, nuda, velelia, spirans, pulmo, tyrrhena, tubercularis, utriculus, caravella, umbella, dimorpha, campanula, digitata, frondosa, tetrastyla, octostyla, andromeda, corona, persea, cephea, proboscidalis, mollicina, pileata, crucigera, and unguiculata.

67 Lucernaria.

50. Lucernaria.

Body gelatinous, wrinkled, branched; mouth placed beneath.

There are three species, viz. quadricornis, phrygia, and auricula.

68 Asterias.

51. Asterias.

Body depressed, covered with a coriaceous crust; muricate, with tentacula, and grooved below; mouth central, and five-rayed.

These

Species. Mollusca.

These animals, which are usually called *star-fish*, or *sea-stars*, constitute one of the most numerous genera of the mollusca. They are very curious in their forms, but are almost all radiated, as stars are usually painted; and some of them, from the minuteness of their rays, make a very beautiful appearance.

By the coriaceous crust, with which they are covered, they are defended from the attacks of the smaller animals, that inhabit the seas in which they reside. Each of the rays has a great number of short, soft, and fleshy tubes, that serve for tentacula, and seem not only designed for taking prey, and aiding the motion of the animal; but also for enabling it to cling to the rocks, and thus resist the force of the waters. These tentacula have been found to exceed 1500 in a single animal; they are situated on the lower surface, and when the animal is laid on its back, they may be seen to be pushed out and withdrawn like the horns of snails. The rays enable them to swim, but they move very slowly. These rays are very brittle, and are easily broken off; but when this happens, their power of reproduction is so great, that they are speedily renewed. The mouth is armed with bony teeth, for breaking the shells of the small fish on which they feed; and from the mouth a canal proceeds through each of the rays, becoming narrower as it approaches the tip.

For preserving these animals, Mr Barbut advises that they be drowned in brandy or other spirits, taking care to keep the rays all the time extended. Then it is easy to draw out the entrails by the mouth with a pair of forceps; and after this is done, the animal may be dried.

There are 45 species distinguished, according as their circumference is more or less divided.

A. *Lunate*,

Comprehending four species, viz. nobilis, pulvillus, militaris, and luna.

B. *Stellate*,

Comprising 20 species, viz. papposa, spongiosa, * rubens, * seposita, endeca, minuta, * glacialis, * clathrata, echinitis, reticulata, phrygiana, nodosa, * violacea, sanguinolenta, perforata, araneica, * equestris, lævigata, * membranea, granularis.

C. *Radiate*,

Comprising 20 species, viz. rosea, pertusa, * ophiura, aculeata, ciliaris, * sphærulata, * pentaphylla, * varia, * aculearis, * hastata, * fissa, * nigra, tenella, * pectinata, multiradiata, * caput medusæ, euryali, aligætes, nigrita, tricolor, and fragilis.

Many of these are extremely beautiful; but one of the most showy is the *caput medusæ*, or *arborescent star-fish*.

caput medusæ. Having five rays, each subdivided, dichotomous; rays and disk granulate; mouth depressed (Vid. fig. 12.).—This extremely singular species is occasionally met with in most seas; but it is not very common. It has five equidistant, thick, jointed rays, proceeding from the centre; and each of them is divided into two other smaller, and each of these is again subdivided in a similar manner; and this subdivision is carried, in the most beautiful and regular gradation, to a vast extent, so that the extreme ramifications sometimes amount to several thousands. Mr Bingley speaks of a specimen that was three feet across, and had 512 extremities to each ray, making in all 2560. By this curious structure, the animal becomes, as it were, a living net, and is capable of entangling such creatures as are designed for its prey, by the sudden contraction of these numerous ramifications, by the intricacy of which they are prevented from escaping.

Species. Mollusca.

The colour of the living animal is a reddish or deep carnation; but when dead it is more of a gray colour. To preserve this curious animal whole and undamaged for cabinets, it should be taken far out at sea, and the fishermen should be careful not to break off any of the limbs, and to keep it as still as possible. It should be dried in the shade in some open place, as in the sun it is apt to melt away, and if too much in the shade, to become putrid.

This species is so valuable, that the fishermen at the Cape get from six to ten rix-dollars for a specimen.

69 Echinus.

51. Echinus.

Body roundish, covered with a bony crust, and generally furnished with moveable spines; mouth placed beneath, and commonly five-valved.

The animals of this genus are called *sea urchins* or *sea hedgehogs*, from the spines which grow on their external covering; they are also called *sea eggs*, probably from many of them being eatable. They are all inhabitants of the seas; and are so nearly alike in character, that a description of one species will serve to illustrate the whole family.

There are no less than 109 species, which are subdivided as follows.

A. *Vent vertical, and all the tentacula simple.*

a. *Globular* or *hemispherical*,

Containing 37 species, viz. * esculentus, sphæra, droebachiensis, * miliaris, basteri, hæmisphericus, angulosus, excavatus, globulus, sphæroides, gratilla, lixula, saxatilis, fenestratus, subangularis, * ovarius, diadema, calamaris, araneiformis, stellatus, radiatus, circinatus, cidaris, mamillatus, lucuntis, atratus, * coronatis, asterizans, assulatus, sardicus, lammeus, variegatus, pustulatus, granulatus, tessellatus, botryoides, and torcumaticus.

b. *Shaped somewhat like a shield;*

Four species, viz. * sinuatus, semiglobosus, quinquilabiatus, and conoideus.

B. *Having the vent beneath and no tentacula at the mouth.*

a. *Base circular, with the vent in the circumference,*

Containing five species, viz. alba-gabrus, depressus, * vulgaris, quadrifasciatus, and sexfaciatus.

b. *Base exactly circular;*

One species, viz. subuculus.

c. *Base oval;*

Three species, viz. cyclostomus, semilunaris, and sentiformis.

Species. Mollusca.

d. *Base oval and acute; vent opposite the mouth;*

Six species, viz. * scutatus, ovatus, * pustulosus, quadriradiatus, minor, and dubius.

e. *Base irregular, with five expanded petal-shaped marks on the surface.*

1. *Margin with angular sinuosities;*

Two species, viz. rosaceus and attus.

2. *Ovate; margin entire;*

Two species, viz. oviformis and orbiculatus.

f. *Flat on both sides, with petal-shaped avenues; mouth central, flat, and toothed; crown with four pores.*

1. *Having a sinuated margin and perforated surface;*

Seven species, viz. biforis, pentaporus, hexaporus, emarginatus, auritus, inauritus, and tetraporus.

2. *Having a sinuated margin and entire surface;*

Five species, viz. * laganum, subrotundus, reticulatus, orbicularis, and gorallatus.

3. *Having a toothed margin;*

Three species, viz. decadactylus, octadactylus, orbiculus.

g. *With ten avenues on the crown; rays straight, biporous, and stellate; mouth and vent near each other in the middle of the base;*

13 species, viz. nucleus, centralis, ervum, craniolaris, turcicus, vicia, ovulum, lathyrus, equinus, minutus, falca, inæqualis, raninus, and bufonius.

C. *Vent lateral, with pencilled tentacula at the mouth.*

a. *Circular; mouth central, vent square;*

One species, viz. placenta.

b. *Heart-shaped, with the crown grooved;*

Two species, viz. cor anguinum and lacunosus.

c. *Heart-shaped, with the crown not grooved;*

Eight species, viz. radiatus, purpureus, pusillus, complanatus, * subglobulus, ananchitis, bicordatus, and carinatus.

c. *Ovate, with grooved avenues;*

One species, viz. spatagus.

d. *Ovate, with the avenues not grooved;*

Eight species, viz. brissoides, teres, oliva, amygdala, ovalis, pyriformis, lapiscaneri, and patellaris.

Many of the above have hitherto been found only in a fossile state.

** esculentus.* Subglobular, with 10 avenues of pores; and the intermediate spines covered with small tubercles, supporting the spines. fig. 13.—This animal, which lodges in cavities of rocks, just within low water mark, on most of the British coasts, is nearly of a globular shape, having its shell marked into ten partitions or divisions, not much unlike those of an orange. The mouth is situated in the lower part, and armed with five strong and sharpened teeth. The stomach and intestines which are of considerable length, are disposed in a somewhat circular form; and the whole body is supported entirely by a set of upright bones or columns.

Species. Zoophyta.

On the right side of the shell is a prodigious number of sharp moveable spines, of a dull white and greenish colour, curiously articulated, like ball and socket, with tubercles on the surface, and connected by strong filaments to the skin or epidermis, with which the shell is covered. The spines are the instruments by which the animal conveys itself at pleasure from one place to another; and by means of these it is enabled to move at the bottom of the water with great swiftness. It generally employs those about the mouth for this purpose, keeping that opening downwards; but it is also asserted to have the power of moving forwards, by turning on itself like a wheel. When any thing alarms these animals, they immediately move all their spines towards it, and wait an attack, as an army of pikemen would with their weapons. The number of muscles, fibres, and other apparatus necessary to the proper management of these must be very great, and are exceedingly wonderful. So tenacious are the sea-urchins of the vital principle, that on opening one of them, it is no uncommon circumstance to observe the several parts of the broken shell, move off in different directions.

Between the spines, and disposed in a continued longitudinal series on the several divisions or regions of the shell, are an infinite number of very small knobs, communicating with an equal number of tentacula placed above them. These are the instruments by which the creature fixes itself to any object, and stops its motion. They are possessed of a very high degree of contractile power, and are furnished at the extremities with an expansile part, which may be supposed to operate as a sphincter, or as the tail of a leech, in fastening the animal securely to rocks and other substances to which they choose to adhere.

The shell of this animal, when deprived of the spines, which easily fall off in dying, is of a pale reddish tinge, and the tubercles on which the spines are fixed, appear like so many pearly protuberances on the surface.

At Marseilles, and in some other towns on the continent, this species is exposed for sale in the markets, as oysters are with us, and is eaten boiled like an egg. It forms an article of food among the lower class on the sea coasts of many parts of this country, but does not seem to have made its way to the tables of the great.

This order of Mollusca contains 32 genera, and about 433 species.

Order IV. ZOOPHYTA.

The creatures ranked under this order seem to hold a middle rank between animals and vegetables. Most of them are, like the latter, fixed by a root to a certain spot, from which they never move, and where they sprout and grow; many of them propagate, like plants, by buds, or slips; and some of them appear only to be entitled to rank as animal bodies by their possessing a degree of irritability a little superior to the *sensitive plant*. Few of them enjoy the faculty of locomotion, though the agility with which they seize their prey and the instinct which directs them in search of it, shew them to be really animal bodies.

The

Species. Zoophyta.

The coral reefs that ſurround many iſlands, particularly thoſe in the Indian Archipelago, and round New Holland, are formed by various tribes of theſe animals, eſpecially by thoſe of the five firſt genera. M. Peron obſerved, that the animals form theſe corals with ſuch rapidity, that enormous maſſes of them very ſpeedily appear, where there was ſcarcely any mark of ſuch reefs before.

The principal works that treat of the Zoophyta are thoſe of Ellis, Solander, Pallas, and Dr Shaw's "Naturaliſt's Miſcellany".

70 Tubipora.

53. TUBIPORA.

Animal probably a nereis; coral, conſiſting of erect, hollow, cylindrical, parallel, aggregate tubes.

There are 10 ſpecies, viz. muſica, catenulata, * ſerpens, faſciculāris, ramoſa, pennata, penicillata, flabellaris, ſtellata, and ſtrues.

71 Madrepora.

54. MADREPORA.

Animal reſembling a meduſa; coral with lamellate ſtar-ſhaped cavities.

There are 118 ſpecies, which are diſtributed into five ſubdiviſions, viz.

A. *Compoſed of a ſingle ſtar,*

Containing ſix ſpecies, viz. * verrucaria, turbinata, * porpita, fungitis, patella, and cyathus.

B. *With numerous ſeparate ſtars, and continued numerous gills.*

14 ſpecies, viz. pileus, criſtata, lactuca, ficoides, aceroſa, lichen, agaricites, elephantatus, cruſtacea, incruſtans, exeſa, filograna, natans, and anthophyllum.

C. *With numerous united ſtars.*

There are 15 ſpecies, viz. labyrinthica, ſinuoſa, meandrites, areola, abdita, phrygia, repanda, ambigua, dædalia, gyroſa, clivoſa, cerebrum, involuta, implicata, and cochlea.

D. *Aggregate undivided, having diſtinct ſtars, and porulous, tuberculous, prominent undulations.*

There are 56 ſpecies, viz. favoſa, cavata, bulliris, ananas, hyades, ſiderea, galaxea, pleiades, papilloſa, radiata, latebroſa, polygonia, arenoſa, interſtincta, ſpongioſa, folioſa, porculata, ſtellulata, aſtroites, ſtellata, noduloſa, acropora, cavernoſa, punctata, calycularis, truncata, ſtellaris, organum, divergens, * muſicalis, denticulata, faveolata, retepora, rotuloſa, ceſpitoſa, flexuoſa, faſcicularis, pectinata, rotularis, tubularis, mamillaris, patelloides, globularis, telum, perforata, vermicularis, * arachnoides, undulata, ſolida, monile, dædalia, monoſtriata, contignatio, criſtata, rus, and cuſpidata.

E. *Branched, having diſtinct ſtars, and porulous tuberculous undulations.*

There are 27 ſpecies, viz. porites, digitata, damicornis, verrucoſa, muricata, faſtigiata, ramea, oculata, virginea, roſea, hirtella, linulata, botryoides, granoſa, prolifera, ſeriata, cactus, corymboſa, gammaſcens, problematica, ſpuria, infundibuliformis, anguloſa, diſcoides, chalcidicum, concamerata, and roſacea.

Species. Zoophyta.

55. MILLEPORA.

72 Millepora.

Animal an hydra or polype; coral moſtly branched, and covered with cylindrical, turbinate pores.

There are 34 ſpecies, viz. alcicornis, cærulea, aſpera, ſolida, truncata, miniacea, * cervicornis, *ſkenei, pumila, compreſſa, * lichenoides, violacea, tubulifera, * faſcialis, * foliacea, zeylanica, forniculoſa, cruſtulenta, eroſa, reticulata, * celluloſa, clathrata, reticulum, ſpongitis, coriacea, calcarea, * polymorpha, decuſſata, * alga, * pumicoſa, * tubuloſa, pinnata, * liliacea, and carduncuſus.

73 Cellepora.

56. CELLEPORA.

Animal an hydra or polype; coral ſomewhat membranaceous, and compoſed of round cells.

There are eight ſpecies viz. ramuloſa, ſpengites, * pumicoſa, verrucoſa, ciliata, hyalina, nitida, and annulata.

74 Iſis.

57. ISIS.

Animal growing in the form of a plant; ſtem ſtony and jointed; the joints longitudinally ſtreaked, united by horny junctures, and covered with a ſoft, porous cellular fleſh or bark; the mouths of which are beſet with oviparous polypes.

There are ſix ſpecies, viz. hippuris, dichotoma, ochracea, * entrochá, *aſteria, and coccinea.

75 Antipathes.

58. ANTIPATHES.

Animal growing in the form of a plant; ſtem expanded at the baſe, horny within, and beſet with ſmall ſpines; externally covered with a gelatinous fleſh, beſet with numerous polypes bearing tubercles.

There are 13 ſpecies, viz. ſpiralis, ulex, ſubpinnata, myriophylla, allopecuroides, cupreſſus, oricalcea, dichotoma, clathrata, flabellum, pennacea, ericoides, and fœniculacea.

76 Gorgonia.

59. GORGONIA.

Animal growing in the form of a plant; leathery, corky, woody, horny, or bony; compoſed of glaſſy or ſtony fibres; ſtreaked, tapering, dilated at the baſe, covered with a cellular fleſh or bark, and becoming ſpongy and friable when dry; mouths covering the ſurface of the ſtem and polype-bearing.

There are 41 ſpecies, viz. lepadifera, verticillaris, * placomus, mollis, ſuccinia, americana, exſerta, patula, ceratophyta, juncea, flammea, umbraculum, purpurea, ſaſappo, palma, radicata, ſuberoſa, coralloides, elongata, ſcirpea, ſetacea, viminalis, muricata, * verrucoſa, antipathes, * anceps, nobilis, craſſa, pinnata, ſanguinolenta, violacea, ſetoſa, petechizans, pectinata, abietina, calyculata, briareus, ventalina, reticulum, clathrus, and * flabellum.

77 Alcyonium.

60. ALCYONIUM.

Animal generally growing in the form of a plant; ſtem fixed, fleſhy, gelatinous, ſpongy or leathery, and beſet with ſtellate cells bearing polypes.

There

Species. Zoophyta.

There are 28 ſpecies, viz. arboreum, exos, * digitatum, ſchloſſeri, lyncuriuni, * burſa, cydonium, * ficus, gelatinoſum, manus diaboli, * arenoſum, botryoides, maſſa, cranium, rubrum, mammilloſum, ocellatum, tuberoſum, gorgonoides, aſbeſtinum, alburnum, papilloſum, * conglomeratum, * aſcidioides, ſynovium, vermiculare, ſtellatum, and corniculatum.

78 Spongia.

61. SPONGIA.

Animal fixed, flexile, torpid, of various forms, compoſed either of reticulate fibres, or maſſes of ſmall ſpines interwoven together, and clothed with a gelatinous fleſh, full of ſmall mouths on its ſurface by which it abſorbs and rejects water.

There are 49 ſpecies, viz. ventilabrum, ſlabelliformis, infundibuliformis, fiſtularis, aculeata, tubuloſa, * cornata, ciliata, cancellata, rubra, nigra, officinalis, * oculata, muricata, nodoſa, * tomentoſa, bacillaris, dichotoma, * ſtupoſa, * criſtata, * palmata, prolifera, * botryoides, * panicea, fulva, tubularia, fibrilloja, faſciculata, baſta, lichenoides, papillaris, cavernoſa, ſinuoſa, frondoſa, agaricina, tupha, membranoſa, compreſſa, pencillum, coalita, plana, cruciata, oſſiformis, mauda, ficiformis, * lacuſtris, fluviatilis, friabilis, and canalium.

The ſponges conſiſt of a ramified maſs of capillary tubes, that were long ſuppoſed to be the production of a ſpecies of worms, which are often found within theſe cavities; an idea, however, which is now nearly exploded. Others have imagined them to be only vegetables; but that they are poſſeſſed of animality, appears evident from the circumſtance of their pores alternately contracting and dilating, and from their even ſhrinking in ſome degree from the touch, when examined in their native ſituations. Their ſtructure probably enables them to abſorb nouriſhment from the ſurrounding fluid.

Theſe animals are certainly the moſt torpid of all the zoophytes. The individuals differ very much from each other, both in form and ſtructure. Some of them, as the common ſponge, are of no determinate figure; but others are cup-ſhaped, tubular, &c.

officinalis. Irregularly formed, porous, rough, lobed, and woolly. —The officinal ſponge is elaſtic, and very full of holes; it grows into irregular lobes of a woolly conſiſtence, and generally adheres, by a very broad baſe, to the rocks. It is chiefly found about the iſlands in the Mediterranean, where it forms a conſiderable article of commerce. A variety of ſmall marine animals pierce and gnaw into its irregular winding cavities. Theſe appear on the outſide, by large holes raiſed higher than the reſt. When it is cut perpendicularly, the interior parts are ſeen to conſiſt of ſmall tubes, which divide into branches as they appear on the ſurface. Theſe tubes, which are compoſed of reticulated fibres, extend themſelves every way, by this means increaſing the ſurface of the ſponge, and ending at the outſide in an infinite number of ſmall circular holes, which are the proper mouths of the animal. Each of theſe holes is ſurrounded by a few erect pointed fibres, that appear as if woven in the form of little ſpines. Theſe tubes, with their ramifications, in the living ſtate of the ſponge, are clothed with a gelatinous ſubſtance, properly called the fleſh of the animal. When the ſponge is firſt taken it has a ſtrong fiſhy ſmell, and the fiſhermen take great care in making it perfectly clean, in order to prevent its growing putrid.

Species. Zoophyta.

79 Fluſtra.

62. FLUSTRA, *Sea Mat-Weed*, or *Horn-Wrack*.

Animal a polype, proceeding from porous cells; ſtem fixed, foliaceous, membranaceous, compoſed of numerous rows of cells, united together, and woven like a mat.

There are about 18 ſpecies, viz. * foliacea, * truncata, * piloſa, * chartacea, * carbacea, bombycina, verticillata, * dentata, * bullata, tomentoſa, denticulata, tubuloſa, hiſpida, frondiculoſa, papyracea, hirta, * membranacea, and lineata.

80 Tubularia.

63. TUBULARIA.

Stem tubular, ſimple or branched, fixed by the baſe; animal proceeding from the end of the tube, and having its head creſted with tentacula.

There are 26 ſpecies, viz. magnifica, cornucopiæ, * indiviſa, * ramoſa, ramea, * fiſtuloſa, fragilis, * muſcoides, papyracea, penicillus, acetabulum, ſplachnea, * coryna, * affinis, fabricia, longicornis, multicornis, repens, * campanulata, * reptans, ſultana, ſtellaris, ſimplex, ſpallanzani, membranacea, * and flabelliformis.

Of theſe, by far the largeſt, and probably the moſt beautiful ſpecies, is the magnifica, which is thus characteriſed by Dr Shaw.

magnifica. With a ſimple whitiſh tube, and very numerous tentacula, variegated with red and white. (Vide fig. 14.).

It is found in various parts of the coaſt of Jamaica, adhering to the rocks. It is very ſhy, and on being approached, inſtantly recedes within its elaſtic tube, which on a farther alarm alſo retires into the rock, and ſpecimens can be procured only by breaking off ſuch parts of the ſtone as contained them. Theſe being put into tubs of ſea-water, may be kept for months in perfect preſervation.

81 Corallina.

64. CORALLINA.

Animal growing in the form of a plant; ſtem fixed, with calcareous ſubdivided branches, moſtly jointed.

There are 38 ſpecies, viz. tridens, opuntia, monile, incraſſata, tuna, noduloſa, * ſquamata, loricata, palmata, * elongata, ſubulata, granifera, * officinalis, pennata, * rubens, * cruſtata, * ſpermopheros, * corniculata, fragiliſſima, fruticuloſa, indurata, lichenoides, rugoſa, marginata, cylindrica, oblongata, obtuſata, lapideſcens, barbata, roſarium, cuſpidata, tribulus, flabellum, conglutinata, phœnix, peniculum, penicillum, and terreſtris.

82 Sertularia.

65. SERTULARIA.

Animal growing in the form of a plant, ſtem branched, producing polypes from cup-ſhaped denticles or minute cells.

There are 77 ſpecies, which are diſtributed into two ſections.

A. *Stem horny, tubular, fixed by the baſe, beſet with cup-ſhaped denticles, and furniſhed with veſicles or ovaries containing polypes, eggs, or the living young.*

* Roſacea, * pumila, * operculata, * tamariſca, * abietina,

Species. Zoophyta.

etina, * nigra, * fuſceſcens, obſoleta, pinus, cupreſſoides, * cupreſſina, * argentea, * rugoſa, * halecina, * theja, * myriophyllum, hypoides, ſpecioſa, * falcata, * pluma, echinata, * antennina, * verticillata, * gelatinoſa, * volubilis, * ſyringa, * cuſcuta, * puntuloſa, * fruteſcens, pinaſter, pennatula, * filicula, quadridentata, ſpicata, * evanſii, * muricata, ſecundaria, miſinenſis, racemoſa, * uva, * lindigera, * geniculata, dichotoma, * ſpinoſa, * pinnata, * ſetacea, polygonias, pennaria, * lichenaſtrum, cedrina, * imbricata, purpurea, articulata, filicina, and fruticans.

B. *Stem cruſtaceous, reſembling ſtone, and compoſed of rows of cells; no veſicles, but inſtead of them ſmall globules.* Cellularia.

* Burſaria, * loriculata, * faſtigiata, * ovicularia, * neretina, * ſerupoſa, piloſa, criſpa, placeoſa, * reptans, paraſitica, ciliata, * eburnea, * cornuta, * boricata, * anguina, coreoides, tulipifera, tabulum, * ternata, cirrata, and opuntioides.

83 Pennatula.

66. PENNATULA, the *Sea-pen*.

Animal not fixed, of various ſhapes; ſupported by a bony part within; naked at the baſe; the upper part having generally lateral ramifications furniſhed with rows of tubular denticles, with radiate polypes from each tube.

There are 18 ſpecies, viz. coccinea, griſea, phoſphorea, piloſa, rubra, mirabilis, ſagitta, antennina, ſtellifera, phalloides, arundinacea, ſciopia, juncea, grandis, argentea, encrinus, cynomorium, and reniformis.

84 Hydra.

67. HYDRA, the *Polype*.

Animal fixing itſelf by the baſe; linear, gelatinous, naked, contractile, and furniſhed with ſetaceous tentacula; inhabiting freſh waters, and producing its deciduous offſpring from its ſides. (Vid. fig. 15.).

Theſe animals are among the moſt curious productions of nature, chiefly as exhibiting the moſt ſurpriſing example of diffuſed vitality. Though not ſo formidable as the hydra deſtroyed by Hercules, they are rendered equally prolific by being cut in pieces.

There are about five ſpecies, viz. viridis, * fuſca, * griſea, gelatinoſa, and pallens.

The three firſt ſpecies are thoſe on which the greateſt number of experiments have been made; and their ſhapes are ſo various, that it is by no means eaſy to deſcribe them. They are generally found in ditches. Whoever has carefully examined theſe when the ſun is very powerful, will find many little tranſparent lumps of the appearance of jelly, and ſize of a pea, and flatted upon one ſide. The ſame kind of ſubſtances are likewiſe to be met with on the under ſide of the leaves of plants that grow in ſuch places. Theſe are the polypes in a quieſcent ſtate, and apparently inanimate. They are generally fixed by one end to ſome ſolid ſubſtance, with a large opening, which is the mouth, at the other, having ſeveral arms fixed round it, projecting as rays from the centre. They are ſlender, pellucid, and capable of contracting themſelves into very ſmall compaſs, or of extending to a conſiderable length. The arms are capable of the ſame contraction and expanſion as the body, and with theſe they lay hold of minute worms and inſects, bringing them to the mouth, and ſwallowing them. The indigeſtible parts are again thrown out by the mouth.

Species. Zoophyta.

The green polype was that firſt diſcovered by M. Trembley; and the firſt appearances of ſpontaneous motion were perceived in its arms, which it can contract, expand, and twiſt about in various directions. On the firſt appearance of danger they contract to ſuch a degree, that they appear little longer than a grain of ſand, of a fine green colour, the arms diſappearing entirely. Soon afterwards, he found the griſea, and afterwards the fuſca. The bodies of the viridis and griſea diminiſh almoſt inſenſibly from the anterior to the poſterior extremity; but the fuſca is for the moſt part of an equal ſize for two thirds of its length from the anterior to the poſterior extremities, from which it becomes abruptly ſmaller, and then continues of a regular ſize to the end. Theſe three kinds have at leaſt ſix, and at moſt twelve or thirteen arms. They can contract themſelves till their bodies do not exceed one fourth of an inch in length, and they can ſtop at any intermediate degree of expanſion or contraction. They are of various ſizes, from an inch to an inch and a half long. Their arms are ſeldom longer than their bodies, though ſome have them an inch, and ſome even eight inches long. The thickneſs of their bodies decreaſes as they extend themſelves, and *vice verſa*; and they may be made to contract themſelves either by agitating the water in which they are contained, or by touching the animals themſelves. When taken out of the water they all contract ſo much, that they appear only like a little lump of jelly. They can contract or expand one arm, or any number of arms, independent of the reſt; and they can likewiſe bend their bodies or arms in all poſſible directions. They can alſo dilate or contract their bodies in various places, and ſometimes appear thick ſet with folds, which, when careleſsly viewed, appear like rings. Their progreſſive motion is performed by that power, which they have of contracting and dilating their bodies. When about to move, they bend down their heads and arms, lay hold by means of them on ſome other ſubſtance to which they deſign to faſten themſelves; then they looſen their tail, and draw it towards the head; then either fix it in that place, or ſtretching forward their head as before, repeat the ſame operation. They aſcend or deſcend at pleaſure in this manner upon aquatic plants, or upon the ſides of the veſſel in which they are kept; they ſometimes hang by the tail from the ſurface of the water, or ſometimes by one of the arms; and they can walk with eaſe upon the ſurface of the water. On examining the tail with a microſcope, a ſmall part of it will be found to be dry above the ſurface of the water; and, as it were in a little concave ſpace, of which the tail forms the bottom; ſo that it ſeems to be ſuſpended on the ſurface of the water on the ſame principle that a ſmall pin or needle is made to ſwim. When a polype, therefore, means to paſs from the ſides of the glaſs to the ſurface of the water, it has only to put that part out of the water by which it is to be ſupported, and to give it time to dry, which it always does upon theſe occaſions; and they attach themſelves ſo firmly by the tail to aquatic plants, ſtones, &c. that they cannot be eaſily diſengaged: they often further ſtrengthen theſe attachments *viridis.*

Species. Zoophyta.

attachments by means of one or two of their arms, which ſerve as a kind of anchors for fixing them to the adjacent ſubſtances.

The ſtomach of the polype is a kind of bag or gut into which the mouth opens, and goes from the head to the tail. This, in a ſtrong light, is viſible to the naked eye, eſpecially if the animal be placed between the eye and a candle; for theſe animals are quite tranſparent whatever their colour may be: the ſtomach, however, appears to more advantage through a powerful magnifier. M. Trembley, by cutting one of theſe animals tranſverſely into three parts, ſatisfied himſelf that they were perforated throughout. Each piece immediately contracted itſelf, and the perforation was very viſible through a microſcope. The ſkin which encloſes the ſtomach is that of the polype itſelf; ſo that the whole animal, properly ſpeaking, conſiſts only of one ſkin, in the form of a tube, and open at both ends. No veſſels of any kind are to be diſtinguiſhed.

The mouth is ſituated at the anterior end in the middle between the ſhooting forth of the arms, and aſſumes different appearances according to circumſtances; being ſometimes lengthened out in the form of a nipple, at others appearing truncated; ſometimes the aperture is quite cloſed, at others there is a hollow; though at all times a ſmall aperture may be diſcovered by a powerful magnifier.

The ſkin of a polype, when examined with a microſcope, appears like ſhagreen, or as if covered with little grains, more or leſs ſeparated from each other, according to the degree of contraction of the body. If the lips of a polype be cut tranſverſely, and placed ſo that the cut part of the ſkin may be directly before the microſcope, the ſkin throughout its whole thickneſs will be found to conſiſt of an infinite number of grains, and the interior part is found to be more ſhagreened than the exterior one; but they are not ſtrongly united to each other, and may be ſeparated without much trouble. They even ſeparate of themſelves, though in no great numbers, in the moſt healthy animals of this kind; for where they are obſerved to ſeparate in large quantities, it is a ſymptom of a very dangerous diſorder. In the progreſs of this diſorder, the ſurface of the polype becomes gradually more and more rough and unequal, and no longer well defined or terminated as before. The grains fall off on all ſides, the body and arms contract and dilate, and aſſume a white ſhining colour; and at laſt the whole diſſolves into a heap of grains, which is more particularly obſerved in the green polype. By a careful examination we find, that the ſkin of the polype is entirely compoſed of grains, cemented by means of a kind of gummy ſubſtance; but it is to the grains entirely that the polype owes its colour. The ſtructure of the arms is analogous to that of the body; and they appear ſhagreened, when examined by the microſcope, whether they be in a ſtate of contraction or expanſion; but, if very much contracted, they appear more ſhagreened than the body, though almoſt quite ſmooth when in their utmoſt ſtate of extenſion. In the green polype the appearance of the arms is continually varying; and theſe variations are more ſenſible towards the extremity of the arm than at its origin, but more ſcattered in the parts further on. The extremity is often terminated by a knob, the hairs of which cannot be obſerved without a powerful magnifier. They have a remarkable inclination for turning towards the light, ſo that if that part of the glaſs, on which they are, be turned from the light, they will quickly remove to the other.

Species. Zoophyta.

That ſpecies named the *fuſca* has the longeſt arms, and makes uſe of the moſt curious manœuvres to ſeize its prey. They are beſt viewed in a glaſs ſeven or eight inches deep, when their arms commonly hang down to the bottom. When this or any other kind is hungry, it ſpreads its arms in a kind of circle to a conſiderable extent, incloſing in this, as in a net, every inſect which has the misfortune to come within the circumference. While the animal is contracted by ſeizing its prey, the arms are obſerved to ſwell like the muſcles of the human body when in action. Though no appearance of eyes can be obſerved in the polype, they certainly have ſome knowledge of the approach of their prey, and ſhew the greateſt attention to it as ſoon as it comes near them. It ſeizes a worm the moment it is touched by one of the arms; and in conveying it to the mouth, it frequently twiſts the arm into a ſpiral like a cork-ſcrew, by which means the inſect is brought to the mouth in a much ſhorter time than otherwiſe it would be; and ſo ſoon are the inſects on which the polypes feed killed by them, that M. Fontana thinks they muſt contain the moſt powerful kind of poiſon; for the lips ſcarce touch the animal when it expires, though there cannot be any wound perceived on it when dead. The worm, when ſwallowed, appears ſometimes ſingle, ſometimes double, according to circumſtances. When full, the polype contracts itſelf, hangs down as in a kind of ſtupor, but extends again in proportion as the food is digeſted, and the excrementitious part is diſcharged. The bodies of the inſects, when ſwallowed, are firſt macerated in the ſtomach, then reduced into fragments, and driven backwards and forwards from one end of the ſtomach to the other, and even into the arms, which, as well as the other parts of this remarkable creature, are a kind of hollow guts or ſtomachs. In order to obſerve this motion, it is beſt to feed the polypes with ſuch food as will give a lively colour; ſuch, for inſtance, as thoſe worms which are furniſhed with a red juice. Some bits of a ſmall black ſnail being given to a polype, the ſubſtance of the ſkin was ſoon diſſolved into a pulp conſiſting of ſmall black fragments; and on examining the polype with a microſcope, it was found that the particles were driven about in the ſtomach, and that they paſſed into the arms, from thence back into the ſtomach; then to the tail, from whence they paſſed again into the arms, and ſo on. The grains of which the body of the polype conſiſts, take their colour from the food with which it is nouriſhed, and become red or black as the food happens to afford the one or the other. They are likewiſe more or leſs tinged with theſe colours in proportion to the ſtrength of the nutritive juices; and it is obſervable that they loſe their colour if fed with aliments of a colour different from themſelves. They feed on moſt inſects, and fiſh or fleſh, if cut into ſmall bits. Sometimes two polypes lay hold of the ſame worm, and each begins to ſwallow its own end till their mouths meet and the worm breaks. But ſhould this happen not to be the caſe, the one polype will ſometimes devour the other along with its portion.

It

Species. Zoophyta.

It appears, however, that the ſtomach of one polype is not fitted for diſſolving the ſubſtance of another; for the one which is ſwallowed always gets clear again after being impriſoned an hour or two.

The manner in which the polypes generate is moſt perceptible in the griſea and fuſca, as being conſiderably larger than the viridis. If we examine one of them in ſummer, when the animals are moſt active, and prepared for propagation, ſome ſmall tubercles will be found proceeding from its ſides, which conſtantly increaſe in bulk, until at laſt in two or three days they aſſume the figure of ſmall polypes. When they firſt begin to ſhoot, the excreſcence becomes pointed, aſſuming a conical figure, and deeper colour than the reſt of the body. In a ſhort time it becomes truncated, and then cylindrical, after which the arms begin to ſhoot from the anterior end. The tail adheres to the body of the parent animal, but gradually grows ſmaller, until at laſt it adheres only by a point, and is then ready to be ſeparated. When this is the caſe, both the mother and young ones fix themſelves to the ſides of the glaſs, and are ſeparated from each other by a ſudden jerk. The time requiſite for the formation of the young ones is very different, according to the warmth of the weather and the nature of the food eaten by the mother. Sometimes they are fully formed, and ready to drop off in 24 hours; in other caſes, when the weather is cold, 15 days have been requiſite for bringing them to perfection.

It is remarkable, that there is a reciprocal communication of food betwixt the young and old, before they be ſeparated. The young ones, as ſoon as they are furniſhed with arms, catch prey for themſelves, and communicate the digeſted food to the old ones, who on the other hand do the ſame to the young ones. This was fully verified by the following experiment. One of the large polypes of the fuſca kind being placed on a ſlip of paper in a little water, the middle of the body of a young one growing out from it was cut open; when the ſuperior part of that end which remained fixed to the parent was found to be open alſo. But cutting over the parent polype on each ſide of the ſhoot, a ſhort cylinder was obtained, open at both ends; which being viewed through a microſcope, the light was obſerved to come through the young one into the ſtomach of the old one. On cutting open the portion of the cylindrical portion lengthwiſe, not only the hole of communication was obſerved, but one might ſee through the end of the young one alſo. On changing the ſituation of the two pieces, the light was ſeen through the hole of communication. This may be ſeen between the parent polype and its young ones after feeding them; for after the parents have eaten, the bodies of the young ones ſwell as if they themſelves had been eating.

The polypes produce young ones indiſcriminately from all parts of their bodies, and five or ſix young ones have frequently been produced at once; nay, M. Trembley has obſerved nine or ten produced at the ſame time.

Nothing like copulation among theſe creatures was ever obſerved by M. Trembley, though for two years he had thouſands of them under his inſpection. To be more certain on this ſubject, he took two young ones the moment they came from their parent, and placed them in ſeparate glaſſes. Both of them multiplied, not only themſelves, but alſo their offſpring, which were ſeparated and watched in the ſame manner to the ſeventh generation. They have even the ſame power of generation while adhering to their parent. In this ſtate the parent, with its children and grandchildren, exhibits a ſingular appearance, looking like a ſhrub thick ſet with branches. Thus ſeveral generations ſometimes are attached to one another, and all of them to one parent. Mr Adams gives a figure of one polype with 19 young ones hanging at it; the whole group being about one inch broad, and one inch and a half in length; the old polype ate about 12 monoculi per day, and the young ones about 20 among them.

Species. Zoophyta.

When a polype is cut tranſverſely or longitudinally into two or three parts, each part in a ſhort time becomes a perfect animal; and ſo great is this prolific power, that a new animal will be produced even from a ſmall portion of the ſkin of the old one. If the young ones be mutilated while they grow upon the parent, the parts ſo cut off will be reproduced; and the ſame property belongs to the parent. A truncated portion will ſend forth young ones before it has acquired a new head and tail of its own, and ſometimes the head of the young one ſupplies the place of that which ſhould have grown out of the old one. If we ſlit a polype longitudinally through the head to the middle of the body, we ſhall have one formed with two heads; and by again ſlitting theſe in the ſame manner, we may form one with as many heads as we pleaſe.

A ſtill more ſurpriſing property of theſe animals is, that they may be grafted together. If the truncated portions of a polype be placed end to end, and gently puſhed together, they will unite into a ſingle one. The two portions are firſt joined together by a ſlender neck, which gradually fills up and diſappears, the food paſſing from one part into the other; and thus we may form polypes, not only from different portions of the ſame animal, but from thoſe of different animals. We may fix the head of one to the body of another, and the compound animal will grow, eat and multiply, as if it had never been divided. By puſhing the body of one into the mouth of another, ſo far that their heads may be brought into contact, and kept in that ſituation for ſome time, they will at laſt unite into one animal, only having double the uſual number of arms. The *hydra fuſca* may be turned inſide out like a glove, at the ſame time that it continues to eat and live as before. The lining of the ſtomach now forms the outer ſkin, and the former epidermis conſtitutes the lining of the ſtomach. If previous to this operation the polype have young ones attached to it, ſuch as are newly beginning to vegetate turn themſelves inſide out, while the larger ones continue to increaſe in ſize till they reach beyond the mouth of the parent, and are then ſeparated in the uſual manner from the body. When thus turned, the polype combines itſelf in many different ways. The fore part frequently cloſes and becomes a ſupernumerary tail. The animal, which was at firſt ſtraight, now bends itſelf, ſo that the two tails reſemble the legs of a pair of compaſſes, which it can open and ſhut. The old mouth is placed as it were at the joint of the compaſſes, but loſes its power of action; to ſupply which,

Species. Infusoria.

a new one is formed in its neighbourhood, and in a little time there is a new species of hydra found with several mouths.

The sides of a polype which has been cut through in a longitudinal direction, begin to roll themselves up, usually from one of the extremities, with the outside of the skin inwards; but in a little time they unroll themselves, and the two cut edges join together, sometimes beginning at one extremity, and sometimes approaching throughout their whole length. As soon as the edges join, they unite so closely that no scar can be perceived. If a polype be partly turned back, the open part closes, and new mouths are formed in different places. Every portion of a polype is capable of devouring insects, almost as soon as it is cut off, and the voracity of the whole tribe is astonishing; for Mr Adams observes, that most of the insects on which they feed bear the same proportion to the mouth of a polype, that an apple the size of a man's head bears to the mouth of a man.

The hydra pallens is very rarely met with, and is described by Mr Roiselle. It is of a pale yellow colour, growing gradually smaller from the bottom; the tail is round or knobbed; the arms are about the length of the body, of a white colour, generally seven in number, and are apparently composed of a chain of globules. The young are brought forth from all parts of its body.

The order *Zoophyta* contains 15 genera and 489 species.

Order V. INFUSORIA.

We have already, under the article Animalcule, treated of the general character and habits of the animals composing this order, and we can add little here to what has been said in that article. We shall therefore merely give the classification of the genera and species, and briefly notice a few of the more remarkable individuals.

Few writers have written expressly on this order; but the principal are Muller, Bruigiere, in the Encyclopedie Methodique, and Baker and Adams on the Microscope.

85 Brachionus.

68. Brachionus.

Body contractile, covered with a shell, and furnished with rotatory cilia.

There are about 12 species, viz. urceolaris, patella, cirratus, tripus, uncinatus, mucronatus, cernuus, calyciflorus, tubisex, quadridentatus, patina, and striatus.

patina. The patina is extremely bright and splendid, has a large body, a crystalline and nearly circular shell, without either incision or teeth, only towards the apex it falls in so as to form a smooth notch. A double glittering organ, with ciliated edges, projects from the apex; both of them of a conical figure, and standing as it were upon a pellucid substance, which is divided into two lobes, between which and the rotatory organ there is a silver-coloured crenulated membrane. Two small claws may likewise be discovered near the mouth.

striatus. The striatus has an oblong, pellucid shell, capable of altering its figure. The apex is truncated, with six small teeth on the edge of it, 12 longitudinal streaks down the back, the base obtuse and smooth. The teeth are occasionally protruded or retracted; and there are two small spines or horns on the other side of the shell. The animal itself is of a yellow colour, crystalline, and muscular; now and then putting out from the apex two or three little bundles of playing hairs, the two lateral ones shorter than that in the middle; on the outer side we may observe a forked degludatory muscle, and two rigid points when the apex is drawn in. It is found in sea water.

Species. Infusoria.

69. Vorticella.

86 Vorticella.

Body contractile, naked, and furnished with ciliate, rotatory organs.

There are about 57 species, which are arranged under three sections.

A. Seated on a pedicle or stem.

29 species, viz. * racemosa, * polypina, * anastatica, conglomerata, * pyraria, * opercularia, * tuberosa, hians, bellis, * umbellaria, * berberina, digitalis, fasciculata, annularis, nutans, gemella, * nebulifera, * convallaria, * lunaris, * globularia, inclinans, ringens, * pyriformis, stellata, vaginata, * citrina, cyathina, putrida, and patellina.

B. Furnished with a tail.

14 species, viz. * flosculosa, * socialis, * stentorea, * hyacinthina, auriculata, * furcata, senta, * catulus, felis, vermicularis, * macroura, * rotatoria, * lacinalata, and sacculata.

C. Without tail or stem.

14 species, viz. * ampulla, * cratægaria, caniculata, * nasuta, * crateriformis, * truncatella, * limacina, * discina, cornuta, * cincta, * polymorpha, * viridis, * bursata, and * nigra.

polypina. The polypina, when viewed through a small magnifier, appear like so many little trees; the upper part, or heads, are egg-shaped, the top truncated, the lower part filled with intestines; the branches thick set with little knobs. Vide fig. 16.

fasciculata. The fasciculata has a rotatory organ, which may sometimes be seen projecting beyond the aperture; there is a little head at the apex, and the pedicle is twisted and very slender. A congealed green mass which is often found swimming about in ditches is composed of myriads of these animals, which are not visible to the naked eye, and when magnified appear like a bundle of green flowers.

socialis. The socialis, when considerably magnified, appears like a circle surrounded with crowns or ciliated heads, tied by small thin tails to a common centre, from whence they advance towards the circumference, where they turn very briskly, occasioning a kind of whirlpool, which brings its food. When one of them has been in motion for some time, it stops, and another begins; sometimes two or three may be perceived in motion at once; they are frequently to be met with separate, with the tail sticking in the mud. The body contracts and dilates very much, so as sometimes to have the appearance of a cudgel, at others to assume almost a globular form.

The

Species. Infuſoria. *floſculoſa.* The floſculoſa appears to the naked eye like a yellow globule adhering to the ceratophyllon like a little flower or a heap of yellow eggs. When magnified, they are ſeen to conſiſt of a congeries of animalcula conſtituting a ſphere from a mouldy centre. They contract and extend their bodies either alone or in ſociety, and excite a vortex in the water by means of a diſk. When they quit the ſociety and act ſingly, they may be obſerved to conſiſt of a head, abdomen and tail; the head being frequently drawn back into the abdomen ſo far that it cannot be ſeen, only exhibiting a broad kidney-ſhaped diſk ſtanding out. The abdomen is oblong, oval, and tranſparent; the tail ſharp, twice as long as the abdomen, ſometimes rough and annulated, or altogether ſmooth.

87 Trichoda.

70. Trichoda.

Animal inviſible to the naked eye, pellucid, hairy, or horned.

There are about 60 ſpecies, which are divided into three ſections.

A. *Hairy.*

47 ſpecies, viz. grandinella, * cometa, * granata, * ſol, * bamba, orbis, urnula, urinarium, * trigona, tinea, * pubes, * proteus, * gibba, * patens, * uvula, ſulcata, * anas, * farcimen, * linter, * vermicularis, * melitæa, * fimbriata, camelus, * rattus, inquilinus, * innata, transfuga, ciliata, * cyclidium, * pulex, * lynceus, * charon, * cimex, pellionella, angulus, urſula, ſemiluna, pupa, * pocillum, clavus, * muſculus, * delphinus, clava, cuniculus, * piſcis, larus, and * longicauda.

B. *Furniſhed with cirri.*

Four ſpecies, viz. * acarus, * ludis, ſanaio, and volutator.

C. *Horned.*

Nine ſpecies, viz. lyncaſter, * hiſtrio, * cypris, * patella, * pullaſter, * mytilus, lepus, ſilurus, and calvitium.

grandinella. The grandinella is a very ſmall pellucid globule, with the inteſtines ſcarcely viſible; the top of the ſurface furniſhed with ſeveral ſmall briſtles not eaſily diſcoverable, as the creature has a power of extending or drawing them back in an inſtant. It is found in pure water as well as in infuſions of vegetables.

ſol. The ſol is ſmall, globular, and cryſtalline; beſet everywhere wirh diverging rays longer than the diameter of the body; the inſide full of molecules. The body contracts and dilates, but the creature remains confined to the ſame ſpot. It was found with other animalcules in water which had been kept three weeks.

proteus. The proteus is that which Mr Baker diſtinguiſhes by the ſame name, and of which an account is given under the article Animalcule. It is found in the ſlimy matter adhering to the ſides of the veſſel in which vegetables have been infuſed, or animal ſubſtances preſerved. That deſcribed by Mr Adams was diſcovered in the ſlime produced from the water where ſmall fiſhes, water ſnails, &c. had been kept. The body reſembled that of a ſnail, the ſhape being ſomewhat elliptical, but pointed at one end, while from the other proceeded a long, ſlender, and finely proportioned neck, of a ſize ſuitable to the reſt of the animal.

Species. Infuſoria. 88 Cercaria.

71. Cercaria.

Animal inviſible to the naked eye, pellucid, and furniſhed with a tail.

There are 13 ſpecies; viz. * cyrinus, * inquieta, * lemna, * turbo, * podura, * mutabilis, catellus, * lupus, * vermicularis, pleuronectis, * tripus, cyclidium, and tenax.

The *lemna* varies its form ſo much, that it might be miſtaken for the proteus of Baker, deſcribed under the article Animalcule: though in fact it is totally different. The body ſometimes appears of an oblong, ſometimes of a triangular, and ſometimes of a kidney-ſhape. The tail is generally ſhort, thick, and annulated; but ſometimes long, flexible, cylindric, and without rings; vibrating, when ſtretched out, with ſo much velocity, that it appears double. A ſmall pellucid globule, which Muller ſuppoſes to be its month, is obſervable at the apex; and two black points not eaſily diſcovered, he thinks, are its eyes. It walks ſlowly after taking three or four ſteps, and extends the tail, erecting it perpendicularly, ſhaking and bending it, in which ſtate it very much reſembles a leaf of the lemna.

89 Leucophra.

72. Leucophra.

Animal inviſible to the naked eye, and every where ciliate.

There are eight ſpecies; viz. * conflictor, * veſiculifera, acuta, fluxa, armilla, * cornuta, * heteroclita, and nodulata.

90 Gonium.

73. Gonium.

Animal very ſimple, flat, angular, but inviſible to the naked eye.

There are five ſpecies; viz. * pectorale, pulvinatum, polyſphericum, truncatum, and rectangulum.

pectorale. The *pectorale* is found in pure water, and moves alternately towards the right and left. It is quadrangular and pellucid, with 16 ſpherical molecules, of a greeniſh colour, ſet in a quadrangular membrane, like the jewels in the breaſt-plate of the high prieſt, reflecting light on both ſides.

91 Colpoda.

74. Colpoda.

Animal inviſible to the naked eye, very ſimple, pellucid, ſinuate.

cucullus. There are ſeven ſpecies; viz. lamella, roſtrum, * meleagris, * cucullus, ren, * pyrum, and hypocrepis.

The *cucullus* is found in vegetable infuſions, and in fœtid hay, moving in all directions, and commonly with great velocity. It is very pellucid, and has a well defined margin, filled with little bright veſicles differing in ſize, and of no certain number. Its figure is commonly oval, with the top bent into a kind of beak, ſometimes oblong, but moſt commonly obtuſe. It has in the inſide from 8 to 24 bright little veſicles not diſcernible in ſuch as are young. Some have ſup-

Species. Infuſoria.

poſed theſe to be animalcules which this creature has ſwallowed; but Mr Muller is of opinion that they are its offspring. When this creature is near death by reaſon of the evaporation of the water, it protrudes its offspring with violence. From ſome circumſtances it would ſeem probable that this animalcule caſts its ſkin, as is the caſe with ſome inſects.

92 Parameſium.

75. PARAMESIUM.

Worm inviſible to the naked eye, ſimple, pellucid, flattened, oblong.

There are ſeven ſpecies; viz. * aurelia, * chryſalis, * oviferum, * marginatum, caudatum, anceps, and acutum.

aurelia. The *aurelia* is membranaceous, pellucid, and four times longer than it is broad; the fore part obtuſe and tranſparent; the hind part filled with molecules. It has ſomewhat the appearance of a gimlet, by reaſon of a fold which goes from the middle to the apex, and is of a triangular figure. It moves in a rectilinear and vacillatory manner. It is found in ditches where there is plenty of duckweed; and will live many months in the ſame water without any renewal of it.

93 Cyclidium.

76. CYCLIDIUM.

Worm inviſible to the naked eye, very ſimple, pellucid, flat, orbicular or oval.

There are ſeven ſpecies; viz. * bulla, milium, glaucoma, * radians, roſtratum, * nucleus, and pediculus.

94 Burſaria.

77. BURSARIA.

Worm very ſimple, membranaceous, hollow.

There are three ſpecies; viz. truncatella, * hirundinella, and * duplella.

95 Vibrio.

78. VIBRIO.

Worm inviſible to the naked eye; very ſimple, round, elongated.

There are 20 ſpecies; viz. lineola, bacillus, undula, vermiculus, inteſtinum, * lunula, malleus, * ſerpentulus, * aceti, * glutinis, * anguilula, utriculus, faſciola, colymbus, cygnus, * anſer, * olor, falx, diffluens, and * proteus.

anſer. The *anſer* is found in water where duckweed grows. The trunk is elliptic, round, and without any inequality on the ſides. It is full of molecules; the hind part ſharp and bright; the fore part produced into a bending neck, longer than the body; the apex whole and even, with blue canals paſſing between the marginal edges, occupying the whole length of the neck; and in one of them a violent deſcent of water to the beginning of the trunk is obſervable. It moves the body ſlow, but the neck more briſkly.

96 Enchelis.

79. ENCHELIS.

Worm inviſible to the naked eye; very ſimple, cylindrical.

There are 15 ſpecies; viz. viridis, * punctifera, noduloſa, farcimen, ſemilunum, ovulum, pyrum, fuſus, fritillus, * caudata, epiſtomium, * retrograda, * truncus, ſpatula, and papula.

Species. Infuſoria.

97 Bacillaria.

80. BACILLARIA.

Body conſiſting of cylindrical ſtraw-like filaments, placed parallel to each other, and frequently changing their poſition.

There is only one ſpecies; viz. paradoxa.

98 Volvox.

81. VOLVOX.

Worm inviſible to the naked eye; ſimple, pellucid, ſpherical.

There are nine ſpecies; viz. globulus, pilula, * ſphærula, uva, * lunula, dimidiatus, * globator, pileus, and bulla.

The *globator*, or *ſpherical membranaceous volvox*, is found in great numbers in the infuſions of hemp and tremella, and in ſtagnant waters in ſpring and ſummer. It was firſt obſerved and diſected by Leeuwenhoeck; but the deſcriptions of it given by authors differ conſiderably from each other. The following is that of Mr Baker. "There is no appearance of either head, tail, or fins. It moves in every direction, backwards, forwards, up or down, rolling over and over like a bowl, ſpinning horizontally like a top, or gliding along ſmoothly without turning itſelf at all: ſometimes its motions are very ſlow, at other times very ſwift; and when it pleaſes it can turn round as upon an axis very nimbly, without moving out of its place. The body is tranſparent, except where the circular ſpots are placed, which are probably its young. The ſurface of the body in ſome is as if all dotted over with little points, and in others as if granulated like ſhagreen. In general it appears as if ſet round with ſhort moveable hairs." Another author informs us, that "they are firſt very ſmall, but grow ſo large that they can be diſcerned with the naked eye; they are of a yelloviſh green colour, globular figure, and in ſubſtance membranaceous and tranſparent; and in the midſt of this ſubſtance ſeveral ſmall globes may be perceived. Each of theſe are ſmaller animalcula, which have alſo the diaphanous membrane, and contain within themſelves ſtill ſmaller generations, which may be diſtinguiſhed by means of very powerful glaſſes. The larger globules may be ſeen to eſcape from the parent, and then increaſe in ſize."

globator.

This little animal appears like a tranſparent globule of a greeniſh colour, the fœtus being compoſed of ſmaller greeniſh globules. In proportion to its age it becomes whiter and brighter, and moves ſlowly round its axis; but to the microſcope its ſurface appears as if granulated; the roundeſt molecules fixed in the centre being largeſt in thoſe that are young. The exterior molecules may be wiped off, leaving the membrane naked. When the young ones are of a proper ſize, the membrane opens, and they paſs through the fiſſure, after which the mother melts way. Sometimes they change their ſpherical figure, and become flat in ſeveral places. They

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 5.

Fig. 3.

Fig. 6.

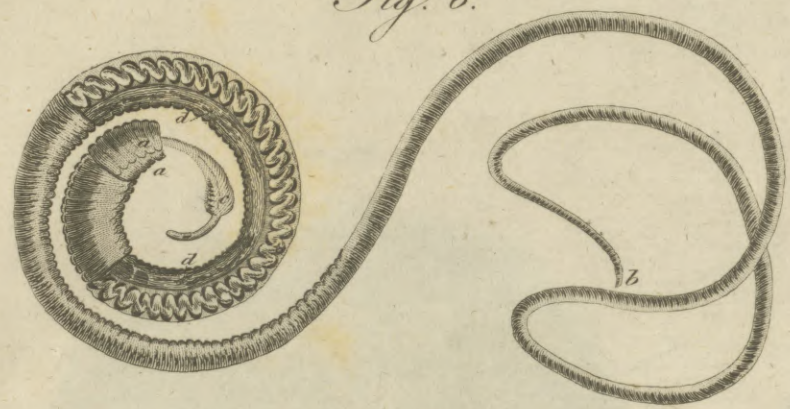

Fig. 8.

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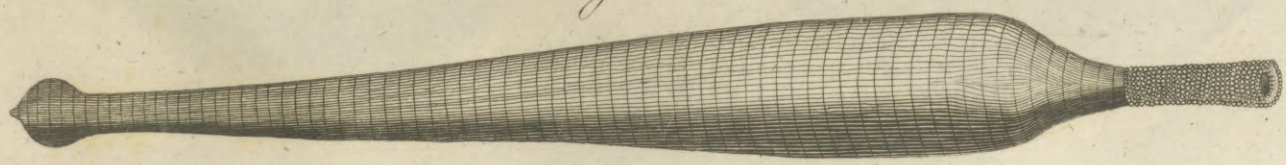
Fig. 9.



A Bell Prin. Wal.^r Sculpsitor fecit.

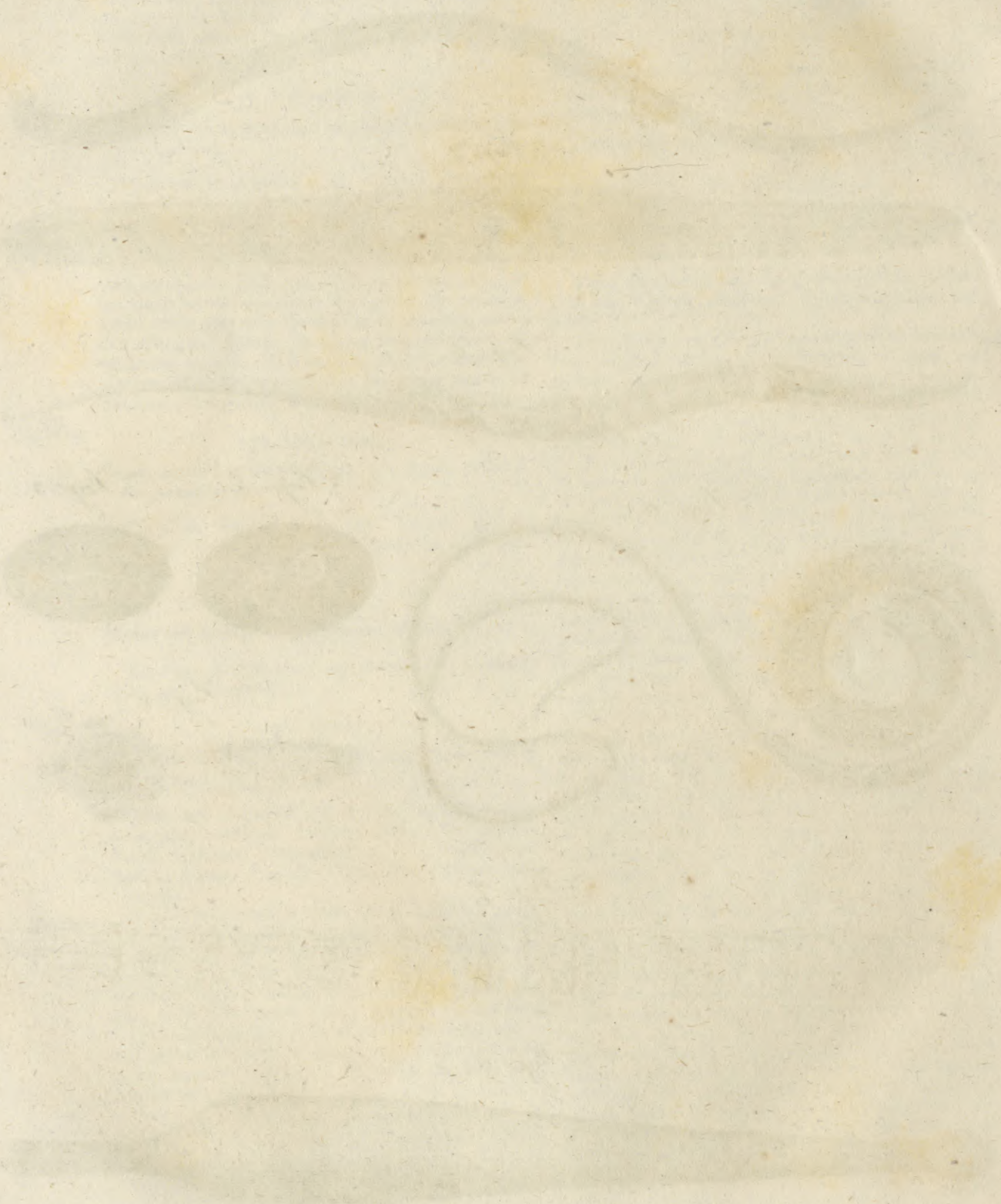


Fig. 10.

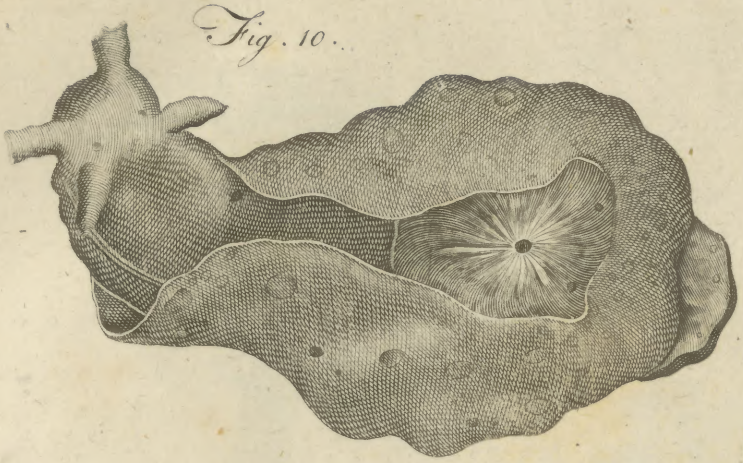
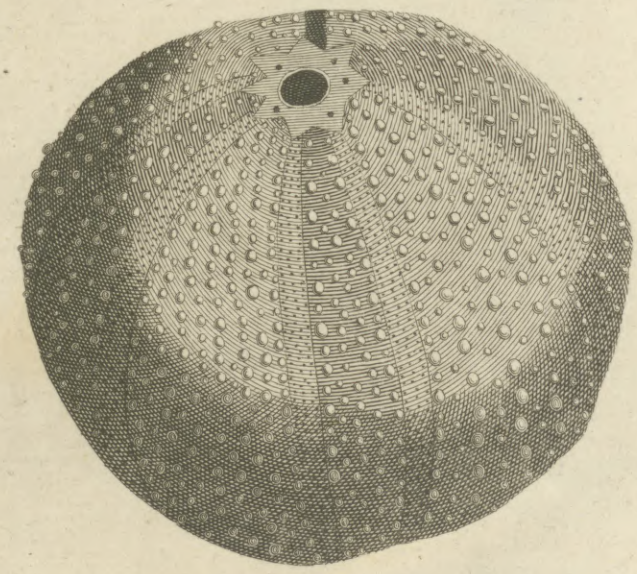


Fig. 11.

Fig. 12.

Fig. 13.



A Bell. Prin. Wal. Sculptor fecit.

Fig. 14.

Fig. 15.

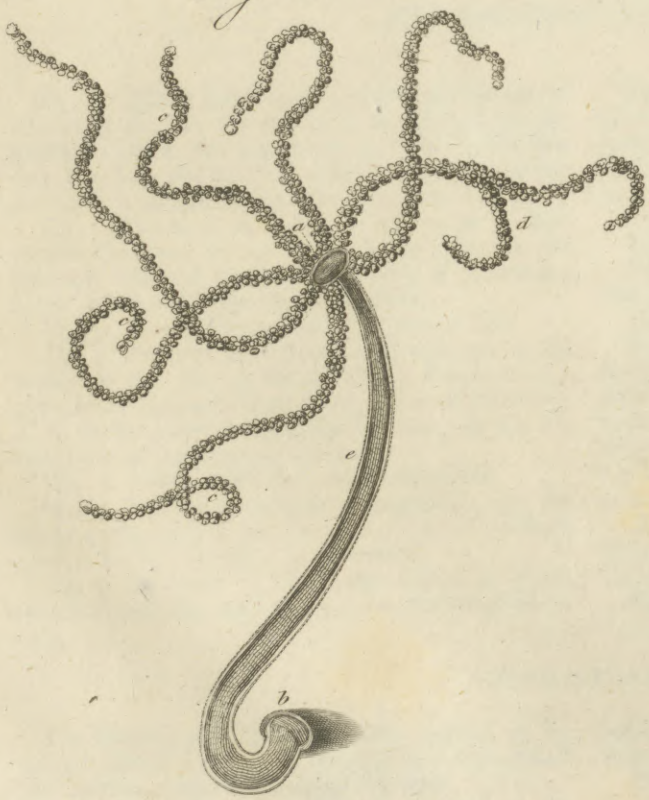


Fig. 16.

A.Bell Princ.Mod.Sculptor fecit.

Species. Infuſoria. They contain from 8 to 30 and 40 globules within the membrane.

99 Monas.

82. Monas.

Worm inviſible to the naked eye; moſt ſimple, pellucid, reſembling a point.

There are five ſpecies; viz. * atomus, punctum, * mica, * lens, and termo.

This order contains 15 genus and 229 ſpecies.

How many kinds of theſe inviſibles there may be (ſays Mr Adams), is yet unknown; as they are diſcerned of all ſizes, from thoſe which are barely inviſible to the naked eye, to ſuch as reſiſt the force of the miſcroſcope as the fixed ſtars do that of the teleſcope, and with the greateſt powers hitherto invented, appear only as ſo many moving points. The ſmalleſt living creatures our inſtruments can ſhew, are thoſe which inhabit the waters; and though animalcula equally minute may fly in the air, or creep upon the earth, it is ſcarce poſſible to get a view of them; but as water is tranſparent, by confining the creatures within it we can more eaſily obſerve them by applying a drop of it to the glaſſes.

Animalcules in general are obſerved to move in all directions with equal eaſe and rapidity; ſometimes obliquely, ſometimes ſtraight forward; ſometimes moving in a circular direction, or rolling upon one another, removing backwards and forwards through the whole extent of the drop, as if diverting themſelves; at other times greedily attacking the little parcels of matter they meet with. Notwithſtanding their extreme minuteneſs, they know how to avoid obſtacles, or to prevent any interference with one another in their motions: ſometimes they will ſuddenly change the direction in which they move, and take an oppoſite one; and by inclining the glaſs on which the drop of water is, as it can be made to move in any direction, ſo the animalcules appear to move as eaſily againſt the ſtream as with it. When the water begins to evaporate, they flock towards the place where the fluid is, and ſhew a great anxiety and uncommon agitation of the organs with which they draw in the water. Theſe motions grow languid as the water fails, and at laſt ceaſe altogether, without a poſſibility of renewal if they be left dry for a ſhort time. They ſuſtain a great degree of cold as well as inſects, and will periſh in much the ſame degree of heat that deſtroys inſects. Some animalcules are produced in water at the freezing point, and ſome inſects live in ſnow. By mixing the leaſt drop of urine with the water in which they ſwim, they inſtantly fall into convulſions and die.

Species. Infuſoria.

The ſame rule ſeems to hold good in theſe minute creatures, which is obſervable in the larger animals, viz. that the larger kinds are leſs numerous than ſuch as are ſmaller; while the ſmalleſt of all are found in ſuch multitudes, that there ſeem to be myriads for one of the others. They increaſe in ſize, like other animals, from their birth until they have attained their full growth; and when deprived of proper nouriſhment, they in like manner grow thin and periſh."

EXPLANATION OF FIGURES.

Fig. 1. *Aſcaris Lumbricoides*, entire, and nearly of its natural ſize; *a*, the head; *b*, the tail; *c*, the depreſſed band; *d*, the punctiform aperture; *e*, the line extending from the head to the tail; *f*, the gyrated apparatus as it appears through the ſkin of the worm.

Fig. 2. Repreſents the *viſcera* of the worm in their natural ſituation; *a*, the head; *b*, the gullet; *c*, the inteſtinal canal; *d*, the lines of the body of the worm; *e*, the uterus, and its convoluted apparatus.

Fig. 3. *Aſcaris Vermicularis* of its natural ſize.

Fig. 4. The ſame viewed by the microſcope; *a*, the head; *b*, the tail; *c*, the piſtilliform ſtomach; *d*, a convoluted apparatus ſurrounding the inteſtinal canal; *e*, an orifice which is probably the anus; *f*, the external part of the organs of generation.

Fig. 5. *Trichuris Hominis*, of its natural ſize.

Fig. 6. The ſame conſiderably magnified; *a a*, the head; *b*, the tail; *c*, the proboſcis; *d d*, the inteſtinal canal; \ a hollow tube; × the ovaria.

Fig. 7. A portion of the *Tænia Solium*, of its natural ſize, and uſual appearance; *a a*, the marginal oſcula.

Fig. 8. *a*, the head enlarged by the microſcope; *b*, a full view of the head when very much magnified; *a*, the oſcula at the baſe; *c*, the mouth.

Fig. 9. *Sipunulus Saccatus*, of its natural appearance.

Fig. 10. *Laplyſia Depilans*, or Sea-hare.

Fig. 11. *Holothuria Tremula.*

Fig. 12. *Aſterias Caput Meduſæ*, or Arboreſcent Sea-ſtar.

Fig. 13. *Echinus Eſculentus*, or common Sea-urchin.

Fig. 14. *Tubularia Magnifica*, as it proceeds from its native rocks; *a*, the animal with its tentacula fully expanded from the tube; *b*, another with the tentacula collapſed; *c*, one with the tentacula nearly withdrawn into the tube; *d*, the animal with the tentacula entirely withdrawn; *e*, *e*, *e*, probably *actiniæ*.

Fig. 15. *Hydra Griſea*, or Freſh-water Polype, magnified: *a*, the mouth; *b*, the attached part; *c*, *c*, *c*, &c. the arms; *e*, the tranſparent body.

Fig. 16. *Vorticella Polypina*, magnified.

ERRATUM.

The Genus Scyllæa is inadvertently omitted in the arrangement of the ſpecies. It ſhould have been placed next Lernæa, with the following character.

Scyllæa. Body compreſſed and grooved on the back; mouth conſiſting of a terminal toothleſs aperture; tentacula 3 on each ſide, placed beneath.

There are two ſpecies, viz. pelagica and gomphodenſis.

INDEX.

INDEX.

Helmont.

HELMONT, JOHN-BAPTIST VAN, a leader of diſtinction in the chemical ſchool of medicine, was born at Bruſſels in the year 1577, and deſcended of a noble family. He ſtudied medicine at Louvain and ſome other places with ſo much avidity, that he had peruſed Hippocrates, Galen, and the Greek and Arabian phyſicians at a very early period of life. When not more than 17 years of age, he read public lectures, at Louvain, and was created M. D. in the year 1599 when only 22. Having, in 1609, married a wife who was both rich and noble, he retired with her to Vilforde, where he practiſed as a phyſician without taking any fees, and was accuſtomed to boaſt of the thouſands whom he cured every year, although his ſucceſs in his own family was by no means great; for his eldeſt daughter died of a leproſy, and he loſt two ſons by the plague. He publiſhed a variety of works, by which he acquired very great reputation. He was invited to the court of Vienna by the emperor Rodolph, which he declined to accept. He died in the year 1644, in the 68th year of his age.

He was a man of acute genus, clear-ſighted in detecting the miſtakes of others, and extremely fond of forming hypotheſes of his own, which were not always ſupported by concluſive arguments. He affirmed with boldneſs, was extremely credulous, and fond of ſuch extravagant narrations as ſeemed to favour his own preconceived opinions. Perhaps his greateſt foible was the liberal manner in which he praiſed himſelf, in reference to his own noſtrums and pretended ſpecifics. His ideas were far from being perſpicuous, chiefly owing to his making uſe of terms and phraſes which he never properly defined. He added much, however, to the ſtock of chemical facts at that time known, and paved the way to more intereſting diſcoveries. He contributed more than any of his predeceſſors, to ſubvert the Galenical theory of humours and qualities, which he certainly combated with many forcible arguments. His theory of ferments was in a great meaſure eſpouſed by Sylvius. His ſon Francis-Mercurius firſt publiſhed his works collectively in 1648; and although it cannot be denied that they abound with error, and even jargon, they contain many pertinent remarks, and much curious and intereſting ſpeculation.

Helmont || Helos.

HELMONT, a ſmall town in the Netherlands, in Dutch Brabant, and capital of the diſtrict of Peeland, with a good caſtle. It is ſeated on the river Aa, in E. Long. 5. 37. N. Lat. 51. 31.

HELMSTADT, a town of Germany, in the duchy of Brunſwick, built by Charlemagne, in E. Long. 11. 10. N. Lat. 52. 20.

HELMSTADT, a ſtrong maritime town of Sweden, and capital of the province of Halland, ſeated near the Baltic ſea; in E. Long. 21. 5. N. Lat. 56. 44.

HELONIAS, a genus of plants belonging to the hexandria claſs; and in the natural method ranking under the 10th order, *Coronariæ*. See BOTANY *Index*.

HELOISE, celebrated on account of her unfortunate affection for her tutor Abelard, and for her Latin letters to him after they had retired from the world. She died abbeſs of Paraclet in 1163. See ABELARD.

HELOS, in *Ancient Geography*, a maritime town of Laconia, ſituated between Trinaſus and Acriæ, in Pauſanias's time in ruins. The diſtrict was called *Helotea*, and the people *Helotes*, *Helotæ*, *Helei*, and *Heleatæ*, by Stephanus; and *Ilotæ*, by Livy. Being ſubdued by the Lacedæmonians, they were all reduced to a ſtate of public ſlavery, or made the ſlaves of the public, on theſe conditions, viz. that they neither could recover their liberty nor be ſold out of the territory of Sparta.

Hence

Helots || Helvetius

Hence the term ειλωτηυειν, in Harpocration, for being in a ſtate of ſlavery; and hence alſo the Lacedæmonians called the ſlaves of all nations whatever *helotes*. *Heloticus* is the epithet.

HELOTS, in Grecian antiquity, the ſlaves of the Spartans. See HELOS.—The freemen of Sparta were forbidden the exerciſe of any mean or mechanical employment, and therefore the whole care of ſupplying the city with neceſſaries devolved upon the Helots.

HELSINBURG. See ELSIMBURG.

HELSINGIA, a province of Sweden, bounded on the north by Jempterland and Medelpadia, on the eaſt by the Bothnic gulf, and on the ſouth and weſt by Dalecarlia and Geſtricia. It is full of mountains and foreſts, and the inhabitants are almoſt conſtantly employed in hunting and fiſhing. It has no cities: the principal towns are, Hudwickvald, Alta, and Dilſbo.

HELSINGIC CHARACTER, a peculiar kind of character found inſcribed on ſtones in the province of Helſingia. The Runic and Helſingic characters may be eaſily transformed into each other.

HELSTON, a town of Cornwall in England, ſeated on the river Cober, near its influx into the ſea, one of the towns appointed for the coinage of tin, and the place of aſſembly for the weſt diviſion of the county. It had formerly a priory and a caſtle, and ſent members to parliament in the reign of Edward I. but was not incorporated till the time of Queen Elizabeth. It was re-incorporated in 1774. A little below the town there is a tolerable good harbour, where ſeveral of the tin-ſhips take in their lading. King John exempted this place from paying toll any where but in the city of London. It contains about 400 houſes, and ſends two members to parliament.

HELVELLA, a genus of the natural order of fungi, belonging to the cryptogamia claſs of plants. See BOTANY *Index*.

HELVETIC, ſomething that has a relation to the inhabitants of the Swiſs cantons, who were anciently called *Helvetii*.—The Helvetic body comprehends the republic of Switzerland, conſiſting of 13 cantons, which make ſo many particular commonwealths. By the laws and cuſtoms of the Helvetic body, all differences between the ſeveral ſtates and republics are to be decided within themſelves, without the intervention of any foreign power. The government of this body, before its ſubjugation to France, was chiefly democratic, with ſome mixture of the ariſtocratic.

HELVETII, a people of Belgica, in the neighbourhood of the Allobroges and the Provincia Romana; famed for bravery and a turn for war. Called *Civitas Helvetia*, and divided into four pagi or cantons; ſituated to the ſouth and weſt of the Rhine, by which they were divided from the Germans; and extending towards Gaul, from which they were ſeparated by Mount Jura on the weſt, and by the Rhodanus and Lacus Lemanus on the ſouth, and therefore called a Gallic nation (Tacitus, Cæſar, Strabo, Ptolemy, Pliny). Formerly a part of Celtic Gaul, but by Auguſtus aſſigned to Belgica.

HELVETIUS, CLAUD-ADRIAN, a man of letters, and celebrated French philoſopher, was born at Paris in the year 1715. After receiving the rudiments of his education in his father's houſe, he was ſent to the college of Louis the Great, where he diſcovered greater indications of genius than any of his fellow ſtudents, and thus gained the eſteem of the profeſſor of rhetoric, by whom particular attention was paid to his education. By his elegant and graceful exterior he endeavoured to ingratiate himſelf with the fair ſex; but he was ſoon convinced, that although external accompliſhments may dazzle for the moment, nothing ſhort of intellectual accompliſhments can ſecure the conqueſt. The circumſtance which led him to perceive the abſolute neceſſity of mental improvement in order to be truly eſteemed and admired, is worthy of notice. When walking alone in one of the public gardens, he diſcovered a moſt extravagant figure amidſt a circle of young and amiable ladies. This was M. Maupertuis, who engroſſed all the care and attention of this charming group, notwithſtanding the ridiculous and groteſque ſingularity of his dreſs. This convinced Helvetius that if he wiſhed to be ſincerely admired or eſteemed, dancing, tennis, and all other bodily exerciſes muſt give place to the decoration of his mind. He therefore immediately became a ſolitary, ſilent ſtudent, and the mathematics in particular firſt attracted his notice; and in a ſhort time he was deemed a fit companion for ſome of the firſt and moſt diſtinguiſhed literary characters of the period in which he flouriſhed. Voltaire and Monteſquieu were among his early intimates; with the latter of whom he contracted a cordial and laſting friendſhip. Helvetius

The firſt literary performance of M. Helvetius was of the poetical kind, conſiſting of epiſtles on happineſs, but theſe were not communicated to the public till after his deceaſe. When read in private however, they were very much admired, and Voltaire conſidered them as a ſtrong proof of the didactic and philoſophical powers of their author. When the *L'Eſprit des Loix* of Monteſquieu appeared in public, it was ſtudied by Helvetius with the utmoſt care and attention, and his only fault to it was, that it did not contain the firſt ideas of the things of which it profeſſed to treat. Inſtead of examining ſyſtems of legiſlation, and comparing them with each other, Helvetius was of opinion, that the nature of man ſhould be firſt ſtudied, and the laws for governing him founded on his own nature. This was true philoſophy, and ſuch ideas determined him to undertake a work which might ſupply what he conceived to be defects in the publication of Monteſquieu. In the year 1758 this work made its appearance, under the title of *De l'Eſprit*, &c. which was condemned by the parliament of Paris, becauſe it was conſidered as degrading the nature of man; but this impolitic method of ſuppreſſing his labours made them ſought for with avidity all over France, as well as other European countries, and gave them more importance than perhaps they would have otherwiſe acquired.

To avoid the malice of his enemies, he came over to England in the year 1762, and in the following year he went to Pruſſia, where he was received by the king with every mark of reſpect, who gave him lodgings in the palace, and admitted him into his familiar parties. He was uncommonly liberal to the indigent, ſome of whom but ill requited him, on which occaſions he was wont to ſay to his friends, "If I were a king, I would correct them; but as I am only rich, and they are poor, I did my duty in relieving them." Notwithſtanding his conſtitution was excellent, from which his friends concluded that they would long enjoy the happineſs of his

Helvidians Hemero-baptists.

his ſociety, he fell a victim to the gout in his head and ſtomach in the month of December 1771, in the 56th year of his age.

Beſides his work *De l'Eſprit*, he was the author of a "Treatiſe on Man, his Intellectual Faculties and his Education," in 2 vols. 8vo. publiſhed after his death. In both it muſt be confeſſed that he has diſplayed very great ingenuity and taſte, an extenſive knowledge of human nature, and a turn for ridiculing the follies of mankind; but ſome of his hypotheſes appear rather paradoxical, and perhaps his ironical obſervations on credulity and falſe religion can hardly be reconciled with a belief of genuine Chriſtianity, which he openly profeſſes.

HELVIDIANS, a ſect of ancient heretics, denominated from their leader Helvidius, a diſciple of Auxentius the Arian, whoſe diſtinguiſhing principle was, that Mary, the mother of Jeſus, did not continue a virgin, but had other children by Joſeph.

HELVOET-SLUYS, a ſea-port town of the United Netherlands, ſeated on the iſland of Voorn, in the province of Holland, and where the Engliſh packet-boat always goes. It is but a ſmall place, conſiſting only of a handſome quay, and two or three little ſtreets. But it is very well fortified, and eſteemed the ſafeſt harbour in the country. The largeſt men of war may come up to the middle of the town; and yet it has but very little trade, becauſe the merchants chooſe to live higher up the country. It ſurrendered to the French in 1795. E. Long. 4. 23. N. Lat. 51. 44.

HEMATH, or HAMATH, in *Ancient Geography*, the name of a city (whoſe king was David's friend. 2 Sam. ix.) to the ſouth of Lebanon, from which a territory was called *Hemath*, on the north of Canaan and ſouth of Syria, as appears by the ſpies, Numb. xiii. 1 Kings viii. Ezek. xlvii. Whether one or more cities and diſtricts of this name lay in this tract, neither interpreters nor geographers are agreed. The eaſtern part was called *Hemath-zoba*, 2 Chron. viii. unleſs we ſuppoſe that there was a city in *Zoba* of this name, fortified by Solomon. In defining the boundary of Paleſtine, it is often ſaid, *from the entering of Hamath;* as a province to be entered into through a ſtrait or defile. And if there was ſuch, the next queſtion is, From what metropolis it was called *Hemath?* Antioch, capital of Syria, is ſuppoſed to be called *Hemath* or *Amatha*, (Jonathan, Targum, &c.); and again, *Epiphania*, (Joſephus). Both were to the north of Lebanon; conſequently not the *Hemath* of Scripture, the immediate boundary of Paleſtine to the north, and lying to the ſouth of Lebanon.

HEMATITES. See HÆMATITES, MINERALOGY *Index*.

HEMEROBAPTISTS, a ſect among the ancient Jews, thus called from their waſhing and bathing every day, in all ſeaſons; and performing this cuſtom with the greateſt ſolemnity, as a religious rite neceſſary to ſalvation.

Epiphanius, who mentions this as the fourth hereſy among the Jews, obſerves, that in other points theſe heretics had much the ſame opinions as the Scribes and Phariſees; only that they denied the reſurrection of the dead, in common with the Sadducees, and retained a few other of the improprieties of theſe laſt.

The ſect who paſs in the Eaſt under the denomination of Sabians, calling themſelves *Mendai Iahi*, or *the diſciples of John*, and whom the Europeans entitle *the Chriſtians of St John*, becauſe they yet retain ſome knowledge of the goſpel, is probably of Jewiſh origin, and ſeems to have been derived from the ancient Hemerobaptiſts; at leaſt it is certain, that that John, whom they conſider as the founder of their ſect, bears no ſort of ſimilitude to John the Baptiſt, but rather reſembles the perſon of that name whom the ancient writers repreſent as the chief of the Jewiſh Hemerobaptiſts. Theſe ambiguous Chriſtians dwell in Perſia and Arabia, and principally at Baſſora; and their religion conſiſts in bodily waſhings, performed frequently, and with great ſolemnity, and attended with certain ceremonies, which the prieſts mingle with this ſuperſtitious ſervice.

Hemerobius || Hemicycle.

HEMEROBIUS, a genus of inſects belonging to the neuroptera order. See ENTOMOLOGY *Index*.

HEMEROCALLIS, DAY-LILY, or *lily aſphodel;* a genus of plants belonging to the hexandria claſs, and in the natural method ranking under the 10th order, *Coronariæ*. See BOTANY *Inaex*.

HEMERODROMI, (compounded of ἡμέρα, "day," and δρόμος, "courſe," &c.) among the ancients, were ſentinels or guards, appointed for the ſecurity and preſervation of cities and other places. They went out of the city every morning, as ſoon as the gates were opened, and kept all day patrolling round the place; ſometimes alſo making excurſions farther into the country, to ſee that there were no enemies lying in wait to ſurpriſe them.

HEMERODROMI were alſo a ſort of couriers among the ancients, who only travelled one day, and then delivered their packets or diſpatches to a freſh man, who run his day, and ſo on to the end of the journey. The Greeks had couriers of this kind, which they derived from the Perſians, who were the inventors thereof, as appears from Herodotus. Auguſtus had the ſame; at leaſt he eſtabliſhed couriers, who, if they did not relieve each other from day to day, yet did it from ſpace to ſpace, and that ſpace was not very great.

HEMEROTROPHIS, in antiquity, a meaſure of capacity, the ſame with the chœnix. It was ſo called from its holding one day's food. The word is compounded of ἡμέρα, *a day*, and τροφη, *food*.

HEMI, a word uſed in the compoſition of divers terms. It ſignifies the ſame with *ſemi* or *demi*, viz. "half;" being an abbreviate of ἡμισυς, *hemiſys*, which ſignifies "the ſame." The Greeks retrenched the laſt ſyllable of the word ἡμισυς in the compoſition of words; and after their example, we have done ſo too in moſt of the compounds borrowed from them.

HEMICRANIA, in *Medicine*, a ſpecies of cephalalgia, or head-ach; wherein only one ſide of the head is affected; and owing to a congeſtion of blood in the veſſels of that half.

HEMICYCLE, HEMICYCLIUM, compounded of ἡμισυς, *half*, and κυκλος, *circle*, a ſemicircle.

HEMICYCLE is particularly applied, in *Architecture*, to vaults in the cradle form; and arches or ſweeps of vaults, conſtituting a perfect ſemicircle. To conſtruct an arch of hewn ſtone, they divide the hemicycle into ſo many vouſſoirs; taking care to make them an uneven number, that there be no joint in the middle, where the key-ſtone ſhould be. See KEY and BRIDGE.

Hemicyclium ‖ Hemitritæus.

HEMICYCLIUM was alſo a part of the orcheſtra in the ancient theatre. Scaliger, however, obſerves, it was no ſtanding part of the orcheſtra; being only uſed in dramatic pieces, where ſome perſon was ſuppoſed to be arrived from ſea, as in Plautus's Rudens.

The ancients had alſo a ſort of ſun-dial, called *hemicyclium*. It was a concave ſemicircle, the upper end or cuſp whereof looked to the north. There was a ſtyle, or gnomon, iſſuing from the middle of the hemicycle, whereof that point correſponding to the centre of the hemicycle repreſented the centre of the earth; and its ſhadow projected on the concavity of the hemicycle, which repreſented the ſpace between one tropic and another, the ſun's declination, the day of the month, hour of the day, &c.

HEMIMERIS, a genus of plants belonging to the didynamia claſs. See BOTANY *Index*.

HEMINA, in Roman antiquity, a liquid meaſure, which, according to Arbuthnot, was equal to half a wine pint Engliſh meaſure; its contents being 2.818 ſolid inches.

HEMIOBOLON, a weight often mentioned by the ancient writers in medicine, and expreſſing the half of their obolus, or the twelfth part of a drachm, that is, five grains.

HEMIONITIS, a genus of plants of the order of filices, belonging to the cryptogamia claſs. See BOTANY *Index*.

HEMIPLEGIA, or HEMIPLEXIA, among phyſicians, a palſy of one half of the body. See MEDICINE *Index*.

HEMIPTERA, derived from ἡμισυς, *half*, and πτερον, *wing*, in the Linnæan ſyſtem, the ſecond order of inſects, comprehending the *blatta*, *mantis*, *gryllus*, &c. See ENTOMOLOGY *Index*.

HEMISPHERE, (HÆMISPHÆRIUM, compounded of ἡμισυς, *half*, and σφαιρα, *ſphere*), in *Geometry*, is one half of a globe or ſphere, when divided into two by a plane paſſing through its centre.

HEMISPHERE, in *Aſtronomy*, is particularly uſed for one-half of the mundane ſphere.

The equator divides the ſphere into two equal parts, called the *northern* and *ſouthern hemiſpheres*. The horizon alſo divides the ſphere into two parts, called the *upper* and the *lower hemiſpheres*.

HEMISPHERE is alſo uſed for a map, or projection, of half the terreſtrial globe, or half the celeſtial ſphere, on a plane. Hemiſpheres are frequently called *planiſpheres*.

HEMISTICH, in *Poetry*, denotes half a verſe, or a verſe not completed.

Of this there are frequent examples in Virgil's Æneid; but whether they were left unfiniſhed by deſign or not is diſputed among the learned: ſuch are, *Ferro accincta vocat*, Æn. ii. 614. And, *Italiam non ſponte ſequor*, Æn. iv. 361.

In reading common Engliſh verſes, a ſhort pauſe is required at the end of each hemiſtich or half verſe.

HEMITONE, in the ancient muſic, was what we now call a half note or ſemitone.

HEMITRITÆUS, in *Medicine*, a kind of fever, denoting the ſame as ſemi-tertian, returning twice every day. The word is Greek, and compounded of ἡμισυς, "half," and τριταιος, "third or tertian."

HEMLOCK. See CICUTA and CONIUM, BOTANY and MATERIA MEDICA *Index*.

Hemlock ‖ Hemp.

HEMOIPTOTON. See ORATORY, N° 77.

HEMP. See CANNABIS, BOTANY *Index*.—It does not appear that the ancients were acquainted with the uſe of hemp, in reſpect of the thread it affords. Pliny, who ſpeaks of the plant in his natural hiſtory, lib. xx. cap. 23. ſays not a word of this; contenting himſelf with extolling the virtues of its ſtem, leaves, and root. In effect, what ſome writers of the Roman antiquities remark, viz. that the hemp neceſſary for the uſe of war was all ſtored up in two cities of the weſtern empire, viz. at Ravenna and Vienne, under the direction of two procurators, called *procuratores linificii*, muſt be underſtood of linum or flax.

The uſe of hemp is ſo extenſive and important, that vaſt quantities of it are annually imported into this and other kingdoms from thoſe countries where it grows in greateſt plenty, of which Ruſſia is one. In the year 1763, the quantity imported into England alone amounted to 11,000 tons. Sir John Sinclair informs us, that in the year 1785, the quantity exported from Peterſburg in Britiſh ſhips was as follows. *Annals of Agriculture*, vol. xiii. p. 508.

	Poods.
Clean hemp	1,038,791
Outſhot	37,382
Half-clean	18,374
Hemp-codille	19,251
	1,113,798

Now, allowing 63 poods to a ton, the quantity juſt mentioned will amount to 17,695 tons; and ſuppoſing it to take five acres to produce a ton of hemp, the whole quantity of ground requiſite for this purpoſe would amount to 88,475 acres.

By other accounts, the annual export of hemp to England is valued at 400,000l.; but by a computation of the whole imported into Britain and Ireland in 1788, it would ſeem that a conſiderably greater quantity muſt fall to the ſhare of England. In that year the quantity amounted to no leſs than 58,464 tons; which at 20l. per ton amounted to 1,269,280l. We cannot wonder at this vaſt conſumpt, when it is conſidered that the ſails and cordage of a firſt-rate man of war require 180,000 lb. of rough hemp for their conſtruction; but even this will ſcarce account for the enormous conſumpt in France, which in the year 1783 is ſaid to have amounted to upwards of 400 millions of pounds, or 200,000 tons; of which more than one-third was imported. *Annals of Agriculture.*

Only the coarſer kinds of hemp are employed in making cordage, the better ſorts being uſed for linen, which, though it can never be made ſo fine as that from flax, is yet incomparably ſtronger, and equally ſuſceptible of bleaching both in the old and new way. Cloths made of hemp have alſo this property, that their colour improves by wearing, while that of linen decays. The prices of hemp linen are various; from 10d. to 4s. 6d. per yard. The low-priced kinds are very generally worn in Suffolk, where hemp is cultivated, by huſbandmen, farmers, &c.; thoſe from 1s. 6d. to 2s. by farmers and tradeſmen; and thoſe from 2s. 6d. to 4s. 6d. are frequently preferred by gentlemen to flax-linen,

Hemp. linen, on account of their ſtrength and warmth. The Engliſh hemp is much ſuperior in ſtrength to that which grows in any other country. Next to it is the Ruſſian, from which ſacking is uſually made, as it is ſometimes alſo from the offal of the Engliſh kind; but none of the Suffolk hemp is ever made into cordage, on account of its fineneſs. A conſiderable quantity of Ruſſia ſheeting is imported into England merely on account of its ſtrength, and is much coarſer at the price than any other foreign linen.

Beſides theſe uſes of hemp, it is ſaid to poſſeſs a property as a plant which renders it almoſt invaluable; viz. that of driving away almoſt all inſects that feed upon other vegetables. Hence in ſome places of the continent they ſecure their crops from theſe miſchievous attacks, by ſowing a belt of hemp round their gardens, or any particular ſpot which they wiſh to preſerve.

The important uſes of hemp, and the ſuperiority of that produced in Britain to other kinds, have rendered the culture of it an object of attention to government. Accordingly, in the year 1787, a bounty of threepence per ſtone was allowed on all the hemp raiſed in England; and probably with a view to encourage the growth of Engliſh hemp, duties have been laid on that which comes from abroad. Dreſſed hemp in a Britiſh ſhip pays 2l. 4s. per cwt. import duty; in a foreign one 2l. 6s. 9.; and in both caſes a drawback of 1l. 19s. is allowed. Undreſſed hemp in a Britiſh ſhip pays 3s. 8d.; and in a foreign one 3s. 11d. In both caſes the drawback is 3s. 4d. The export of Britiſh hemp is free.

The uſual height of the plant when growing is from five to ſix feet, but this varies very conſiderably according to circumſtances. That which is cultivated near Biſchwiller in Alſace is ſometimes more than 12 feet high, and upwards of three inches in circumference, the ſtalks being ſo deeply rooted that a very ſtrong man can ſcarce pull them up. Mr Arthur Young, in a tour through Catalonia in Spain, ſays, that where the country is well watered, the crops of hemp are extraordinary; and that the plants generally riſe to the height of ſeven feet. In Italy hemp is generally cultivated, though the Bologneſe only can pretend to any ſuperiority in the management of it. It is there ſown upon their beſt lands, which are rich ſtrong loams; and on which they are at all poſſible pains to procure a fine friable ſurface. For manure they uſe dung, pieces of rotten cloth, feathers, and horns brought from Dalmatia. The plant, however, may be cultivated upon ground of every kind; the poorer land producing that which is finer in quality though in ſmaller quantity; whereas ſtrong and rich land produces a great quantity, but coarſer. It does not exhauſt the land on which it grows like flax; whence it is probable, that if properly managed, and care taken in the cultivation, it might be found to ſuperſede flax entirely. A Suſſex manufacturer, who writes on this ſubject in the Annals of Agriculture, informs us, that it may be raiſed for many years ſucceſſively on the ſame ground, provided it be well manured. An acre requires from nine to twelve pecks, according to the nature of the ſoil; the latter being the moſt uſual, though a variation in the quality of the ſoil makes an alteration both in the quantity and quality of the hemp. An acre produces on an average 36 or 38 ſtone. The abbé Brulle, in a treatiſe upon the Cultivation and Management of Hemp, printed by order of the lords of the committee of council for trade and foreign plantations, informs us, that the ſeaſon for ſowing it extends from the 25th of March to the 15th of June. The ſeed ought always to be ſown thin, not exceeding two buſhels to an acre; and if you have the advantage of a drill plough, ſtill leſs will anſwer. As there are two kinds of hemp, the male and female, of which the former only produces ſeed, ſome regard muſt be had to this circumſtance. In Suſſex the male and female are pulled together about 13 weeks after the ſowing, but in the fens they are frequently ſeparated. This laſt method is recommended by the abbé Brulle, who, for the more eaſy accompliſhment of it, directs that little paths ſhould be made lengthwiſe through the field at about ſeven feet diſtance from each other, to allow a paſſage for the perſon who pulls up the female hemp from among the other; the latter requiring to ſtand more than a month after for the purpoſe of ripening the ſeeds. The female hemp is known to be ripe by the fading of the flowers, the falling of the farina fecundans, and ſome of the ſtalks turning yellow. After the whole of this kind is pulled, it muſt be manufactured according to the directions to be afterwards given, and ought to be worked if poſſible while green; the hemp thus produced being much finer than that which is previouſly dried. The reaſon of this is, that the plant contains a great quantity of glutinous matter; which being once dried, agglutinates the fibres in ſuch a manner that they can never be afterwards perfectly ſeparated. The female hemp, however, is always in ſmaller quantity than the male; and therefore where the crop is large, it will be impoſſible to work the whole as faſt as it is pulled or cut. It is known to be ripe by the ſtems becoming pale; but it muſt be remembered, that hemp of any kind will be much leſs injured by pulling the plants before they are ripe than by letting them ſtand too long.

The male hemp being ſtripped of its leaves, &c. as afterwards directed, will ſoon be dry for ſtoring by the heat of the atmoſphere, though ſometimes it may be neceſſary to uſe artificial means; but where theſe are uſed, the utmoſt care muſt be taken, hemp, when dry, being exceedingly inflammable. The ſtored or dried hemp muſt be ſteeped and treated in every other reſpect as though it had been green; whence it is evident that this operation ought never to be uſed but in caſes of neceſſity. It is likewiſe impoſſible to make hemp which has been dried previous to its being ſteeped ſo white as that which has been worked green.

With regard to the perfecting of hemp-ſeed for a ſubſequent ſeaſon, it would ſeem proper to ſet apart a piece of ground for this purpoſe: for M. Amien, from 40 plants raiſed in the common way, had only a pound and a half of ſeed, though the plants from which it was taken might be deemed fine; whereas, from a ſingle plant which grew by itſelf, he had ſeven pounds and a half. Some are of opinion, that by putting the cluſters which contain the hemp-ſeed to heat and ſweat, the quality is improved; as many of thoſe ſeeds which would otherwiſe wither and die may thus arrive at perfection. This, however, ſeems to be very problematical; as there are no experiments which ſhow that ſeeds, *Mill's Huſbandry*, vol. v.

Hemp. when ſeparated from the vegetable producing them, have any power of meliorating themſelves.

After the hemp is pulled, it muſt be taken in large handfuls, cutting off the roots (though this is not abſolutely neceſſary), the leaves, ſeeds, and lateral branches, being dreſſed off with a wooden ſword or ripple. It is then to be made up into bundles of twelve handfuls each, in order to be ſteeped, like flax, in water. This, or ſomething ſimilar, is abſolutely neceſſary, in order to ſeparate the bark; which is properly the hemp, from the reed or woody part. In Suffolk this operation is called *water-retting;* but ſometimes a mere expoſure to the air is ſubſtituted in its place, turning the hemp frequently during the time it is expoſed. This is called *dew-retting;* but the former method is univerſally deemed preferable. Such hemp as is deſigned for ſeed is ſeldom water-retted, though in the opinion of the manufacturer already quoted, it would be better if it were ſo. Dew-retted hemp is generally ſtacked and covered during the winter; in January and February it is ſpread upon meadow land, and whitens with the froſt and ſnow; though it is always much inferior to the other, and proper for coarſer yarns only.

The length of time required for ſteeping hemp is various, and a complete knowledge of it can only be attained by practice. In Suffolk it is uſual to continue the immerſion four, five, or ſix days; ſtanding water is preferred, and the ſame water will ſteep hemp three times during the ſeaſon, but the firſt has always the beſt colour. The abbé Brulle prefers clear and running water, eſpecially if overhung with trees. The bundles are to be laid croſswiſe upon each other, taking particular notice of the manner in which they lie when put in, that they may be taken out without difficulty. His time of ſteeping is from ſix to 11 days; and here we muſt obſerve, that it is much better to let it remain too long in the water than too ſhort a time. The ſlendereſt hemp requires the moſt ſoaking. The operation is known to be finiſhed by the reed ſeparating eaſily from the bark.

After the hemp is thoroughly ſteeped, the next operation is to ſeparate the bark from the reed or woody part; and this may be done in two ways, viz. either pulling out the reed from every ſtalk with the hand, or drying and breaking it like flax. The abbé Brulle is very particular in his directions for this laſt operation, which he calls *reeding*, and which may be performed either in a trough under water or upon a table. The whole, however, may be reduced to the following, viz. preſſing down the bundles either in the trough or on a table by proper weights, to keep the hemp ſteady in the middle and top end. Then beginning at the upper part of the bundle, pull out the reeds one by one. As you proceed, the rind which remains will preſs cloſely upon the remaining unreeded hemp, and keep it more ſteady; ſo that you may take two, four, or even ſix ſtalks, at a time. The weight is then to be removed from the top, and all the pieces of reed which remain there having broken off in the former operation, are to be taken out. Laſtly, the middle weight is to be taken off, and any ſmall pieces which remain there taken out. If the reeding is performed on a table, the bundle muſt be weeded frequently, though ſlightly; a continual dropping of water would perhaps be the beſt method.

After the hemp is reeded, it muſt next be freed from the mucilaginous matter with which it ſtill abounds. This is done by pouring water through it, ſqueezing out the liquid after every affuſion, but taking care not to let the threads twiſt or entangle each other, which they will be very apt to do. The abbé is of opinion, that ſoft ſoap ſhould be diſſolved in the laſt water, in the proportion of an ounce to three pounds of dry hemp; which though not abſolutely neceſſary, contributes much to the ſoftening and rendering the hemp eaſy and pleaſant to dreſs. Hemp.

Hemp is broken by machinery, after being ſteeped, in a manner ſimilar to flax; but the inſtruments uſed for this purpoſe in Suffolk are all worked by the hand. That which breaks in the operation is called *ſhorts*, and is about half the value of the long hemp. The beſt water-retted hemp ſells for about 8s. 6d. per ſtone; the other kind from one to two ſhillings lower.

Beating of hemp is the next operation, which formerly was performed entirely by hand, but now in moſt places by a water-mill, which raiſes three heavy beaters that fall upon it alternately; the hemp being turned all the while by a boy in order to receive the ſtrokes equally. The finer it is required to make the tow, the more beating is neceſſary. It is then dreſſed or combed by drawing it through heckles formed like the combs of wool-manufacturers, only fixed. Sometimes it is divided into two or three ſorts of tow, and ſometimes the whole is worked together into one ſort; the prices varying from 6d. to 1s. per pound.

The hemp thus manufactured is ſold to ſpinners, who reel their yarn as follows.

2 yards make	-	1 thread.
40 threads	-	1 lea.
20 leas	-	1 ſkain.
3 ſkains	-	1 clue of 4800 yards.

It is next delivered to the bleachers, who return it bleached on receiving 20 or 21 clues for every 120 bleached. The prices of the hemp-yarn are as follow:

1 clue from a pound			7d. or 6½d.
1½ from do.	-	-	8½d. or 8d.
2 from do.	-	-	9½d. or 9d.
2½ from do.	-	-	10½d. or 10d.
3 from do.	-	-	12d.

Chineſe Hemp, a ſpecies of cannabis, of which an account is given in the 72d volume of the Philoſophical Tranſactions, p. 46. In that paper Mr Fitzgerald, vice-preſident of the ſociety for encouraging arts, mentions his having received the ſeeds from the late Mr Elliot; which being ſown, according to his directions, produced plants 14 feet high, and nearly ſeven inches in circumference. Theſe being pulled up in November, and ſteeped for a fortnight in water, were placed againſt a ſouthern wall to dry. After this the hemp was found to ſeparate eaſily from the woody part; and ſo great was the produce, that 32 plants yielded three pounds and a quarter. In conſequence of this ſucceſs, Mr Fitzgerald applied to the directors of the India Company to procure ſome of the ſeeds from China; which being complied with, the ſociety were furniſhed, in 1785, with ſome more of the ſeeds, which were diſtributed

Hemp, Hempſtead.

buted to ſeveral of the members; but, notwithſtanding their endeavours, few of the plants appear to have ripened their ſeeds in this country. Two of the ſpecies of hemp, tried by the duke of Northumberland, roſe to the height of 14 feet ſeven inches, and would have been much larger, had they not been hurt by a high wind: another kind aroſe only to that of three feet and a half, the ſtem about the ſize of a common wheat ſtraw; but though it flowered well, did not produce any ſeed. Theſe kinds were ſown in a hotbed where the heat was very ſtrong, on the 14th of April. They appeared above ground in four days, and were tranſplanted into pots on the 25th. They were then put under a hot-bed frame where the heat had been gone off, to harden them for the natural ground, in which they were planted on the 30th, by turning them whole out of the pots; letting them, three together, be planted at two feet diſtance every way; covering them at times for about ten days, until they were ſuppoſed to be rooted. Only a few ſeeds were preſerved from plants which had been kept conſtantly in a ſtove.

Other trials were attended with little better ſucceſs; but, in 1786, the Rev. Dr Hinton of Northwold near Brandon, made a ſucceſsful experiment with ſome ſeeds he received from the ſecretary of the ſociety. They were ſown on the 17th of May, and appeared on the 6th of June. The plants were few and ſickly; and notwithſtanding ſome fine ſhowers, they continued to languiſh ſo much that the experiment was entirely abandoned, and buckwheat was harrowed into the ground for a fallow crop. In the beginning of October, however, the perſons employed in cutting the buckwheat diſcovered ſome ſeed in the heads of a few ſtraggling hemp plants which had been ſuffered to grow in the crop; which being carefully threſhed, afforded three pints of ſeed tolerably bright and heavy. Theſe ſeeds were ſown on the 10th of May 1787. On the 19th they appeared above the ground numerous and healthy. The male hemp was drawn on the 13th of Auguſt, but the female not till the 9th of October; the ſpot on which the plants were ſown meaſured only 322 ſquare yards, and produced of marketable hemp no leſs than 95 ſtone 7 pounds 12 ounces; being upwards of one-third more than the beſt crops of Engliſh hemp are ever known to produce. Thus it appeared, that the ſeeds of the Chineſe hemp had retained their ſuperiority over thoſe of the Engliſh; though how long they would continue to do ſo cannot be determined but by experience. For this experiment Dr Hinton received a ſilver medal from the ſociety. Few of the ſeeds either of Chineſe, or any other hemp, will vegetate if two years old at the time of ſowing; and to this circumſtance the doctor attributes the failure of other trials of Chineſe hemp.

Hemp-Agrimony, a ſpecies of eupatorium. See Eupatorium, Botany *Index*.

HEMPSTEAD, a town of Hartfordſhire in England, in a hilly country, upon a ſmall river called the Gade, and 20 miles north-weſt of London. It was, in the time of the Saxons, called by the name of Henamſted, or Hean-Hemſted, i. e. High-Hemſtead. In William the Conqueror's time, by the name of Hemelamſtede. Henry VIII. incorporated this village by the name of a bailiff; and he empowered the inhabitants to have a common ſeal, and a pye-powder court during its market and fairs. It has been reckoned one of the greateſt markets for wheat in this county, if not in England, 20,000l. a-week being often returned in it only for meal. Eleven pair of mills ſtand within four miles of the place, which produce a great trade.

Hemſkerck || Henault.

HEMSKERCK, Egbert, called the *Old*, a celebrated Flemiſh painter of humorous converſations, of whom, though ſo univerſally known, we have no information as to the time in which he flouriſhed, or the ſchool in which he was taught. Though the taſte of his compoſitions is but low, yet it ought to be conſidered that he took his ſubjects from nature; from perſons in the meaneſt occupations, whoſe dreſs, actions, and manners, could not furniſh the imagination with any ideas of elegance: and to expreſs their paſſions and undiſguiſed humours, ſeems to have been the utmoſt of his ambition. By frequenting fairs, merry-meetings, gaming-houſes, and inns, he acquired a ſurpriſing power of connecting humorous circumſtances. He deſigned and drew correctly, and his pictures have a ſtrong effect from his accurate management of the chiaro obſcuro. Some of his pictures have ſuffered from unſkilful cleaners, and many things are ſold as his which diſhonour him; but his genuine works, well preſerved, have a clearneſs and force equal to any of the Flemiſh artiſts.

HEN. See Phasianus, Ornithology *Index*.

Guinea-Hen. See Numida, Ornithology *Index*.

Hen-Bane. See Hyosciamus, Botany and Materia Medica *Index*.

Hen-Harrier. See Falco, Ornithology *Index*.

Hen-Mould Soil, in *Agriculture*, a term uſed by the huſbandmen in Northamptonſhire, and other counties, to expreſs a black, hollow, ſpongy, and mouldering earth, uſually found at the bottoms of hills. It is an earth much fitter for grazing than for corn, becauſe it will never ſettle cloſe enough to the grain to keep it ſufficiently ſteady while it is growing up, without which, the farmers obſerve, it either does not grow well; or, if it ſeem to thrive, as it will in ſome years, the growth is rank, and yields much ſtraw, but little ear. It is too moiſt, and to that is principally to be attributed this rankneſs of the crop in ſome years; and the occaſion of its retaining ſo much moiſture is, that it uſually has a bed of ſtiff clay, which will not let the water run off into the under ſtrata.

In ſome places they alſo give this name to a black, rich, and denſe earth, with ſtreaks of a whitiſh mould in many parts. This ſort of hen-mould is uſually found very rich and fertile.

HENAULT, Charles John Francis, an ingenious French writer, was the ſon of John Remi Henault lord of Mouſſy, and was born at Paris in 1685. He early diſcovered a ſprightly benevolent diſpoſition, and his penetration and aptneſs ſoon diſtinguiſhed itſelf by the ſucceſs of his ſtudies. Claude de Liſle, father of the celebrated geographer, gave him the ſame leſſons in geography and hiſtory which he had before given to the duke of Orleans, afterwards regent; and which have been printed in ſeven volumes, under the title of "Abridgement of Univerſal Hiſtory." On quitting college, Henault entered the Oratory, where he ſoon attached himſelf to the ſtudy of eloquence: and, on the death of the abbé Rene, reformer of La Trappe, he undertook to pronounce his panegyric; which not meeting

Henault. ing the approbation of Father Maſſilon, he quitted the Oratory after two years, and his father bought for him, of Mareſchal Villeroi, the "lieutenance des chaſſes," and the government of Corbeil. At the marſhal's he formed connexions, and even intimate friendſhips, with many of the nobility, and paſſed the early part of his life in agreeable amuſements, and in the livelieſt company, without having his religious ſentiments tainted. He aſſociated with the wits till the diſpute between Rouſſeau and de la Motte ſoon gave him a diſguſt for theſe trifling ſocieties. In 1707, he gained the prize of eloquence at the French academy; and another next year at the academy des Jeux Floraux. About this time M. Reaumur, who was his relation, came to Paris, and took leſſons in geometry under the ſame maſter, Guinée. Henault introduced him to the abbé Bignon, and this was the firſt ſtep of his illuſtrious courſe. In 1713 he brought a tragedy on the ſtage, under the diſguiſed name of Fuſelier. As he was known to the public only by ſome ſlighter pieces, "Cornelia the Veſtal" met with no better ſucceſs. He therefore locked it up without printing. In his old age his paſſion for theſe ſubjects reviving, and Mr Horace Walpole being at Paris in 1768, and having formed a friendſhip with him as one of the moſt amiable men of his nation, obtained this piece, and had it printed at his own preſs. In 1751 M. Henault, under a borrowed name, brought out a ſecond tragedy, intitled, "Marius," which was well received and printed. He had been admitted counſellor in parliament in 1706, with a diſpenſation on account of age; and in 1710 preſident of the firſt chamber of inqueſts. Theſe important places, which he determined to fill in a becoming manner, engaged him in the moſt ſolid ſtudies. The excellent work of M. Domat charmed him, and made him eager to go back to the fountain head. He ſpent ſeveral years in making himſelf maſter of the Roman law, the ordonnances of the French kings, their cuſtoms, and public law. M. de Morville, procureur-general of the great council, being appointed ambaſſador to the Hague in 1718, engaged M. Henault to accompany him. His perſonal merit ſoon introduced him to the acquaintance of the moſt eminent perſonages at that time there. The grand penſionary, Heinſius, who, under the exterior of Lacedemonian ſimplicity, kept up all the haughtineſs of that people, loſt with him all that hauteur which France itſelf had experienced from him in the negociations of the treaty of Utrecht. The agitation which all France felt by Law's ſyſtem, and the conſequent ſending of the parliament into exile, was a trial to the wiſe policy of the preſident Henault. His friendſhip for the firſt preſident, De Meſmes, led him to ſecond all the views of that great magiſtrate: he took part in all the negociations, and was animated purely by the public good, without any private advantage. On the death of the cardinal du Bois, in 1732, he ſucceeded in his place at the French academy. Cardinal Fleury recommended him to ſucceed himſelf as director, and he pronounced the eloge of M. de Malezieux.

Hiſtory was M. Henault's favourite ſtudy: not a bare collection of dates, but a knowledge of the laws and manners of nations; to obtain which he drew inſtruction from private converſations, a method he ſo ſtrongly recommends in his preface. After having thus diſcuſſed the moſt important points of our public law, he undertook to collect and publiſh the reſult of his inquiries, and he is deſervedly accounted the firſt framer of chronological abridgments: in which, without ſtopping at detached facts, he attends only to thoſe which form a chain of events that perfect or alter the government and character of a nation, and traces only the ſprings which exalt or humble a nation, extending or contracting the ſpace it occupies in the world. His work has had the fortune of thoſe literary phenomena, where novelty and merit united excite minds eager after glory, and fire the ardour of young writers to preſs after a guide whom few can overtake. The firſt edition of the work, the reſult of 40 years reading, appeared in 1744, under the auſpices of the chancellor Dagueſſeau, with the modeſt title of *an Eſſay*. The ſucceſs it met with ſurpriſed him. He made continual improvements in it, and it has gone through nine editions, and been tranſlated into Italian, Engliſh, and German, and even into Chineſe. As the beſt writings are not ſecure from criticiſm, and are indeed the only ones that deſerve it, the author read to the academy of Belles Lettres a defence of his abridgment. All the ages and events of the French monarchy being preſent to his mind, and his imagination and memory being a vaſt theatre whereon he beheld the different movements and parts of the actors in the ſeveral revolutions, he determined to give a ſpecimen of what paſſed in his own mind, and to reduce into the form of a regular drama one of the periods of French hiſtory, the reign of Francis II. which, though happy only by being ſhort, appeared to him one of the moſt important by its conſequences, and moſt eaſy to be confined within the ſtage bounds. His friend the chancellor highly approved the plan, and wiſhed it to be printed. It accordingly went through five editions; the harmony of dates and facts is exactly obſerved in it, and the paſſions intereſted without offence to hiſtoric truth. Henault.

In 1755, he was choſen an honorary member of the academy of Belles Lettres, being then a member of the academies of Nanci, Berlin, and Stockholm. The queen appointed him ſuperintendant of her houſe. His natural ſprightlineſs relieved her from the ſerious attendance on his private morning lectures. The company of perſons moſt diſtinguiſhed by their wit and birth, a table more celebrated for the choice of the gueſts than its delicacies, the little comedies ſuggeſted by wit, and executed by reflections, united at his houſe all the pleaſures of an agreeable and innocent life. All the members of this ingenious ſociety contributed to render it agreeable, and the preſident was not behind any. He compoſed three comedies: *La Petite Maiſon*, *La Jaloux de Soi-meme*, and *Le Reveil d'Epimenide*. The ſubject of the laſt was the Cretan philoſopher, who is pretended to have ſlept 27 years. He is introduced fancying that he had ſlept but one night, and aſtoniſhed at the change in the age of all around him: he miſtakes his miſtreſs for his mother; but diſcovering his miſtake, offers to marry her, which ſhe refuſes, though he ſtill continues to love her. The queen was particularly pleaſed with this piece. She ordered the preſident to reſtore the philoſopher's miſtreſs to her former youth: he introduced Hebe, and this epiſode produced an agreeable entertainment. He was now in ſuch favour with her majeſty, that on the place of ſuperintendant becoming vacant by the death of M. Bernard de Conbert

Hendecagon || Henley

bert master of requests, and the sum he had paid for it being lost to his family, Henault solicited it in favour of several persons, till at last the queen bestowed it on himself, and consented that he should divide the profits with his predecessor's widow. On the queen's death he held the same place under the dauphiness.

A delicate constitution made him liable to much illness; which, however, did not interrupt the serenity of his mind. He made several journeys to the waters of Plombieres: in one of these he visited the deposed king Stanislaus at Luneville; and in another accompanied his friend the marquis de Pauliny, ambassador to Switzerland. In 1763 he drew near his end. One morning, after a quiet night, he felt an oppression, which the faculty pronounced a suffocating cough. His confessor being sent to him, he formed his resolution without alarm. He has since said, that he recollected having then said to himself, "What do I regret?" and called to mind that saying of Madame de Sevigne, "I leave here only dying creatures." He received the sacraments. It was believed the next night would be his last; but by noon next day he was out of danger. "Now (said he) I know what death is. It will not be new to me any more." He never forgot it during the following seven years of his life, which, like all the rest, were gentle and calm. Full of gratitude for the favours of providence, resigned to its decrees, offering to the Author of his being a pure and sincere devotion; he felt his infirmities without complaining, and perceived a gradual decay with unabated firmness. He died Dec. 24. 1771, in his 86th year. He married in 1714 a daughter of M. le Bas de Montargis keeper of the royal treasure, &c. who died in 1728 without leaving any issue.

HENDECAGON, in *Geometry*, a figure having eleven sides and as many angles.

HENED-PENNY, in our old writers, a customary payment of money instead of hens at Christmas. It is mentioned in a charter of King Edward III. Mon. Angl. tom. ii. p. 327. Du Cange is of opinion it may be *hen-penny*, *gallinagium*, or a composition for eggs; but Cowel thinks it is misprinted *hened-penny* for *hoved-penny*, or *head-penny*.

HENIOCHAS, or HENIOCHUS, a northern constellation, the same as Auriga.

HENLEY, a town of Oxfordshire in England, seated on the river Thames, over which there is a handsome bridge. It sends malt, corn, and other things, to London in barges. W. Long. 0. 40. N. Lat. 51. 34.

HENLEY, a town of Warwickshire in England, seated on the river Alne, in W. Long. 0. 40. N. Lat. 52. 18.

HENLEY, *John*, better known by the appellation of *Orator Henley*, a very singular character, was born at Melton-Moubray, Leicestershire, in 1691. His father, the Rev. Simon Henley, and his grandfather by his mother's side (John Dowel, M. A.), were both vicars of that parish. Having passed his exercises at Cambridge, and his examination for the degree of B. A. with the particular approbation of Mr Field, Mr Smales, and the master of the college, he returned to his native place, where he was first desired by the trustees of the school in Melton to assist in, and then to take the direction of, that school; which he increased and raised from a declining to a flourishing condition. He established here a practice of improving elocution by the public speaking of passages in the classics, morning and afternoon, as well as orations, &c. Here he was invited by a letter from the Rev. Mr Newcombe to be a candidate for a fellowship in St John's; but as he had long been absent, and therefore lessened his personal interest, he declined appearing for it. Here likewise he began his "Universal Grammar," and finished ten languages, with dissertations prefixed, as the most ready introduction, to any tongue whatever. In the beginning of this interval he wrote his poem on "Esther," which was approved by the town, and well received. He was ordained a deacon by Dr Wake, then bishop of Lincoln; and after having taken his degree of M. A. was admitted to priest's orders by Dr Gibson, his successor in that see. He formed an early resolution to improve himself in all the advantages of books and conversation the most effectually, on the first opportunity, at London. But he laid the basis of future proficiency in assisting at the curacy of his native town; where he preached many occasional sermons, particularly one at the assizes at Leicester: he then gave a voluntary warning for the choice of a new master and curate, and came to town recommended by above 30 letters from the most considerable men in the country, both of the clergy and laity; but against the inclination of his neighbours and his school, which was now, as from his first entrance upon it, still advancing: and his method being established and approved, one of his own scholars was appointed to succeed him.—In town he published several pieces, as a translation of Pliny's Epistles, of several works of Abbé Vertot, of Montfaucon's Italian Travels in folio, and many other lucubrations. His most generous patron was the earl of Macclesfield, who gave him a benefice in the country, the value of which to a resident would have been above 80l. a year; he had likewise a lecture in the city; and preached more charity sermons about town, was more numerously followed, and raised more for the poor children, than any other preacher, however dignified or distinguished. But when he pressed his desire and promise from a great man of being fixed in town, it passed in the negative. He took the people (it seems) too much from their parish-churches; and as he was not so proper for a London divine, he was very welcome, notwithstanding all difficulties, to be a rural pastor. But it was not for a second rustication, as he informs us ‡, that he left the fields and the swains of Arcadia to visit the great city: and as he knew it was as lawful to take a licence from the king and parliament at Hicks's-hall as at Doctors Commons (since the ministerial powers of this kingdom are and ought to be parliamentary only), he freely, without compulsion, or being desired or capable of being compelled to reside in the country, gave up his benefice and lecture, certainties for an uncertainty; believing the public would be a more hospitable protector of learning and science, than some of the upper world in his own order.

Henley.

‡ *Oratory, Transact.* p 12, &c.

Mr Henley, in answer to a cavil (that he borrowed from books), proposed, "that if any person would single out any celebrated discourse of an approved writer, dead or living, and point out what he thought excellent in it, and the reasons; he would submit it to the world, whether the most famed composition might not be

Henley || Henneberg.

be ſurpaſſed in their own excellency, either on that or any different ſubject."

Henley preached on Sundays upon theological matters, and on Wedneſdays upon all other ſciences. He declaimed ſome years againſt the greateſt perſons, and occaſionally, ſays Warburton, did Pope that honour. The poet in return thus blazons him to infamy:

But where each ſcience lifts its modern type,
Hiſtory her pot, Divinity his pipe,
While proud Philoſophy repines to ſhow,
Diſhoneſt ſight! his breeches rent below;
Imbrown'd with native bronze, lo Henley ſtands,
Tuning his voice, and balancing his hands.
How fluent nonſenſe trickles from his tongue!
How ſweet the periods, neither ſaid nor ſung!
Still break the benches, Henley! with thy ſtrain,
While Kennet, Hare, and Gibſon preach in vain.
O great reſtorer of the good old ſtage,
Preacher at once and zany of thy age!
O worthy thou of Ægypt's wiſe abodes,
A decent prieſt where monkeys were the gods!
But Fate with butchers plac'd thy prieſtly ſtall,
Meek modern faith to murder, hack, and maul:
And bade thee live, to crown Britannia's praiſe,
In Toland's, Tindal's, and in Woolſton's days."

This extraordinary perſon (who died October 14. 1756) ſtruck medals, which he diſperſed as tickets to his ſubſcribers: a ſtar riſing to the meridian, with this motto, *Ad ſumma;* and below, *Inveniam viam, aut faciam.* Each auditor paid 1s. He was author of a weekly paper called The Hyp Doctor, for which he had 100l. a-year. Henley uſed every Saturday to print an advertiſement in the Daily Advertiſer, containing an account of the ſubjects he intended to diſcourſe on the enſuing evening at his oratory near Lincoln's-inn-fields, with a ſort of motto before it, which was generally a ſneer at ſome public tranſaction of the preceding week. Dr Cobden, one of Geo. II.'s chaplains, having, in 1748, preached a ſermon at St James's from theſe words, "Take away the wicked from before the king, and his throne ſhall be eſtabliſhed in righteouſneſs;" it gave ſo much diſpleaſure, that the Doctor was ſtruck out of the liſt of chaplains; and the next Saturday the following parody of his text appeared as a motto to Henley's advertiſement:

Away with the wicked before the king,
And away with the wicked behind him;
His throne it will bleſs
With righteouſneſs,
And we ſhall know where to find him."

His audience was generally compoſed of the loweſt ranks; and it is well-known that he even collected an infinite number of ſhoe-makers, by announcing that he could teach them a ſpeedy mode of operation in their buſineſs, which proved only to be, the making of ſhoes by cutting off the tops of ready-made boots.

HENNA, or ALHENNA. See LAWSONIA.

HENNEBERG, a county of Germany, in the circle of Franconia. It is bounded on the north by Thuringia, on the weſt by Heſſe, on the ſouth by the biſhoprick of Wertſburg, and on the eaſt by that of Bamberg. It abounds in mountains and woods; and it is populous, and pretty fertile. Mainingen is the capital town.

Henneberg || Henry.

HENNEBERG, a town of Germany, in the circle of Franconia, which gives title to a county of the ſame name, with a caſtle. E. Long. 9. 17. N. Lat. 50. 40.

HENNEBON, a town of France, in Bretagne, in the dioceſe of Vannes. It is inhabited by rich merchants, and is ſeated on the river Blavet, in W. Long. 2. 13. N. Lat. 47. 48.

HENOTICUM, (Ἑνωτικον, q. d. "reconcilative;" of ἑνοω "I unite"), in church hiſtory, a famous edict of the emperor Zeno, publiſhed A. D. 482, and intended to reconcile and reunite the Eutychians with the Catholics. It was procured of the emperor by means of Acacius, patriarch of Conſtantinople, with the aſſiſtance of the friends of Peter Mongus and Peter Trullo. The ſting of this edict lies here; that it repeats and confirms all that had been enacted in the councils of Nice, Conſtantinople, Epheſus, and Chalcedon, againſt the Arians, Neſtorians, and Eutychians, without making any particular mention of the council of Chalcedon. It is in form of a letter, addreſſed by Zeno to the biſhops, prieſts, monks, and people of Egypt and Libya. It was oppoſed by the Catholics, and condemned in form by Pope Felix II.

HENRICANS, in eccleſiaſtical hiſtory, a ſect ſo called from Henry its founder, who, though a monk and hermit, undertook to reform the ſuperſtition and vices of the clergy. For this purpoſe he left Lauſanne in Switzerland, and removing from different places, at length ſettled at Tholouſe in the year 1147, and there exerciſed his miniſterial function, till being overcome by the oppoſition of Bernard abbot of Clairval, and condemned by Pope Eugenius III. at a council aſſembled at Rheims, he was committed to a cloſe priſon in 1148, where he ſoon ended his days. This reformer rejected the baptiſm of infants; ſeverely cenſured the corrupt manners of the clergy; treated the feſtivals and ceremonies of the church with the utmoſt contempt, and held clandeſtine aſſemblies for inculcating his peculiar doctrines.

HENRY, or CAPE-HENRY, the ſouth cape of Virginia, at the entrance of Cheſapeak bay. W. Long. 74. 50. N. Lat. 37. 0.

HENRY, the name of ſeveral emperors of Germany, and kings of England and France. See ENGLAND, FRANCE, and GERMANY.

HENRY IV. emperor of Germany in 1056, ſtyled *the Great*, was memorable for his quarrels with Pope Gregory II. whom at one time he depoſed, for having preſumed to judge his ſovereign; but at another, dreading the effects of the papal anathemas, he had the weakneſs to ſubmit to the moſt humiliating perſonal ſolicitations and penances to obtain abſolution; which impolitic meaſure increaſed the power of the pope, and alienated the affections of his ſubjects: thus circumſtanced, he reaſſumed the hero, but too late; marched with an army to Rome, expelled Gregory, depoſed him, and ſet up another pope. Gregory died ſoon after: but Urban II. and Paſcal II. ſucceſſively, excited his ambitious ſons, Conrad and Henry, to rebel againſt him, and the latter was crowned emperor by the title of Henry V. in 1106; and he had the inhumanity to arreſt his father, and to deprive

Henry. prive him, not only of all his dignities, but even of the neceſſaries of life. The unfortunate Henry IV. was reduced to ſuch extremities (after having fought 62 battles in defence of the German empire), that he ſolicited the biſhop of Spire to grant him an under-chaunter's place in his cathedral, but was refuſed. He died the ſame year at Liege, aged 55, a martyr to the ignorance and ſuperſtition of the age, and to his own blind confidence in favourites and miſtreſſes.

HENRY IV. king of France (in 1589) and Navarre, juſtly ſtyled *the Great*, was the ſon of Anthony de Bourbon, chief of the branch of Bourbon (ſo called from a fief of that name which fell to them by marriage with the heireſs of the eſtate). His mother was the daughter of Henry d'Albert, king of Navarre; a woman of a maſculine genius; intrepid, ſimple, and ruſtic in her manners, but deeply verſed in politics, and a zealous Proteſtant. Foreſeeing that her party would want ſuch a protector (for her huſband was a weak indolent prince), ſhe undertook the care of the education of the young hero: his diet was coarſe; his clothes neat, but plain; he always went bare-headed; ſhe ſent him to ſchool with the other children of the ſame age, and accuſtomed him to climb the rocks and neighbouring mountains, according to the cuſtom of the country. He was born in 1553; and in 1569, the 16th year of his age, he was declared the Defender and Chief of the Proteſtants at Rochelle. The peace of St Germain, concluded in 1570, recalled the lords in the Proteſtant intereſt to court; and in 1572 Henry was married to Margaret de Valois, ſiſter to Charles IX. king of France. It was in the midſt of the rejoicings for theſe nuptials that the horrid maſſacre of Paris took place. Henry was reduced, by this infernal ſtroke of falſe policy, to the alternative of changing his religion or being put to death: he choſe the former, and was detained priſoner of ſtate three years. In 1587 he made his eſcape; put himſelf at the head of the Huguenot party, expoſing himſelf to all the riſks and fatigues of a religious war, often in want of the neceſſaries of life, and enduring all the hardſhips of the common ſoldiers; but he gained a victory this year at Courtras, which eſtabliſhed his reputation in arms, and endeared him to the Proteſtants. On the death of Henry III. religion was urged as a pretext for one half of the officers of the French army to reject him, and for the leaguers not to acknowledge him. A phantom, the cardinal de Bourbon, was ſet up againſt him; but his moſt formidable rival was the duke de Mayenne: however, Henry, with few friends, fewer important places, no money, and a very ſmall army, ſupplied every want by his activity and valour. He gained ſeveral victories over the duke; particularly that of Ivri in 1590, memorable for his heroic admonition to his ſoldiers: "If you love your enſigns, rally by my white plume; you will always find it in the road to honour and glory." Paris held out againſt him, notwithſtanding his ſucceſſes: he took all the ſuburbs in one day; and might have reduced the city by famine, if he had not humanely ſuffered his own army to relieve the beſieged; yet the bigotted friars and prieſts in Paris all turned ſoldiers, except four of the Mendicant order; and made daily military reviews and proceſſions, the ſword in one hand and the crucifix in the other, on which they made the citizens ſwear rather to die with famine than to admit Henry. Henry. The ſcarcity of proviſions in Paris at laſt degenerated to an univerſal famine; bread had been ſold, whilſt any remained, for a crown the pound, and at laſt it was made from the bones of the charnel-houſe of St Innocents; human fleſh became the food of the obſtinate Pariſians, and mothers ate the dead bodies of their children. In fine, the duke of Mayenne, ſeeing that neither Spain nor the league would ever grant him the crown, determined to aſſiſt in giving it to the lawful heir. He engaged the ſtates to hold a conference with the chiefs of both parties; which ended in Henry's abjuration of the Proteſtant religion at St Dennis, and his conſecration at Chartres in 1593. The following year Paris opened its gates to him; in 1596, the duke of Mayenne was pardoned; and in 1598, peace was concluded with Spain. Henry now ſhowed himſelf doubly worthy of the throne, by his encouragement of commerce, the fine arts, and manufactures, and by his patronage of men of ingenuity and ſound learning of every country: but though the fermentations of Romiſh bigotry were calmed, the leaven was not deſtroyed; ſcarce a year paſſed without ſome attempt being made on this real father of his people; and at laſt the monſter Ravaillac ſtabbed him to the heart in his coach, in the ſtreets of Paris, on the 14th of May 1610, in the 57th year of his age and 22d of his reign.

HENRY VIII. king of England, was the ſecond ſon of Henry VII. by Elizabeth the eldeſt daughter of Edward IV. He was born at Greenwich, on the 28th of June 1491. On the death of his brother Arthur, in 1502, he was created prince of Wales; and the following year betrothed to Catharine of Arragon, Prince Arthur's widow, the pope having granted a diſpenſation for that purpoſe. Henry VIII. acceded to the throne, on the death of his father, the 22d of April 1509, and his marriage with Catharine was ſolemnized about two months after. In the beginning of his reign he left the government of his kingdom entirely to his miniſters; and ſpent his time chiefly in tournaments, balls, concerts, and other expenſive amuſements. We are told that he was ſo extravagant in his pleaſures, that, in a very ſhort time, he entirely diſſipated 1,800,000l. which his father had hoarded. This will ſeem leſs wonderful, when the reader is informed, that gaming was one of his favourite diverſions. Nevertheleſs he was not ſo totally abſorbed in pleaſure, but he found leiſure to ſacrifice to the reſentment of the people two of his father's miniſters, Empſon and Dudley. A houſe in London, which had belonged to the former of theſe, was in 1510 given to Thomas Wolſey, who was now the king's almoner, and who from this period began to inſinuate himſelf into Henry's favour. In 1513, he became prime miniſter, and from that moment governed the king and kingdom with abſolute power. In this year Henry declared war againſt France, gained the battle of Spurs, and took the towns of Terouenne and Tournay; but before he embarked his troops, he beheaded the earl of Suffolk, who had been long confined in the tower. In 1521, he ſacrificed the duke of Buckingham to the reſentment of his prime miniſter Wolſey, and the ſame year obtained from the pope the title of *Defender of the Faith.*

Henry. Henry, having been 18 years married, grew tired of his wife, and in the year 1527 reſolved to obtain a divorce; but after many fruitleſs ſolicitations, finding it impoſſible to perſuade the pope to annul his marriage with Catharine, he eſpouſed Anne Boleyn in the year 1531. During this interval his favourite Wolſey was diſgraced, and died; Henry threw off the papal yoke, and burnt three Proteſtants for hereſy. In 1535, he put to death Sir Thomas More, Fiſher, and others, for denying his ſupremacy, and ſuppreſſed all the leſſer monaſteries.

His moſt ſacred majeſty, having now poſſeſſed his ſecond queen about five years, fell violently in love with Lady Jane Seymour. Anne Boleyn was accuſed of adultery with her own brother, and with three other perſons: ſhe was beheaded the 19th of May 1536. He married Jane Seymour the day following. In 1537, he put to death five of the noble family of Kildare, as a terror to the Iriſh, of whoſe diſloyalty he had ſome apprehenſions; and in the year following he executed the marquis of Exeter, with four other perſons of diſtinction, for the ſole crime of correſponding with Cardinal Pole. In 1538 and 1539, he ſuppreſſed all the monaſteries in England, and ſeized their revenues for his own uſe. The queen having died in childbed, he this year married the princeſs Ann of Cleves: but diſliking her perſon, immediately determined to be divorced; and his obſequious parliament and convocation unanimouſly pronounced the marriage void, for reaſons too ridiculous to be recited: but this was not all; Henry was ſo incenſed with his miniſter and quondam favourite, Cromwell, for negociating this match, that he revenged himſelf by the hand of the executioner. Yet this was not the only public murder of the year 1540. A few days after Cromwell's death, ſeveral perſons were burnt for denying the king's ſupremacy, and other articles of hereſy.

His majeſty being once more at liberty to indulge himſelf with another wife, fixed upon Catharine Howard, niece to the duke of Norfolk. She was declared queen in Auguſt 1540; but they had been privately married ſome time before. Henry, it ſeems, was ſo entirely ſatisfied with this lady, that he daily bleſſed God for his preſent felicity; but that felicity was of ſhort duration: he had not been married above a year, before the queen was accuſed of frequent proſtitution, both before and ſince her marriage: ſhe confeſſed her guilt, and was beheaded in February 1542. In July 1543, he married his ſixth wife, the lady Catharine Parr, the widow of John Nevil lord Latimer, and lived to the year 1547 without committing any more flagrant enormities: but finding himſelf now approach towards diſſolution, he made his will; and that the laſt ſcene of his life might reſemble the reſt, he determined to end the tragedy with the murder of two of his beſt friends and moſt faithful ſubjects, the duke of Norfolk and his ſon the earl of Surrey. The earl was beheaded on the 19th of January; and the duke was ordered for execution on the 29th; but fortunately eſcaped by the king's death on the 28th. They were condemned without the ſhadow of a crime; but Henry's political reaſon for putting them to death, was his apprehenſion that, if they were ſuffered to ſurvive him, they would counteract ſome of his regulations in religion, and might be troubleſome to his ſon. Henry died on the 28th of January 1547, in the 56th year of his age, and was buried at Windſor. Henry.

As to his character, it is pretty obvious from the facts above related. Lord Herbert palliates his crimes, and exaggerates what he calls his *virtues*. Biſhop Burnet ſays, "he was rather to be reckoned among the *great* than the *good* princes." He afterwards acknowledges, that "he is to be numbered among the ill princes; but adds, "I cannot rank him with the worſt." Sir Walter Raleigh, with infinitely more juſtice, ſays, "If all the pictures and patterns of a mercileſs prince were loſt to the world, they might again be painted to the life out of the hiſtory of this king." He was indeed a mercileſs tyrant, a ſcurvy politician, a fooliſh bigot, a horrible aſſaſſin. See ENGLAND, N° 253—292.

HENRY *of Huntingdon*, an Engliſh hiſtorian, of the 12th century, was canon of Lincoln, and afterwards archdeacon of Huntingdon. He wrote, 1. A hiſtory of England, which ends with the year 1154. 2. A continuation of that of Bede. 3. Chronological tables of the kings of England. 4. A ſmall treatiſe on the contempt of the world. 5. Several books of epigrams and love-verſes. 6. A poem on herbs; all which are written in Latin.——His invocation of Apollo and the goddeſs of Tempe, in the exordium of his poem on herbs, may not be unacceptable as a ſpecimen of his poetry.

'Vatum magne parens, herbarum Phœbe repertor,
'Voſque, quibus reſonant Tempe jocoſa, Deæ!
'Si mihi ſerta prius hedera florente parâſtis,
'Ecce meos flores, ſerte parata fero.'

HENRY *of Suſa*, in Latin *de Sugufio*, a famous civilian and canoniſt of the 13th century, acquired ſuch reputation by his learning, that he was called *the ſource and ſplendour of the law*. He was archbiſhop of Embrun about the year 1258, and cardinal biſhop of Oſtia in 1262. He wrote *A ſummary of the canon and civil law*; and *a commentary on the book of the decretals*, compoſed by order of Alexander IV.

HENRY *the Miniſtrel*, commonly called *Blind Harry*, an ancient Scottiſh author, diſtinguiſhed by no particular ſurname, but well known as the compoſer of an hiſtorical poem reciting the atchievements of Sir William Wallace. This poem continued for ſeveral centuries to be in great repute; but afterwards ſunk into neglect, until very lately that it has been again releaſed from its obſcurity by a very neat and correct edition publiſhed at Perth under the inſpection and patronage of the earl of Buchan.

It is difficult to aſcertain the preciſe time in which this poet lived, or when he wrote his hiſtory, as the two authors who mention him ſpeak ſomewhat differently. Dempſter, who wrote in the beginning of the 17th century, ſays that he lived in the year 1361: but Major, who was born in the year 1446, ſays that he compoſed this book during the time of his infancy, which we muſt therefore ſuppoſe to have been a few years poſterior to 1446; for if it had been compoſed that very year, the circumſtance would probably have been mentioned. As little can we ſuppoſe, from Mr Dempſter's words, that Henry was born in 1361: for though he ſays that he *lived* in that year, we muſt naturally

Henry. turally imagine rather that he was then come to the years of maturity, or began to diſtinguiſh himſelf in the world, than that he was only born at that time. The author of the diſſertation on his life, prefixed to the new edition of the poem, endeavours to reconcile matters in the following manner: "It is not indeed impoſſible that he might be born in or about that year (1361). In the time of Major's infancy he might be about 83 years of age. In that caſe, it may be ſuppoſed that it was the work of his old age to collect and put in order the detached pieces of his hiſtory of Wallace, which he had probably compoſed in thoſe parts of the country where the incidents were ſaid to have happened."

We are entirely ignorant of the family from which Henry was deſcended; though, from his writings, we ſhould be led to ſuppoſe that he had received a liberal education. In them he diſcovers ſome knowledge in divinity, claſſical hiſtory, and aſtronomy, as well as of the languages. In one place he boaſts of his celibacy, which ſeems to indicate his having engaged himſelf in ſome of the religious orders of that age. From what Major ſays further of him, we may ſuppoſe his profeſſion to have been that of a travelling bard; though it does not appear that he was ſkilled in muſic, or had no other profeſſion than that juſt mentioned. His being blind from his birth, indeed, makes this not improbable; though even this circumſtance is not inconſiſtent with the ſuppoſition of his being a religious mendicant. "The particulars (ſays Major) which he heard related by the vulgar, he wrote in the vulgar verſe, in which he excelled. By reciting his hiſtories before princes or great men, he gained his food and raiment, of which he was worthy." It is thus probable that he would be a frequent viſitor at the Scottiſh court; and would be made welcome by thoſe great families who could boaſt of any alliance with the hero himſelf, or took pleaſure in hearing his exploits or thoſe of his companions.

With regard to the authenticity of his hiſtories, Major informs us only that he "does not believe every thing that he finds in ſuch writings;" but from other teſtimonies it appears, that he conſulted the very beſt authorities which could at that time be had. Though, according to the moſt early account of Henry, it appears to have been at leaſt 56 years after the death of Wallace that Henry was born; yet he is ſaid to have conſulted with ſeveral of the deſcendants of thoſe who had been the companions of that hero while he atchieved his moſt celebrated exploits, and who were ſtill capable of aſcertaining the veracity of what he publiſhed. The principal of theſe were Wallace of Craigie and Liddle of that Ilk; who, he ſays, perſuaded him to omit in his hiſtory a circumſtance which he ought to have inſerted. Beſides theſe, he conſulted with the principal people of the kingdom; and he utterly diſclaims the idea of having adhered entirely to any unwritten tradition, or having been promiſed any reward for what he wrote. His chief authority, according to his own account, was a Latin hiſtory of the exploits of Sir William, written partly by Mr John Blair and partly by Mr Thomas Gray, who had been the companions of the hero himſelf. Henry's account of theſe two authors, is to the following purpoſe: "They became acquainted with Wallace when the latter was only about 16 years of age, and at that time a ſtudent at the ſchool of Dundee; and their acquaintance with him continued till his death, which happened in his 29th year. Mr John Blair went from the ſchools in Scotland to Paris, where he ſtudied ſome time, and received prieſts orders. He returned to Scotland in 1296, where he joined Wallace, who was bravely aſſerting the liberties of his country. Mr Thomas Gray, who was parſon of Libberton, joined Wallace at the ſame time. They were men of great wiſdom and integrity, zealous for the freedom of Scotland; and were preſent with Wallace, and aſſiſting to him, in moſt of his military enterpriſes. They were alſo his ſpiritual counſellors, and adminiſtered to him godly comfort. The hiſtory written by theſe two clergymen was atteſted by William Sinclair biſhop of Dunkeld, who had himſelf been witneſs to many of Wallace's actions. The biſhop, if he had lived longer, was to have ſent their book to Rome, for the purpoſe of obtaining the ſanction of the pope's authority." Henry.

The book which Henry thus appeals to as his principal authority is now loſt, ſo that we have no opportunity of comparing it with what he has written. The character given by Dempſter of Henry, however, is more favourable than that by Major. He tells us, that "he was blind from his birth; a man of ſingular happy genius; he was indeed another Homer. He did great honour to his native country, and raiſed it above what was common to it in his age. He wrote, in the vernacular verſe, an elaborate and grand work, in ten books, of the deeds of William Wallace." In this account there is a miſtake; for the poem contains eleven or twelve books; but Dempſter, who wrote in a foreign country, and had not a printed copy of Henry's work by him when he wrote his eulogium, is excuſable in a miſtake of this kind.

With regard to his poetical merit, it muſt undoubtedly rank very far below that of Homer, whom indeed he ſcarcely reſembles in any other reſpects than that he went about, as Homer is ſaid to have done, reciting the exploits of the heroes of his country, and that he was blind. In this laſt circumſtance, however, he was ſtill worſe than Homer; for Henry was born blind, but Homer became blind after he had been advanced in years. Hence Henry, even ſuppoſing his genius to have been equal to that of Homer, muſt have lain under great diſadvantages; and theſe are very evident in his works. The deſcriptive parts are evidently deficient, and the alluſions taken principally from the way in which nature affects thoſe ſenſes of which he was poſſeſſed. Thus, ſpeaking of the month of March, he calls it *the month of right digeſtion*, from the ſuppoſed *fermentation* then begun in the earth. Of April he ſays that the earth is then *able*, or has obtained a power of producing its different vegetables; and of this productive power he appears to have been more ſenſible than of the effects which commonly ſtrike us moſt ſenſibly. "By the working of nature (ſays he), the fields are again clothed, and the woods acquire their worthy weed of green. May brings along with it great celeſtial gladneſs. The heavenly hues appear upon the tender green." In another place he deſcribes the deity of ſome river, whom he calls *Nymphæus*, "building his bower with *oil and balm*, fulfilled of ſweet odour." By reaſon of theſe diſadvantages, he ſeldom makes uſe

Henry. of families with which Homer abounds ſo much; and few miraculous interpoſitions are to be found in his poem, though the prophecies of Thomas Lermont commonly called *The Rhymer*, and a prophetic dream of Wallace himſelf, are introduced, as well as the ghoſt of Fawdon, a traitor who had joined Wallace, and whom the latter in a fit of paſſion had killed. In other reſpects, the ſame inextinguiſhable thirſt of blood which Homer aſcribes to his hero Achilles is aſcribed to Wallace, though in all probability the mind of Wallace was too much enlightened to admit of ſuch ſentiments. A vaſt degree of courage and perſonal ſtrength are aſcribed to him, by means of which the exploits of the whole army are in effect transferred to a ſingle perſon. As long as he is inveſted with the command, the Scots are victorious and irreſiſtible; when deprived of it, they are enſlaved and undone. After ſtruggling for ſome time againſt an inveterate and powerful faction, diſdaining to feign ſubmiſſion, he is taken by treachery, and died a martyr to the freedom of his country. The poem, on the whole, is valuable, on account of our being able to trace, by its means, the progreſs which the Engliſh language had made at that time in Scotland: the manners of the Scots in that age: as the favourite dreſs of green which at that time was the taſte of the inhabitants of Scotland, &c. With regard to the authenticity of his relations, it is impoſſible to ſuppoſe any other thing than that they are partly true and partly falſe. The general thread of the ſtory may undoubtedly be looked upon to be genuine, though embelliſhed with poetical fictions and exaggerations; and his conſtant appeals to the book already mentioned, though it is now loſt, muſt be looked upon as a ſtrong teſtimony in his favour: for we cannot ſuppoſe that at the time he lived, when we may ſay that the tranſactions which he relates were recent, he would have had the confidence to appeal to a book which had not been generally known to have an exiſtence; and its being now loſt can never be any argument againſt it, when we conſider the difficulty there was of preſerving books before the invention of printing; the confuſions in which Scotland was frequently involved; and that the exploits of Wallace, who muſt be ſuppoſed to have been a kind of rival to the great Bruce, could not be ſo agreeable to the court as thoſe of the more ſucceſsful hero; and therefore the hiſtory of them might be ſuffered to fall into oblivion, though written in elegant Latin, while a moſt ridiculous poem in that language on the battle of Bannockburn has been preſerved to his day.

Henry Prince of Wales, eldeſt ſon of King James VI. of Scotland by his queen Anne ſiſter of the king of Denmark, and one of the moſt accompliſhed princes of the age in which he lived, was born on the 19th of February 1594. The birth of the prince was announced by embaſſies to many foreign powers, with invitations to be preſent at the ceremony of his baptiſm, which was thus delayed for a conſiderable time. Mr Peter Young, who, along with the celebrated George Buchanan, had been preceptor to his majeſty, was ſent to the courts of Denmark, Brunſwic, and Mecklenburg, the duke of Mecklenburgh being great-grandfather to the prince by the mother's ſide; the laird of Eaſt Weems to France and England; and Sir Robert Keith, and Captain Murray provoſt of St Andrew's, to the States General, who at that time were ſtruggling againſt the Spaniſh tyranny, and not yet declared a free ſtate. All theſe ambaſſadors were cordially received, and others appointed in return except by the courts of France and England. Henry IV. at that time king of France, though the Scots ambaſſador had formerly been one of his own ſervants, neither made any preſent, nor appointed an ambaſſador. Queen Elizabeth had deſigned to act in the ſame manner till ſhe heard of the behaviour of Henry; after which ſhe honoured James by appointing an ambaſſador of very high rank, Robert earl of Suſſex. This ambaſſador, however, was ſo long of making his appearance, that the queen imagined the ceremony would be over before his arrival; for which reaſon ſhe ſent a meſſage to the earl, commanding him in that caſe not to enter Scotland nor deliver her preſent. But James had been more obſequious; and not only delayed the ceremony till the Engliſh ambaſſador arrived, but diſtinguiſhed him from the reſt by having a canopy carried over his head at the proceſſion, ſupported by the lairds of Ceſford, Buccleugh, Duddope, and Traquair. The ceremony was performed with great magnificence; after which the ambaſſadors preſented their gifts. That from the United States was the moſt valuable. it conſiſted of two gold cups worth 12,400 crowns, with a box of the ſame metal, weighing in all about 400 ounces, containing beſides the grant of a penſion of 5000 florins annually to the prince for life. The Engliſh ambaſſador gave a cupboard of plate curiouſly wrought, and valued at 3000l. ſterling; and the Daniſh ambaſſador two gold chains, one for the queen and another for the prince. The baptiſm was celebrated on the 6th of September 1594, and the child named Frederick-Henry and Henry-Frederick. Henry.

The young prince was now committed to the care of the earl of Mar, who was aſſiſted in this important charge by Annabella counteſs-dowager of Mar, daughter of William Murray of Tullibardine, and paternal anceſtor of the preſent duke of Athol. This lady was remarkable for the ſeverity of her temper, ſo that the prince met with little indulgence while under her tuition; notwithſtanding which, he ſhowed great affection for his governeſs all the time ſhe had the care of him. Next year, however (1595), the queen engaged the chancellor, Lord Thirleſtane, in a ſcheme to get the prince into her own power; but the king having found means to diſſuade her majeſty from the attempt, ſhowed afterwards ſuch marks of diſpleaſure to the chancellor, that the latter fell into a languiſhing diſorder and died of grief.

In his ſixth year Prince Henry was committed to the care of Mr Adam Newton a Scotſman, eminently ſkilled in moſt branches of literature, but particularly diſtinguiſhed for his knowledge of the Latin language. Under his tutorage the prince ſoon made great progreſs in that language, as well as in other branches of knowledge; inſomuch that before he had completed his ſixth year, his father wrote for his uſe the treatiſe entitled *Baſilicon Doron*, thought to be the beſt of all his works.

In his ſeventh year, Prince Henry began his correſpondence with foreign powers. His firſt letter was to the States of Holland; in which he expreſſed his regard and gratitude for the good opinion they had conceived of him, and of which he had been informed by

Henry. by ſeveral perſons who had viſited that country; concluding with a requeſt that they would make uſe of his intereſt with his father in whatever he could ſerve them, promiſing alſo his ſervice in every other reſpect in which he could be uſeful, until he ſhould be able to give farther inſtances of his good-will and affection.

At this early period the prince began to add to his literary accompliſhments ſome of the more martial kind, ſuch as riding, the exerciſe of the bow, pike, &c. as well as the uſe of fire-arms; and indeed ſuch was the attachment he ſhowed throughout his whole lifetime to military exerciſes, that had he attained the years of maturity, there can ſcarce be a doubt that he would have diſtinguiſhed himſelf in a moſt eminent manner. In all his exerciſes he made ſurpriſing progreſs; and not only in thoſe of the military kind, but in ſinging, dancing, &c. On his ninth birth-day he ſent a letter in Latin to the king, informing him that he had read over Terence's Hecyra, the third book of Phædrus's Fables, and two books of Cicero's Epiſtles; and that now he thought himſelf capable of performing ſomething in the commendatory kind of epiſtles. His accompliſhments were ſoon ſpoken of in foreign countries; and theſe, along with the general ſuſpicion that James favoured the Catholic party, probably induced Pope Clement VIII. to make an attempt to get him into his hands. With this view he propoſed, that if James would entruſt him with the education of the young prince, he would advance ſuch ſums of money as would effectually eſtabliſh him on the throne of England. This happened a little before the death of Elizabeth; but James, notwithſtanding his ambition to poſſeſs the crown of England, of which he was not yet altogether certain, withſtood the temptation. He alleged, that it would be unnatural for him, as a father, to allow his ſon to be brought up in the belief of a doctrine which he himſelf did not believe: and even though he ſhould act in his private capacity in ſuch an unnatural manner, he could not anſwer for it to the nation, he being heir-apparent to the crown, and the kingdom at large much intereſted in whatever concerned him. On the death of the queen of England, James was obliged to leave Scotland in ſuch haſte, that he had not time to take a perſonal leave of his ſon, and therefore did ſo by letter, which was anſwered by the prince in Latin. The queen, however, who had been deſired to follow the king to London in three weeks, but to leave the prince in Scotland, thought proper to make another attempt to get her ſon into her own power. With this view ſhe took a journey to Stirling, where the prince reſided, but was oppoſed in her deſigns by the friends of the houſe of Mar; and this affected her ſo much, that ſhe miſcarried of a child of which ſhe was then pregnant. The king, hearing of this misfortune, ordered the prince to be delivered to his mother; but refuſed to inflict any puniſhment on the earl of Mar, which the queen inſiſted upon, that nobleman having been with the king at London, and entirely innocent of the whole affair. Inſtead of puniſhing him, therefore, he cauſed him to be acquitted by an act of the public council at Stirling; inveſted him with the order of the garter; made him a grant of ſeveral abbey and other church-lands; and raiſed him to the poſt of lord high treaſurer after the diſgrace of the earl of Somerſet; in which employment he continued till he could no longer perform the duties of his office through age and infirmity. Henry.

In the month of July this year (1603) Prince Henry was inveſted with the order of the garter; after which he was preſented to the queen in his robes, and greatly commended by all who ſaw him on account of his majeſtic carriage and religious behaviour at the altar, as well as the quickneſs of his underſtanding and ready anſwers. Being obliged to leave London on account of the plague, he retired to Otelands, a royal palace near Weybridge in Surrey, where a ſeparate houſehold was appointed for him and his ſiſter Elizabeth. The appointment conſiſted at firſt of 70 ſervants, of whom 22 were to be above ſtairs and 48 below. In ſome weeks the number was augmented to 104, of whom 51 were above ſtairs and 53 below; but before the end of the year they were augmented to 141, of whom 56 were above ſtairs and 85 below. From Otelands he removed the ſame year to Nonſuch in Surrey, and from thence to Hampton Court, where he reſided till Michaelmas 1604; after which he returned to his houſe at Otelands, his ſervants having all this time been kept on board-wages.

In the tenth year of his age, Henry began to ſhow a wonderful deſire of becoming maſter of all thoſe accompliſhments which are neceſſary to conſtitute a great prince. Without deſiſting from his attention to polite literature, he applied himſelf in the moſt aſſiduous manner to the knowledge of naval and military affairs. To give him the firſt rudiments of the former, a ſmall veſſel was conſtructed 28 feet long and 12 broad, curiouſly painted and carved; on board of which he embarked with ſeveral of the principal nobility, and ſailed down as far as Paul's Wharf, where, with the uſual ceremonies, he baptized it by the name of the *Diſdain*. Mr Pett, the builder of this ſhip, was recommended to the prince by the high admiral in ſuch ſtrong terms, that his highneſs took him immediately into his ſervice, and continued his favour to him as long as he lived.

Prince Henry now began to ſhow himſelf equally a patron of military men and of learning. His martial diſpoſition induced him to take notice of Colonel Edmondes, a brave Scots officer in the Dutch ſervice, who had raiſed himſelf ſolely by his merit. To him he applied for a ſuit of armour to be ſent over from Holland: but though the colonel executed his commiſſion, he reaped no benefit from his highneſs's favour, dying in a ſhort time after the armour was purchaſed, before he had any opportunity of ſending it over. In matters of literature the prince appears to have been a very good judge. He patroniſed divines, and appears to have been naturally of a religious turn of mind. His attachment to the Proteſtant religion appears to have been exceſſive; as it never was in the power of the queen, who favoured the Catholic party, to make the leaſt impreſſion upon him. Her machinations for this purpoſe were diſcovered by the French ambaſſador; who, in a letter dated June 7. 1604, informed his maſter of them, and that the Spaniards were in hopes of being able by her means to alter the religion in England, as well as to prejudice the prince againſt France, which the queen ſaid ſhe hoped that her ſon would one day be able to conquer like another Henry V. By another letter, of date 22d October the

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Henry. same year, the ambaſſador, after taking notice of the queen's immoderate ambition, adds, that ſhe uſed all her efforts to corrupt the mind of the prince, by flattering his paſſions, diverting him from his ſtudies, and repreſenting to him, out of contempt to his father, that learning was inconſiſtent with the character of a great general and conqueror; propoſing at the ſame time a marriage with the infanta of Spain. Notwithſtanding theſe remonſtrances, however, the prince continued to behave as uſual, and to patroniſe the learned no leſs than before. He preſented John Johnſton, one of the king's profeſſors at St Andrew's with a diamond, for having dedicated to him an Hiſtorical Deſcription of the kings of Scotland from the foundation of the monarchy to that time; after which the profeſſor added a *carmen encomiaſticum*, which was tranſmitted to his highneſs in November 1605. Many other authors alſo ſought and obtained his countenance. In 1606 Mr John Bond uſhered his edition of Horace into the world with a polite dedication to the prince, whom he highly compliments on account of the progreſs he had made in learning. In 1609 a book was ſent over to him from France by Sir George Carew, the Britiſh ambaſſador there, tending to diſprove the doctrine of the Catholics concerning the church of Rome being the firſt of the Chriſtian churches. The ſame year the learned Thomas Lydyat publiſhed his *Emendatio Temporum*, which appeared under the patronage of the prince; and with this performance his highneſs was ſo well pleaſed, that he took the author into his family to read to him, and made him his chronographer and coſmographer. Paul Buys or Buſius alſo ſent him a letter with a dedication of the ſecond part of his Pandects; in which he beſtows upon him the higheſt compliments on the great expectations which were formed of him, and of the hopes entertained by the reformed Chriſtian churches that he would prove a powerful ſupport to their cauſe, and antagoniſt to the errors of Rome. In 1611 Dr Tooker, in his dedication of an Anſwer to Becanus a Jeſuit, who had written againſt a piece done by his majeſty himſelf, ſtyles his highneſs "the Mæcenas of all the learned." Another treatiſe againſt the ſame Becanus was alſo printed this year, and dedicated to the prince.

Many other authors, whom our limits will not allow us to take notice of, were fond of dedicating their performances to his highneſs; nor was his correſpondence leſs extenſive than his erudition. We have already taken notice of his having written his firſt public letter to the ſtates of Holland. He was congratulated by the elector palatine, afterwards married to the princeſs Elizabeth, on the diſcovery of the gunpowder-plot. On the ſame occaſion alſo Lord Spenſer wrote him a letter, accompanying it with the preſent of a ſword and target; "inſtruments (ſays he) fit to be about you in thoſe treacherous times; from the which, I truſt, God will ever protect your moſt royal father, &c." Previous to this he had correſponded in Latin with the doge of Venice, the landgrave of Heſſe, and the king of Denmark; in French with the duke of Savoy, and in Latin with the duke of Brunſwic and Uladiſlaus king of Poland; beſides a number of other eminent perſons too tedious to enumerate.

The great accompliſhments of Henry ſoon cauſed him to be taken notice of by the moſt eminent princes in Europe. In 1606 Henry IV. of France ordered Henry. his ambaſſador to pay him ſpecial regard on all occaſions. He deſired him likewiſe to ſalute the prince in the name of the dauphin, afterwards Louis XIII. and to inform him of the regard the latter had for him. A meſſage was alſo ſent by the ſame ambaſſador to M. de St Anthoine, appointed to be riding-maſter to his highneſs, enjoining him to do his duty in that office: and aſſuring him that his majeſty would be as much pleaſed with it as if the ſervice had been done to himſelf. To theſe meſſages the prince returned very proper anſwers; and afterwards performed his exerciſe in the riding-ſchool before the ambaſſador himſelf, that the latter might ſend an account thereof to his maſter. On this occaſion he mounted two horſes, and acquitted himſelf ſo well that the ambaſſador in a letter to M. de Villeroy, the French ſecretary, gave him the character of "a prince who promiſed very much, and whoſe friendſhip could not but be one day of advantage." Having then ſet forth the propriety of cultivating a good underſtanding with him, he tells the ſecretary, that the dauphin might make a return for ſome dogs which the prince had ſent him, by a ſuit of armour well gilt and enamelled, together with piſtols and a ſword of the ſame kind; alſo two horſes, one of them a barb.—This year alſo the prince waited on his uncle the king of Denmark, who had come to England on a viſit to King James; and this monarch was ſo much pleaſed with his company, that he preſented him at parting with his vice-admiral and beſt fighting ſhip, valued at no leſs than 2500l. alſo with a rapier and hanger, valued at 2000 marks. The ſtates of Holland were equally ready to ſhow their attachment. On the 25th of Auguſt this year they ſent a letter to the prince in French, accompanied with the preſent of a ſet of table linen, which they thought, as being the produce of their own country, would be agreeable to him; and they requeſted his love and favour towards their ſtate: in return for which they promiſed to be always ready to ſhow their regard for him, and to do him all poſſible ſervice; as the ambaſſador himſelf was ordered more particularly to declare. About this time the prince himſelf wrote a letter to Henry IV. acknowledging the kindneſs which his majeſty had ſhown him for ſeveral years, and confirmed of late by the latter offering him under his own royal hand his friendſhip and that of the dauphin.

While James was this year employed in hunting, the French ambaſſador, who had been obliged to quit London on account of the plague, took frequent opportunities of waiting upon his highneſs, as did alſo the Spaniſh ambaſſador, whoſe oſtenſible reaſon was to inform him about ſome horſes which were to be ſent him from Spain. The prince's partiality towards France, however, was ſo evident, that the French ambaſſador, in a letter dated 31ſt October 1606, mentions, that "as far as he could diſcover, his highneſs's inclination was entirely towards France, and that it would be wrong to neglect a prince who promiſed ſuch great things. None of his pleaſures (continued he) ſavour the leaſt of a child. He is a particular lover of horſes and whatever belongs to them: but is not fond of hunting; and when he goes to it, it is rather for the pleaſure of galloping than that which the dogs give him. He plays willingly enough at tennis, and another Scottiſh

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Henry. diverſion very like mall; but this always with perſons elder than himſelf, as if he deſpiſed thoſe of his own age. He ſtudies two hours a-day, and employs the reſt of his time in toſſing the pike, or leaping, or ſhooting with the bow, or throwing the bar, or vaulting, or ſome other exerciſe of the kind, and he is never idle. He ſhows himſelf likewiſe very good-natured to his dependents, ſupports their intereſts againſt any perſons whatever, and puſhes whatever he undertakes for them or others with ſuch zeal as gives ſucceſs to it. For beſides his exerting his whole ſtrength to compaſs what he deſires, he is already feared by thoſe who have the management of affairs, and eſpecially by the earl of Saliſbury, who appears to be greatly apprehenſive of the prince's aſcendant; as the prince, on the other hand, ſhows little eſteem for his lordſhip." In this letter the ambaſſador further goes on to remark, that ſome of the prince's attendants had formerly been made to expect penſions from France; and he was of opinion that they ought to be gratified on account of the intereſt they had with the prince. He adds, that the queen had leſs affection for Prince Henry than for his brother the duke of York, afterwards Charles I.; which the prince ſeemed to have diſcovered, and ſometimes uſed expreſſions to that purpoſe: that the king alſo ſeemed to be jealous of his ſon's accompliſhments, and to be diſpleaſed with the quick progreſs he made.

In 1607 the prince received the arms and armour which Henry IV. ſent him as a preſent; and theſe being accompanied with a letter, the prince returned an anſwer by a Mr Douglas, who was introduced to the king of France by the ambaſſador Sir George Carew. His majeſty, contrary to cuſtom, opened the prince's letter immediately; and was ſo much ſurpriſed at the beauty of the character, that he could not be ſatisfied that it was the prince's hand until he compared the ſignature with the reſt of the writing. In his letter to the Britiſh court on this occaſion, the ambaſſador ſets forth in ſtrong terms the affection expreſſed by the French monarch for the prince; "accounting of him as of his own ſon, as he hoped that his good brother of Great Britain would do the like of the dauphin." The French ambaſſador alſo gave a character of his highneſs ſimilar to that already mentioned; remarking, "that the prince had great accompliſhments and courage; would ſoon make himſelf talked of, and poſſibly give jealouſy to his father, and apprehenſions to thoſe who had the greateſt aſcendant at court." With regard to the penſions to his attendants, he was at firſt of opinion that they ought to be granted; but afterwards altered his mind, perceiving that there was little probability of the prince being influenced by any of his attendants, as he was much more inclined to be guided by his own judgment than by the ſuggeſtions of others.

—In the month of July this year the Dutch ambaſſadors came recommended to Prince Henry by the States, who wrote to him that they had ordered their ambaſſadors to kiſs his highneſs's hands on their part, and deſired him to continue his friendſhip to their republic, and to allow their ambaſſadors a favourable audience, and the ſame credit as to themſelves.

All this attention paid him by foreign powers, all his attention to his own improvements in learning and the military art, and all the temptations which we cannot but ſuppoſe a youth in his exalted ſtation to have been expoſed to, ſeem never to have ſhaken the mind of this magnanimous prince in the leaſt, or to have at any time made him deviate from the ſtrict line of propriety. We have already mentioned his attachment to the Proteſtant religion; and this appears not to have been grounded upon any prejudice or opinion inculcated upon his infant mind by thoſe who had the care of him, but from a thorough conviction of the truth of the principles which he profeſſed. On the diſcovery of the gunpowder-plot, he was ſo impreſſed with gratitude towards the Supreme Being, that he never afterwards omitted being preſent at the ſermon preached on the occaſion. In his 14th year the prince ſhowed himſelf capable of diſtinguiſhing the merit of religious diſcourſes, and paid particular regard to ſuch divines as were moſt remarkable for their learning and abilities. Among others, he honoured with his attention the learned and eloquent Mr Joſeph Hall, then rector of Halſtead in Suffolk, afterwards dean of Worceſter, and ſucceſſively biſhop of Exeter and Norwich. His highneſs was ſo much pleaſed with a book of Meditations publiſhed by that divine, that he preſſed him to preach before him; and having heard two of his ſermons, he engaged him as one of his chaplains; inviting him afterwards to ſtay conſtantly at his court, while the other chaplains waited only in their turns; promiſing, moreover, to obtain from the king ſuch preferments as ſhould fully ſatisfy him. Mr Hall, however, from a reluctance to leave his new patron Lord Denny afterwards earl of Norwich, did not accept of theſe honourable and advantageous propoſals. Henry.

In his family the prince took the utmoſt care to preſerve decency and regularity. He ordered boxes to be kept at his three houſes of St James's, Richmond, and Nonſuch, for the money required of thoſe who were heard to ſwear; the fines levied on ſuch offenders being given to the poor. He had, indeed, a particular averſion to the vice of ſwearing and profanation of the name of God. When at play, he never was heard to do ſo; and on being aſked why he did not ſwear at play as well as others; he anſwered, that he knew no game worthy of an oath. The ſame anſwer he is ſaid to have given at a hunting-match. The ſtag, almoſt quite ſpent, croſſed a road where a butcher was paſſing with his dog. The ſtag was inſtantly killed by the dog; at which the huntſmen were greatly offended, and endeavoured to irritate the prince againſt the butcher: but his highneſs anſwered coolly, "What if the butcher's dog killed the ſtag, what could the butcher help it? They replied, that if his father had been ſo ſerved, he would have ſworn ſo that no man could have endured. "Away," cried the prince, "all the pleaſure in the world is not worth an oath."

The regard which Prince Henry had for religion was manifeſt from his attachment to thoſe who behaved themſelves in a religious and virtuous manner. Among theſe was Sir John Harrington, whoſe father had been knighted by Queen Elizabeth, and created by King James a baron of England in 1603 by the title of Lord Harrington of Exton in Rutland. He was entruſted with the care of the princeſs Elizabeth after her marriage with the elector palatine, whom he attended to Heydelberg in 1613, and died at Worms on the 24th of Auguſt following. His ſon, who in the

Henry. the year 1604 had been created knight of the Bath, was as ſoon as he came to the years of diſcretion remarkable for his piety; inſomuch that he is ſaid to have kept an exact diary of his life, and to have examined himſelf every week as to the progreſs he had made in piety and virtue, and what faults he had committed during that time. He was affable and courteous to all, and remarkable for his humanity to thoſe in diſtreſs; all which good qualities ſo endeared him to the prince, that he entered into as ſtrict a friendſhip with him as the diſproportion between their ſtations would allow. There are ſtill ſeveral letters extant which paſſed between them, chiefly upon claſſical ſubjects. This worthy and accompliſhed nobleman died in February 1614.

In his friendſhip Prince Henry appears to have been very ſincere, and inviolably attached to thoſe whom he once patroniſed. He had a great regard for the unfortunate Lady Arabella Stewart, ſiſter of Henry Lord Darnley, the king's father; and there is ſtill extant a letter from this lady to the prince in return for ſome kindneſs he had beſtowed on a kinſman of hers at her recommendation. He expreſſed much compaſſion for her misfortunes; ſhe having excited the king's jealouſy on account of her marriage with Mr William Seymour, afterwards earl and marquis of Hertford, and reſtored in 1660 to the dukedom of Somerſet. But on her attempting to eſcape from the houſe in Highgate where ſhe was confined, and to go abroad with her huſband, his highneſs expreſſed ſome reſentment againſt her; though in all probability his apprehenſions, as well as thoſe of the king, were ill-founded.

As early as the year 1605, the prince, though then only in his 11th year, manifeſted his gratitude and attachment to thoſe who had ſerved him, in the inſtance of his tutor Mr Newton already mentioned. That gentleman had been promiſed by his majeſty the deanery of Durham upon the demiſe of the archbiſhop of York. On this promiſe Mr Newton had relied for two years; and as ſoon as the prelate died, his highneſs took care to put the king in mind of his promiſe; in conſequence of which, Mr Newton was inſtalled in his office on the 27th of September 1606.

Mr Pett, the gentleman who firſt inſtructed the prince in naval affairs, having been involved with many others in an enquiry concerning their conduct in their reſpective employments in the royal navy, the prince ſhowed a laudable deſire of protecting their innocence. The inquiry was ſet on foot by the earl of Northampton, lord privy ſeal and warden of the cinque ports, who had received a commiſſion from the king for the purpoſe. It was carried on by his agents, however, with ſuch violence and malice, as not only occaſioned great trouble and expence to the parties concerned, but almoſt ruined the navy, beſides augmenting his majeſty's expences much more than formerly. Mr Pett's trial began on the 28th of April 1609; at which time the reports being very favourable to him, the king determined to examine into the ſtate of the matter himſelf. For this purpoſe he went to Woolwich on the 8th of May, attended by the prince; and appointed Sir Thomas Chaloner, his highneſs's governor, and Sir Henry Briggs then profeſſor of geometry in Greſham college, to decide the controverſy which was then agitated about the proportion of the ſhips. The meaſurers declared in favour of Mr Pett; on which the prince exclaimed, "Where be now thoſe perjured fellows, that dare thus to abuſe his majeſty with falſe informations? Do they not worthily deſerve hanging?" During the whole time he ſtood near Mr Pett to encourage him; and when the king declared himſelf ſatisfied of his innocence, the prince took him up from his knees, expreſſing his own joy for the ſatisfaction which his father had received that day; proteſting that he would not only countenance Mr Pett for the future, but provide for him and his family as long as he lived. Henry.

The courage, intrepid diſpoſition, and martial turn of this prince, were manifeſt from his infancy. It is related of Alexander the Great, that at a very early period of his life he ſhowed more ſkill than all his father's grooms in the breaking of his favourite horſe Bucephalus. An anecdote ſomewhat ſimilar is recorded of Prince Henry. He was hardly ten years of age, when he mounted a very high-ſpirited horſe, in ſpite of the remonſtrances of his attendants; ſpurred the animal to a full gallop; and having thoroughly wearied him, brought him back at a gentle pace, aſking his ſervants at his return, "How long ſhall I continue in your opinion to be a child?" From the very firſt time that he embarked on board the ſmall veſſel formerly mentioned, he continued to pay the utmoſt attention to naval affairs. In Auguſt 1607, he viſited the royal navy at Woolwich, where he was received by Mr Pett, and conducted aboard the Royal Anne, where he had 31 large pieces of ordnance ready to be fired. This was done unexpectedly as ſoon as the prince reached the poop; at which he expreſſed great ſatisfaction. After viſiting the dock-yard, and ſurveying what was done of a ſhip then building for himſelf, he went aſhore, and having partaken of an entertainment prepared for him by Mr Pett, he was by him conducted to the mount, where the ordnance were again charged and ready to be placed for firing. The prince inſiſted upon an immediate diſcharge, but ſuffered himſelf to be perſuaded againſt it by Mr Pett's repreſentation of the danger of firing ſo many ordnance loaded with ſhot while his highneſs ſtood cloſe by: on a ſignal given by him, however, by holding up his handkerchief, after he had removed to a proper diſtance with his barge, the ordnance were diſcharged as he had deſired. In his 16th year he paid ſeveral viſits to Woolwich, in order to ſee the above-mentioned ſhip which was building for himſelf. When finiſhed, it was the largeſt that had ever been ſeen in England: the keel being 114 feet in length, and the croſs-beam 44 feet; carrying 64 pieces of great ordnance; the burden about 1400 tons; and the whole curiouſly ornamented with carving and gilding. His highneſs having received this ſhip in a preſent from his majeſty, went to ſee it launched on the 24th of September 1609. The narrowneſs of the dock, however, having prevented its being done at that time, the prince, who ſtaid behind the reſt of the company in order to prepare for the ceremony next morning, returned by three o'clock through a ſtorm of rain, thunder, and lightning; and ſtanding on the poop while the ſhip was launched, gave it the name of the *Prince Royal*.

In 1611 his highneſs made a private viſit to Chatham,

Henry. tham, where he firſt went on board the Prince Royal, and afterwards from ſhip to ſhip; informing himſelf particularly of every thing of moment relating to the ſtate of all the different ſhips, and even pinnaces lying there at that time. Next day he went by water up to Stroud; where, contrary to all the remonſtrances of his attendants, he cauſed the ordnance to be ſhot over his barge. From Stroud he went to Graveſend, where the magiſtrates received him with a diſcharge of all their ſmall arms and the ordnance of the block-houſes.

About the middle of January 1612, Prince Henry ordered all his majeſty's maſter-ſhipwrights and builders to attend him to conſider of a propoſition concerning the building of ſhips in Ireland made by a Mr Burrel. Some of his propoſitions were, that he ſhould build any ſhip from 100 to 600 tons, with two decks and an half, at the rate of five pounds per ton; that he would build any ſhip from 600 to 1000 tons, with three whole decks, at the rate of ſeven pounds per ton; that he ſhould build a ſhip of 600 tons within a certain time, &c. Mr Pett was employed to ſee that this contract was fulfilled on the part of Mr Burrel. Among the prince's papers, a liſt of the royal navy was found after his death, with an account of all the expences of fitting out, manning, &c. which muſt now be accounted a valuable addition to the naval hiſtory of thoſe times. His paſſion for naval affairs naturally led him to a deſire of making geographical diſcoveries; of which, however, only two inſtances have reached our times. One was in 1607, when he received from Mr Tindal his gunner, who had been employed by the Virginia company, a draught of James's river in that country, with a letter dated 22d June the ſame year. In this letter Mr Tindal remarks, that his fellow-adventurers had diſcovered that river; and that no Chriſtian had ever been there before; that they were ſafely arrived and ſettled; that they found the country very fruitful; and that they had taken a real and public poſſeſſion in the name and to the uſe of the king his highneſs's father. The other inſtance was in the year 1612, the ſame in which he died, when he employed Mr Thomas Button, an eminent mariner, to go in queſt of a north-weſt paſſage. Mr Button accordingly ſet ſail with two ſhips named the *Reſolution* and *Diſcovery;* the ſame deſignations with thoſe in which the late Captain Cook made his laſt voyage. Both of them were victualled for 18 months: but wintering in theſe northern regions, they did not return till after the prince's deceaſe, ſo that Captain Button was never ſent on another voyage: nevertheleſs, he returned fully convinced of the exiſtence of ſuch a paſſage; and even told the celebrated profeſſor Briggs of Greſham college, that he had convinced the king of his opinion.

The martial diſpoſition of the prince, which was conſpicuous on all occaſions, eminently diſplayed itſelf on the occaſion of his being inveſted in the principality of Wales and duchy of Cornwall, which took place in the year 1610. Previous to this ceremony, he, under the name and character of *Mæliades* lord of the iſles, cauſed a challenge to be given, in the romantic ſtyle of thoſe times, to all the knights in Great Britain. The challenge, according to cuſtom, was accepted; and on the appointed day, the prince, aſ-

Henry. ſiſted only by the duke of Lenox, the earls of Arundel and Southampton, Lord Hay, Sir Thomas Somerſet, and Sir Richard Preſton who inſtructed his highneſs in arms, maintained the combat againſt 56 earls, barons, knights and eſquires. Prince Henry himſelf gave and received 32 puſhes of the pike, and about 360 ſtrokes of ſwords, performing his part very gracefully, and to the admiration of all who ſaw him, he being not yet 16 years of age. Prizes were beſtowed upon the earl of Montgomery, Mr Thomas Darry, and Sir Robert Gordon, for their behaviour at this combat. The ceremony of inſtallation was performed on the 4th of June 1610, at which time every kind of magnificence that could be deviſed was diſplayed. Among other pageants uſed on this occaſion was that of Neptune riding on a dolphin and making ſpeeches to the prince; alſo of a ſea-goddeſs upon a whale. After the ceremony the prince took his place on the left hand of his majeſty; ſitting there in his royal robes, with the crown on his head, the rod in one hand, and in the other the patent creating him prince of Wales and duke of Cornwall. A public act was then read, teſtifying that he had been declared prince of Great Britain and Wales. He was afterwards ſerved at table with a magnificence not unworthy of royalty itſelf; the whole concluding with a grand maſquerade and tournament.

In one inſtance, the extreme deſire which Prince Henry had of being inſtructed in military affairs, carried him beyond thoſe bounds which European nations have preſcribed to one another. In 1607 the prince de Joinville, brother to the duke of Guiſe, came to England, having been obliged to leave France in conſequence of his having made love to the counteſs de Moret the king's miſtreſs. After having been for a few weeks magnificently entertained at court, he departed for France in the beginning of June. The prince took an opportunity of ſending to Calais in the train of the prince an engineer in his own ſervice, who took the opportunity of examining all the fortifications of the town, particularly thoſe of the Rix-Banc. This was diſcovered by the French ambaſſador, who immediately gave notice of it to court, but excuſed the prince, as ſuppoſing that what he had done was more out of curioſity than any thing elſe; and the court ſeemed to be of the ſame opinion, as no notice was ever taken of the affair, nor was the friendſhip between King Henry and the prince in the ſmalleſt degree interrupted. The martial diſpoſition of his highneſs was greatly encouraged by ſome people in the military line, who put into his hands a paper entitled "Propoſitions for War and Peace." Notwithſtanding this title, however, the aim of the author was evidently to promote war rather than peace; and for this the following arguments were uſed. 1. Neceſſity; for the preſervation of our own peace, the venting of factious ſpirits, and inſtructing the people in arms. 2. The benefits to be derived from the ſpoils of the enemy, an augmentation of revenue from the conquered countries, &c. This was anſwered by Sir Robert Cotton in the following manner. 1. That our wiſeſt princes had always been inclined to peace. 2. That foreign expeditions were the cauſes of invaſions from abroad, and rebellions at home, endleſs taxations, vaſſalage, and danger to the ſtate from the extent of territory, &c. It

Henry. does not appear, however, that the prince was at all moved by theſe pacific arguments: on the contrary, his favourite diverſions were tilting, charging on horſeback with piſtols, &c. He delighted in converſing with people of ſkill and experience in war concerning every part of their profeſſion; cauſed new pieces of ordnance to be made, with which he learned to ſhoot at a mark; and was ſo careful to furniſh himſelf with a breed of good horſes, that no prince in Europe could boaſt of a ſuperiority in this reſpect. He was ſolicited by Sir Edward Conway to direct his attention to the affairs of the continent, where Sigiſmund III. of Poland threatened, in conjunction with the king of Denmark, to attack Guſtavus Adolphus the young king of Sweden; but the death of the prince, which happened this year, prevented all interference of this kind.

To his other virtues Prince Henry added thoſe of frugality without avarice, and generoſity without extravagance. As early as the year 1605 he began to ſhow an attention to his intereſt as duke of Cornwall, and to take proper meaſures for ſecuring his revenues there. In 1610 he ſettled and appointed the officers of his houſehold, making his choice with the greateſt prudence, and giving orders for the management and regulation of his affairs with all the wiſdom and gravity of an old counſellor. Some lands were now allotted to him for his revenues; and inſtead of diminiſhing his income during the ſhort time he was in poſſeſſion of them, they were found at his death to be ſome thouſands of pounds better than when he obtained them. At this time he ſhowed much reluctance to gratify any of his ſervants except by promiſes, as not thinking himſelf yet authoriſed to give any thing away: but a ſhort time before his death, he conferred penſions on ſome of them; and there is no reaſon to doubt, that had his life been prolonged he would have rewarded them all according to their merit.

Though Prince Henry never interfered much in public buſineſs, yet in any little tranſactions he had of this kind, he always diſplayed great firmneſs and reſolution, as well as abſolute propriety of conduct. In a letter from Sir Alexander Seton, earl of Dunfermling, he is commended for the firmneſs and reſolution with which he repelled the calumnies of ſome who "had raſhly, and with the higheſt intemperance of tongue, endeavoured to wound the Scottiſh nation." By this he alluded to ſome very groſs and ſcurrilous invectives thrown out againſt the whole body of the Scots by Sir Chriſtopher Pigot, in a debate in the houſe of commons on an union between the two kingdoms. This gentleman declared his aſtoniſhment at the propoſal of uniting a good and fertile country to one poor, barren, and in a manner diſgraced by nature; and for aſſociating rich, frank, and honeſt men, with ſuch as were beggars, proud, and generally traitors and rebels to their kings; with many other ſhameful expreſſions of the ſame kind. His majeſty was highly offended with the whole council; and Sir Chriſtopher, after being obliged in parliament to retract his words, was expelled the houſe and impriſoned; in conſequence of which, the king was addreſſed by the ſtates of Scotland, who thanked him for the zeal he had manifeſted for the honour of their country. In another inſtance, where the prince wiſhed Mr Fullerton, a Scotſman, to ſuperſede Sir Robert Car, one of the attendants of his brother the duke of York, contrary to the inclination of the king and earl of Saliſbury, his highneſs carried his point, by perſuading Sir Robert of himſelf to give up the place in queſtion. Henry.

Under this year, 1611, the elegant Latin hiſtorian of Great Britain from 1572 to 1628, Robert Johnſton, places a ſtory, which, though unſupported by any authority but his own, and improbable in itſelf, muſt not be omitted here. The prince, according to this writer, requeſted the king that he might be appointed to preſide in the council. This demand was ſeconded by the king's favourite, Car Viſcount Rocheſter, who urged his majeſty to lay his ſon's requeſt before the council. But the earl of Saliſbury, jealous of the growing power of Rocheſter, and a thorough maſter of artifice and diſſimulation, uſed all his efforts to defeat whatever meaſures were propoſed by his rival: and being aſked ſoon after his opinion upon this point, whether it was for the public intereſt that the prince ſhould preſide in the council; anſwered, that he thought it dangerous to divide the government, and to inveſt the ſon with the authority of the father. Many others of the privy council having delivered their opinions on the ſame queſtion, that of the earl of Saliſbury was adopted by the majority. But his lordſhip ſoon took an opportunity, in a ſecret conference with the prince, to lament his own ſituation, and to perſuade his highneſs that Lord Rocheſter had the only influence in the palace, and privately counteracted all his deſigns. The prince, on his part, reſented the denial of his requeſt, and his excluſion from public buſineſs. It was not long before Lord Rocheſter diſcovered the earl of Saliſbury's practice againſt him with the prince; to whom he therefore went to clear himſelf. But his highneſs turned from him with great indignation, and would not hear his juſtification. The queen likewiſe, highly diſpleaſed with the viſcount, refuſed to ſee him, and ſought all means of leſſening his power. This forwardneſs imputed to the prince by the hiſtorian, in endeavouring to intrude himſelf into the management of public affairs, is not (as Dr Birch remarks) at all ſuitable to the character of his highneſs, or to any other accounts which we have of him; nor ought it to be believed upon the credit of a writer who cites no authority for it, nor indeed for ſcarce any other aſſertions in his hiſtory, how extraordinary ſoever they appear to be, and who frequently ventures to enlarge upon ſubjects which it was impoſſible for him to have known. However, it is not much to be doubted, that the prince had no great eſteem for Lord Rocheſter, whoſe riſe to the power of a favourite and a miniſter he ſo much diſliked, if we may believe a ſatirical writter of Memoirs †, that he was reported either to have ſtruck his lordſhip on the back with a racket, or very hardly forborne it. And another hiſtorian, not much leſs ſatirical, Arthur Wilſon ‡, mentions the bickerings betwixt the prince and the viſcount; and that Sir James Elphinſton obſerving his highneſs one day to be diſcontented with the viſcount, offered to kill him; for which the prince reproved him, and ſaid that if there were cauſe he would do it himſelf. But to wave ſuch very ſuſpicious authorities, it will be ſufficient, in order to judge of his highneſs's opinion of the viſcount, and his adminiſtration at the very height of it, to hear what himſelf ſays in a letter to Sir Thomas Edmondes of

† Francis Oſborne's *Traditional Memoirs on King James*, ſect. 38. p. 530.

† *Life and Reign of K. James I.*

Henry. of the 10th of September 1612; "As matters go now here, I will deal in no buſineſſes of importance for ſome reſpects."

It is not to be ſuppoſed but that the marriage of a prince ſo accompliſhed and ſo much admired would engage the attention of the public. This was indeed the caſe. The queen, who favoured the intereſt of Spain propoſed a match with the infanta, and the king of Spain himſelf ſeemed to be inclined to the match. In 1611 a propoſal was made for a double marriage betwixt the prince of Wales and the eldeſt daughter of the houſe of Savoy, and between the prince of Savoy and the lady Elizabeth; but theſe overtures were very coolly received, being generally diſagreeable to the nation. Sir Walter Raleigh, at that time priſoner in the Tower, wrote two excellent treatiſes againſt theſe matches; in one of which he ſtyles the prince *The moſt excellent and hopeful*, as he does alſo in the introduction to his Obſervations on the royal navy and ſea-ſervice. About the year 1612, his marriage became an object of general attention. In this affair the king ſeems to have inclined to match his ſon with the princeſs who promiſed to bring the largeſt dowry; the nation at large to have been influenced by motives of religion; and the prince himſelf to have remained entirely paſſive, and to have been willing to beſtow his perſon with the moſt perfect indifference on whatſoever princeſs ſhould be choſen for him. This appears from a letter to the king dated 5th October 1612, in which he conſiders the match with the ſecond princeſs of France as in a manner concluded. Propoſals had indeed been made of ſending her over to England for her education, ſhe being only nine years of age at that time; but Villeroy the French miniſter was of opinion, that this ought to be delayed for a year longer. The reaſons aſſigned by the prince for wiſhing her coming to England at that time were merely political: 1. Becauſe the French court, by having the princeſs in their power, might alter her mind as they pleaſed: 2. That there would thus be a greater likelihood of converting her to the Proteſtant religion; and 3. That his majeſty's credit would be better preſerved when both daughters (the eldeſt being promiſed to the prince of Spain) ſhould be delivered at the ſame time, though the concluſion of the one marriage might be much later than of the other. With regard to the exerciſe of her religion, the prince expreſſed himſelf rather in ſevere terms, wiſhing his majeſty only to allow her to uſe it in "her moſt private and ſecret chamber." He then argues with the moſt philoſophic indifference of the propriety of a match with the French princeſs rather than with one of the houſe of Savoy: concluding at laſt in the following words; "If I have incurred in the ſame error that I did laſt by the indifference of my opinion, I humbly crave pardon of your majeſty, holding it fitter for your majeſty to reſolve what courſe is moſt convenient to be taken by the rules of the ſtate, than for me who am ſo little acquainted with ſubjects of that nature: and beſides, your majeſty may think, that my part to play, which is to be in love with any of them, is not yet at hand." On the whole, it appeared, that there never was any real deſign in the king or prince to bring this matter to a concluſion; and that the propoſal had been made only with a view to break off the match of the eldeſt daughter with the prince of Spain, which could not Henry. now be done.

Prince Henry, notwithſtanding his indifference in matrimonial matters, applied himſelf with the utmoſt aſſiduity to his former employments and exerciſes, the continual fatigue of which was thought to impair his health. In the 19th year of his age his conſtitution ſeemed to undergo a remarkable change: he began to appear pale and thin, and to be more retired and ſerious than uſual. He complained now and then of a giddineſs and heavy pain in his forehead, which obliged him to ſtroke up his brow before he put on his hat: he frequently bled at the noſe, which gave great relief, though the diſcharge ſtopped ſome time before his death. Theſe forebodings of a dangerous malady were totally neglected both by himſelf and his attendants, even after he began to be ſeized at intervals with fainting fits. Notwithſtanding theſe alarming ſymptoms, he continued his uſual employments. On the arrival of Count de Naſſau in England, he waited upon him as though nothing had been the matter; and when the ſubject of the princeſs Elizabeth's marriage came to be canvaſſed, he intereſted himſelf deeply in the affair, and never deſiſted till the match with the elector palatine was concluded. In the beginning of June 1612, the prince went to Richmond, where he continued till the progreſs: and notwithſtanding the complaints above mentioned, he now took the opportunity of the neighbourhood of the Thames to learn to ſwim. This practice in an evening, and after ſupper, was diſcommended by ſeveral of his attendants; and was ſuppoſed to have ſtopped the bleeding at the noſe, from which he had experienced ſuch ſalutary effects. He could not, however, be prevailed upon to diſcontinue the practice; and took likewiſe great pleaſure in walking by the river ſide in moon-light to hear the ſound and echo of the trumpets, by which he was undoubtedly too much expoſed to the evening dews. Through impatience to meet the king his father, he rode 60 miles in one day; and having reſted himſelf during the night, he rode the next day 36 miles to Belvoir Caſtle, where he met the king at the time appointed. During the heat of the ſeaſon alſo he made ſeveral other fatiguing journeys, which muſt undoubtedly have contributed to impair his health. At the concluſion of the progreſs, he gave a grand entertainment to the court from Wedneſday till Sunday evening, when the king and queen with the principal nobility attended at ſupper. Next day he haſtened to his houſe at Richmond, where he expected the elector palatine, and began to give orders for his reception, alſo to take meaſures for rewarding his ſervants. To ſome of theſe he gave penſions, and promiſed to gratify the reſt as ſoon as poſſible. From this time, however, his health daily declined. His countenance became more pale, and his body more emaciated: he complained now and then of drowſineſs; which frequently made him aſk his attendants concerning the nature and cure of an epidemic fever, probably of the putrid kind, which at that time prevailed in England, and was ſuppoſed to have been brought thither from Hungary. He now began frequently to ſigh, as is uſual for perſons afflicted with diſorders of that kind. The malady increaſed in the beginning of October, though he uſed his utmoſt endeavours to

Henry. conceal it, and occupied himſelf as uſual; only that now, inſtead of riſing early in the morning as before, he would commonly keep his bed till nine. On the 10th of that month he had two ſlight fits of an ague, which obliged him to keep his chamber; and on the 13th his diſtemper ſeemed to be augmented by a violent diarrhœa, which, however, gave ſo much relief next day, that he inſiſted upon being removed from Richmond to St James's, in order to receive the elector palatine. On his arrival there, ſome of his attendants began to be alarmed by the ſigns of ſickneſs which appeared upon him, though he himſelf made no complaint, and even allowed his phyſician to go to his own houſe. The elector arrived on the 16th, and the prince waited upon him at Whitehall; but his diſeaſe had now gained ſo much ground, that his temper underwent a very conſiderable alteration, and he became peeviſh and diſcontented with almoſt every thing: nevertheleſs he ſtill continued to give orders about what related to the ceremony of his ſiſter's marriage; and kept company as much as he could with the elector and the count de Naſſau, with whoſe converſation he ſeemed to be particularly delighted. So great was his activity even at this time, that he played a match at tennis on the 24th of October. At this time he expoſed himſelf in his ſhirt, ſeemingly without any inconvenience; but at night he complained of a greater degree of laſſitude than uſual, and of a pain in his head. Next day, being Sunday, he attended divine ſervice, and heard two ſermons; after which he dined with his majeſty, ſeemingly with a good appetite, but the paleneſs and ghaſtly appearance of his countenance was much remarked. About three in the afternoon he was obliged to yield to the violence of his diſtemper; being ſeized with a great faintneſs, ſhivering, and headach, with other ſymptoms of a fever, which from that time never left him. Several phyſicians were called; but they differed much in their opinions, if indeed any agreement amongſt them, conſidering the ſtate of medicine at that time, could have been of ſervice. On the firſt of November he was blooded; an operation which Dr Butler one of his phyſicians had hitherto oppoſed, but now conſented to in compliance with his fellows. The impropriety of it was manifeſt by the thin and diſſolved ſtate of the blood which was taken away, and ſtill more by his becoming much worſe next day. As at that time the Peruvian bark, the great antidote in putrid diſeaſes, was unknown, and no proper methods of treatment ſeem to have been employed, it is not to be wondered that he ſunk under the diſeaſe. Among other abſurd remedies uſed on this occaſion was "a cock cloven by the back, and applied to the ſoles of his feet." He expired on the 6th of November 1612, at the age of 18 years 8 months and 17 days. On opening his body, the lungs were found black, ſpotted, and full of corrupted matter; the diaphragm was alſo thickened in many places; the blood-veſſels in the hinder part of the head were diſtended with blood, and the ventricles full of water: the liver was in ſome places pale and lead-coloured; the gall-bladder deſtitute of bile, and diſtended with wind; and the ſpleen in many places unnaturally black. His funeral was not ſolemnized till the 7th of December following. Many funeral ſermons were publiſhed in honour of him, and the two univerſities publiſhed collections of verſes on this occaſion. The moſt eminent poets of that age alſo exerted themſelves in honour of the deceaſed prince; particularly Donne, Brown, Chapman, Drummond of Hawthornden, Dominic Baudius of Leyden, &c. Henry.

His highneſs's family continued together at St James's till the end of December 1612, when it was diſſolved; and upon the day of their diſſolution, Mr Joſeph Hall, his chaplain, preached to them a moſt pathetic farewel ſermon on Revel. xxi. 3. In this he ſpeaks of his deceaſed maſter in the higheſt terms of commendation, as the glory of the nation, ornament of mankind, hope of poſterity, &c.; and that he, who was compounded of all lovelineſs, had infuſed an harmony into his whole family, which was "the moſt loving and entire fellowſhip that ever met in the court of any prince." The exhortation, with which the preacher concludes, is: "Go in peace, and live as thoſe that have loſt ſuch a maſter, and as thoſe that ſerve a maſter whom they cannot loſe."

Prince Henry was of a comely ſtature, about five feet eight inches; of a ſtrong, ſtraight, well made body, with ſomewhat broad ſhoulders and a ſmall waiſt; of an amiable and majeſtic countenance: his hair of an auburn colour; he was long-faced, and had a broad forehead, a piercing eye, a moſt gracious ſmile, with a terrible frown. He was courteous, loving, and affable; naturally modeſt, and even ſhame-faced; moſt patient, which he ſhowed both in life and death; ſlow to anger, ſo that even when he was offended he would govern it and reſtrain himſelf to ſilence. He was merciful to offenders, after a little puniſhment to make them ſenſible of their faults. His ſentiments of piety were ſtrong and habitual; and his zeal for the intereſts of religion was ſuch, that he would, if he had lived, have uſed his endeavours for reconciling the diviſions among its profeſſors. He uſually retired three times a day for his private devotions, and was ſcarce once a month abſent from the public prayers, where his behaviour was highly decent and exemplary, and his attention to the preacher the moſt fixed imaginable. He had the greateſt eſteem for all divines whoſe characters and conduct correſponded with their profeſſion; but could not conceal his indignation againſt ſuch as acted inconſiſtently with it, and he above all things abhorred flattery and vain-glory in them. He had a thorough deteſtation for popery, though he treated thoſe of that religion with great courteſy; ſhowing, that his hatred was not levelled at their perſons, but their opinions. And he was ſo immoveable in his attachment to the Proteſtant religion, that not long before his death, as Sir Charles Cornwallis * aſſures us, he made a ſolemn proteſtation that he would never join in marriage with one of a different faith.

The prince was ſo exact in all the duties of filial piety, and bore ſo true a reverence and reſpect for the king his father, that though ſometimes, out of his own inclination, or by the excitement of others, he moved his majeſty in ſome things relating to the public, or his own particular intereſts, or thoſe of others; yet upon the leaſt word or look or ſign given him of his majeſty's diſapprobation, he would inſtantly deſiſt from purſuing the point, and return either with ſatisfaction upon finding it diſagreeable to the king, or with ſuch a reſolved patience that he neither in word nor action gave ſo much as any appearance

* *Diſcourſe of the moſt illuſtrious Prince Henry, by Sir Charles Cornwallis*, printed in the *Harleian Miſcellany*, vol. iv. p. 320.

Henry. pearance of being diſpleaſed or diſcontented. He adhered ſtrictly to juſtice on all occaſions; and never ſuffered himſelf to determine raſhly, or till after a due examination of both parties. This love of juſtice ſhowed itſelf very early by favouring and rewarding thoſe among his pages and other young gentlemen, placed about him, who, by men of great judgment, were thought to be of the beſt behaviour and moſt merit. And when he was but a little above five years of age, and a ſon of the earl of Mar, ſomewhat younger than himſelf, falling out with ſome of his highneſs's pages, did him ſome wrong, the prince reproved him for it, ſaying, "I love you, becauſe you are my lord's ſon, and my couſin: but if you be not better conditioned, I will love ſuch a one better;" naming the child who had complained of him. He was of ſingular integrity, and hated flattery and diſſimulation: the latter of which he eſteemed a baſe quality, eſpecially in a prince: nor could he ever conſtrain himſelf to treat thoſe kindly who did not deſerve his love. A nobleman in the higheſt favour with the king, had written to him, by ſpecial command of his majeſty, a letter, wherein he recommended to his highneſs a matter of very great conſequence, to be inſtantly anſwered; and in his ſubſcription had uſed theſe words, "Yours before all the world." His highneſs directed Sir Charles Cornwallis to draw up an anſwer, who, having written it, added ſome words of favour to the nobleman to precede the prince's ſigning. His highneſs having read and conſidered the letter, allowed it entirely without alteration: But with regard to the words of ſubſcription, notwithſtanding the great haſte which the diſpatch required, he ordered it to be new written, and the words objected to by him to be left out; alleging, that he to whom he wrote had dealt with him untruly and unfaithfully, and that his hand ſhould never affirm what his heart did not think. His temperance, except in the article of fruit, was as eminent as his abhorrence of vanity and oſtentation, which began to ſhow themſelves when he was very young. When he was taught to handle the pike, and his maſter inſtructed him both by word and example to uſe a kind of ſtateline ſs in marching and holding of his hand; though he learned all other things, he would not conform himſelf to that affected faſhion: and if ſometimes, upon earneſt intreaty, he offered to uſe it, he would laugh at himſelf, and preſently return to his own more modeſt and decent manner. And though he was a perfect maſter of dancing, he never practiſed it except when he was ſtrongly preſſed to it. The ſame modeſty appeared in whatever he ſaid or did: But it was no impediment to his generous and heroic diſpoſition, which made him perform all his exerciſes beſt before much company and the greateſt perſonages. His clothes were uſually very plain, except on occaſions of public ceremony, or upon receiving foreign ambaſſadors, when he would aſſume a magnificence of dreſs, and an air of majeſty, which immediately after he laid aſide. Having once worn a ſuit of Welſh frize for a conſiderable time, and being told that it was too mean for him, and that he ought not to keep even a rich ſuit ſo long; his anſwer was, that he was not aſhamed of his country cloth, and wiſhed that it would laſt for ever.

In quickneſs of apprehenſion and memory few of the ſame age ever went beyond this prince; and fewer ſtill Henry. in a right judgment of what he was taught. When he began to have ſome knowledge of the Latin tongue, being deſired to chooſe a motto out of ſeveral ſentences collected by his tutor for his uſe, after reading over many good ones, he pitched upon that of Silius Italicus, *Fax mentis honeſtæ gloria*. And being aſked by the king one day, which were the beſt verſes that he had learned in the firſt book of Virgil's Æneid, he anſwered theſe:

Rex erat Æneas nobis, quo juſtior alter
Nec pietate fuit, nec bello major & armis.

Reading likewiſe another verſe of the ſame poet,

Tros Tyriuſve mihi nullo diſcrimine agetur,

he ſaid he would make uſe of it with this alteration,

Anglus Scotuſve mihi nullo diſcrimine agetur.

Beſides his knowledge of the learned languages, he ſpoke the Italian and French; and had made a conſiderable progreſs in philoſophy, hiſtory, fortification, mathematics, and coſmography; in the two laſt of which he was inſtructed by that excellent mathematician Mr Edward Wright. He loved and endeavoured to do ſomewhat of every thing, and to be excellent in the moſt excellent. He greatly delighted in all rare inventions and arts, and military engines both at land and ſea; in ſhooting and levelling great pieces of ordnance; in the ordering and marſhalling of armies; in building and gardening; in muſic, ſculpture, and painting, in which laſt art he brought over ſeveral works of great maſters from all countries.

He had a juſt opinion of the great abilities of Sir Walter Raleigh; and is reported to have ſaid, that, "no king but his father would keep ſuch a bird in a cage." And it is affirmed, that his highneſs, but a few months before his death, obtained the lands and caſtle of Sherburn in Dorſetſhire, the confiſcated eſtate of Sir Walter, with an intention of returning it to him. That eminent writer, ſoldier, and ſtateſman, had a reciprocal regard for the prince, to whom he had deſigned to addreſs a diſcourſe, "Of the Art of War by Sea," which his highneſs's death prevented the author from finiſhing. He had written likewiſe to the prince another "Diſcourſe of a Maritimal Voyage, with the paſſages and incidents therein:" But this has never yet appeared in print. He had alſo intended, and, as he expreſſes it, hewn out a ſecond and third volume of his General Hiſtory, which were to have been directed to his highneſs: "but it has pleaſed God (ſays he) to take that glorious prince out of this world, to whom they were directed; whoſe unſpeakable and never-enough lamented loſs hath taught me to ſay with Job, *Verſa eſt in luctum cithara mea, & organum meum in vocem flentium.*"

In the government of his houſehold and management of his revenues, though he was ſo very young, his example deſerved to be imitated by all other princes. He not only gave orders, but ſaw almoſt every thing done himſelf: ſo that there were ſcarce any of his domeſtics whom he did not know by name. And among theſe there was not one even ſuſpected papiſt; his directions being very peremptory for ſetting down the names of all communicants, that he might know if there

Henry. there were any of his family who did abſent themſelves from the communion. His family was large, conſiſting of few leſs than 500, many of them young gentlemen born to great fortunes, in the prime of their years, when their paſſions and appetites were ſtrong, their reaſon weak, and their experience little. But his judgment, the gravity of his princely aſpect, and his own example, were ſufficient reſtraints upon them; his very eye ſerved inſtead of a command; and his looks alone had more effect than the ſharpeſt reprehenſions of other princes. If any diſputes or conteſts aroſe among his ſervants, he would put a ſtop to them at the beginning, by referring them to ſome of his principal officers, whom he thought moſt intelligent in points of that nature, and to underſtand beſt what compenſation was due to the injured, and what reproof to the offender; ſo that in ſo numerous a family there was not ſo much as a blow given, nor any quarrel carried to the leaſt height.

Though he loved plenty and magnificence in his houſe, he reſtrained them within the rules of frugality and moderation, as we have already noticed. By this economy he avoided the neceſſity of being rigid to his tenants, either by raiſing their farms or fines, or ſeeking or taking advantage of forfeitures. Nor was he tempted to make the profit which both law and right afforded him, of ſuch who had in the time of former princes purchaſed lands belonging to his duchy of Cornwall, which could not by law be alienated from it; for he gave them, upon reſuming theſe lands, a reaſonable ſatisfaction. Neither did his economy reſtrain him from being liberal where merit or diſtreſs called for it; at the ſame time he was never known to give, or even promiſe, any thing, but upon mature deliberation. Whatever abuſes were repreſented to him, he immediately redreſſed, to the entire ſatisfaction of the perſons aggrieved. In his removal from one of his houſes to another, and in his attendance on the king on the ſame occaſions, or in progreſſes, he would ſuffer no proviſions or carriages to be taken up for his uſe, without full contentment given to the parties. And he was ſo ſolicitous to prevent any perſon from being prejudiced or annoyed by himſelf or any of his train, that whenever he went out to hawk before harveſt was ended, he would take care that none ſhould paſs through the corn; and, to ſet them an example, would himſelf ride rather a furlong about.

His ſpeech was ſlow, and attended with ſome impediment, rather, as it was conceived, by cuſtom and a long imitation of ſome who firſt inſtructed him, than by any defect of nature, as appeared from his having much corrected it by uſing at home amongſt his ſervants, firſt ſhort diſcourſes, and then longer, as he found himſelf enabled to do it. Yet he would often ſay of himſelf, that he had the moſt unſerviceable tongue of any man living.

He had a certain height of mind, and knew well how to keep his diſtance; which indeed he did to all, admitting no near approach either to his power or his ſecrets. He expreſſed himſelf, upon occaſions offered, to love and eſteem moſt ſuch of the nobility as were moſt anciently deſcended, and moſt nobly and honeſtly diſpoſed. He had an entire affection for his brother the duke of York, and his ſiſter Elizabeth; though ſometimes, by a kind of rough play with the former, and an appearance of contradicting the latter in what he Henry. diſcerned her to deſire, he took a pleaſure in giving them, in their tender years, ſome exerciſe of their patience. A writer * of leſs authority than Sir Charles Cornwallis, from the latter of whom we have theſe particulars, adds, that the prince ſeemed to have more affection for his ſiſter than his brother, whom he would often taunt till he made him weep, telling him that he ſhould be a biſhop, a gown being fitteſt to hide his legs, which were ſubject in his childhood to be crooked.

* Francis Oſborne, *Traditional Memoirs on the Reign of King James*, ſect. 45.

With regard to any unlawful paſſion for women, to the temptations of which the prince's youth and ſituation peculiarly expoſed him, his hiſtorian, who knew him, and obſerved him much, aſſures us, that having been preſent at great feaſts made in the prince's houſe, to which he invited the moſt beautiful ladies of the court and city, he could not diſcover by his highneſs's behaviour, eyes, or countenance, the leaſt appearance of a particular inclination to any one of them; nor was he at any other time witneſs of ſuch words or actions as could juſtly be a ground of the leaſt ſuſpicion of his virtue; though he obſerves, that ſome perſons of that time, meaſuring the prince by themſelves, were pleaſed to conceive and report otherwiſe of him. It is indeed aſſerted, by the writer of *Aulicus Coquinariæ*, believed upon good grounds to be William Saunderſon, Eſq. author of the "Complete Hiſtory of Mary Queen of Scotland, and her ſon and ſucceſſor King James," that the prince made court to the counteſs of Eſſex (afterwards divorced from the earl, and married to the viſcount Rocheſter), before any other lady then living. And Arthur Wilſon mentions the many amorous glances which the prince gave her, till diſcovering that ſhe was captivated with the growing fortunes of Lord Rocheſter, and grounded more hope upon him than the uncertain and hopeleſs love of his highneſs, he ſoon ſlighted her. The learned and pious antiquary, Sir Simonds D'Ewes, in a manuſcript life of himſelf written with his own hand, and brought down to the year 1637, is poſitive, that "notwithſtanding the ineſtimable Prince Henry's martial deſires and initiation into the ways of godlineſs, the counteſs, being ſet on by the earl of Northampton her father's uncle, firſt caught his eye and heart, and afterwards proſtituted herſelf to him, who firſt reaped the fruits of her virginity. But thoſe ſparks of grace which even then began to ſhow their luſtre in him, with thoſe more heroic innate qualities derived from virtue, which gave the law to his more adviſed actions, ſoon raiſed him out of the ſlumber of that diſtemper, and taught him to reject her following temptations with indignation and ſuperciliouſneſs." But theſe authorities, Dr Birch obſerves, ought to have little weight to the prejudice of the prince's character, againſt the direct teſtimony in his favour from ſo well informed a writer as Sir Charles Cornwallis.

The immature death of the prince concurring with the public apprehenſions of the power of the papiſts, and the ill opinion which the nation then had of the court, gave immediate riſe to ſuſpicions of its being haſtened by poiſon. And theſe ſuſpicions were heightened by the very little concern ſhown by ſome perſons in great ſtations. "To tell you (ſays Richard earl of Dorſet in a letter to Sir Thomas Edmondes, of the

Henry. 23d of November 1612) that our rising sun is set ere scarcely he had shone, and that with him all our glory lies buried, you know and do lament as well as we, and better than some do, and more truly; or else you are not a man, and sensible of this kingdom's loss." And it is certain, that this loss made so little impression upon the king and his favourite, that the lord viscount Rochester on the 9th of November, three days after it, wrote to Sir Thomas Edmondes to begin a negociation for a marriage between Prince Charles and the second daughter of France. But the ambassador, who had more sense of decency, thought it improper to enter upon such an affair so soon after the late prince's death. Mr Beaulieu, secretary to Sir Thomas Edmondes, in a letter of the 12th of November 1612, to Mr Trumbull, then resident at Brussels, after styling the prince "the flower of his house, the glory of his country, and the admiration of all strangers, which in all places had imprinted a great hope on the minds of the well affected, as it had already stricken terror into the hearts of his enemies," adds, "who perhaps (for of this lamentable accident we have yet no particular relation) fearing the growing virtues of that young prince, have used the traiterous venom of their abominable practices to cut him off in his youth. And this I do not apprehend without cause, considering the several advertisements which I saw a month ago coming out of England, Holland, and Calais, of strange rumours which were in these parts, of some great and imminent practice in hand, for the success whereof it was written, that in some places our adversaries had made solemn prayers: and out of Calais it was especially advertised, that in your parts they were in expectation of the death of some great prince. But, alas! we did little apprehend, that such ominous prognostications would have lighted upon the person of that vigorous young prince, whose extraordinary great parts and virtues made many men hope and believe, that God had reserved and destined him, as a chosen instrument, to be the standard-bearer of his quarrel in these miserable times, to work the restoration of his church, and the destruction of the Romish idolatry.

With the above notion his royal highness's mother the queen was peculiarly impressed, according to Dr Welwood; who, in his Notes on Arthur Wilson's Life of King James I. in the Complete History of England, p. 714. informs us, though without giving any authority, that when the prince fell into his last illness, the queen sent to Sir Walter Raleigh for some of his cordials, which she herself had taken some time before in a fever with remarkable success. Raleigh sent it, together with a letter to the queen, wherein he expressed a tender concern for the prince; and, boasting of his medicine, stumbled unluckily upon an expression to this purpose, "that it would certainly cure him or any other of a fever, except in case of *poison*." As the prince took this medicine, and died notwithstanding its virtues, the queen, in the agony of her grief, showed Raleigh's letter; and laid so much weight on the expression about poison, that as long as she lived she could never be persuaded but that the prince had died by that means. Sir Anthony Weldon * suggests that the prince was poisoned. The fame notion is countenanced by Wilson in his History †; and was adopted by Dr Welwood, as already mentioned: Who likewise, in another work, his *Memoirs*, after styling the prince "the darling of mankind, and a youth of vast hopes and wonderful virtues," remarks, that it was the general rumour at the time of his death, that his highness was poisoned; and that there is in print a sermon preached at St James's upon the dissolution of his family, that boldly insinuated some such thing. By this sermon Dr Welwood must mean that of Mr Hall cited above; in which, however, at least as it is reprinted in the London edition of his works in 1617, in folio, there is not to be found any expression that carries the least insinuation of that kind. The writer of the memoirs adds, that Sir Francis Bacon, in his speech at the trial of the earl of Somerset, had some reflections upon the intimacy of that lord with Sir Thomas Overbury, which seemed to point that way; there being several expressions left out of the printed copy that were in the speech. Bishop Burnet likewise tells us, that he was assured by Colonel Titus, that he had heard King Charles I. declare, that the prince his brother was poisoned by the means of the viscount Rochester, afterwards earl of Somerset. But it will be perhaps sufficient to oppose to all such suggestions the unanimous opinion of physicians who attended the prince during his sickness, and opened his body after his death; from which, as Dr Welwood himself observes, there can be no inference drawn that he was poisoned. To which may be added the authority of Sir Charles Cornwallis ‡, who was well informed, and above all suspicion in this point, and who pronounces the rumours spread of his highness's having been poisoned vain; and was fully convinced that his death was natural, and occasioned by a violent fever.

Henry.

* *Court and Character of K. James*, p. 77. 78.

† P. 62. 63.

‡ *Life and Death of Henry*, p. 81, 82.

Henry, *Philip*, a pious and learned nonconformist minister, was the son of Mr John Henry, page of the back-stairs to James duke of York, and was born at Whitehall in 1631. He was admitted into Westminster school at about 12 years of age; became the favourite of Dr Bushby, and was employed by him, with some others, in collecting materials for the Greek grammar he afterwards published. From thence he removed to Christ-church, Oxford; where, having obtained the degree of master of arts, he was taken into the family of Judge Puleston, at Emeral in Flintshire, as tutor to his sons, and to preach at Worthenbury. He soon after married the only daughter and heiress of Mr Daniel Matthews of Broad-oak near Whitchurch, by whom he became possessed of a competent estate. When the king and episcopacy were restored, he refused to conform, was ejected, and retired with his family to Broad-oak: here, and in the neighbourhood, he spent the remainder of his life, about 28 years, relieving the poor, employing the industrious, instructing the ignorant, and exercising every opportunity of doing good. His moderation in his nonconformity was eminent and exemplary; and upon all occasions he bore testimony against uncharitable and schismatical separation. In church-government he wished for Archbishop Usher's reduction of episcopacy. He thought it lawful to join in the common prayer in public assemblies; which, during the time of his silence and restraint, he commonly attended with his family with reverence and devotion.

Henry, *Matthew*, an eminent dissenting minister and author, was the son of the former, and was born in

Henry. in the year 1662. He continued under his father's care till he was 18 years of age; in which time he became well ſkilled in the learned languages, eſpecially in the Hebrew, which his father had rendered familiar to him from his childhood; and from firſt to laſt the ſtudy of the Scriptures was his moſt delightful employment. He completed his education in an academy kept at Iſlington by Mr Doolittle, and was afterwards entered in Gray's Inn for the ſtudy of the law; where he became well acquainted with the civil and municipal law of his own country, and from his application and great abilities it was thought he would have become very eminent in that profeſſion. But at length, reſolving to devote his life to the ſtudy of divinity, in 1685 he retired into the country, and was choſen paſtor of a congregation at Cheſter, where he lived about 25 years, greatly eſteemed and beloved by his people. He had ſeveral calls from London, which he conſtantly declined; but was at laſt prevailed upon to accept an unanimous invitation from a congregation at Hackney. He wrote, 1. Expoſitions of the Bible, in 5 vols. folio. 2. The life of Mr Philip Henry. 3. Directions for daily communion with God. 4. A method for prayer. 5. Four diſcourſes againſt vice and immorality. 6. The communicant's companion. 7. Family hymns. 8. A ſcriptural catechiſm. And 9. A diſcourſe concerning the nature of ſchiſm. He died of an apoplexy at Nantwich, when upon a journey, in 1714; and was interred at Trinity church in Cheſter.

HENRY, *Dr Robert*, author of the "Hiſtory of Great Britain, written on a new plan," was the ſon of James Henry farmer at Muirtown in the pariſh of St Ninian's, North Britain, and of Jean Galloway daughter of ——— Galloway of Burrowmeadow in Stirlingſhire. He was born on the 18th of February 1718; and having early reſolved to devote himſelf to a literary profeſſion, was educated firſt under a Mr John Nicolſon at the pariſh-ſchool of St Ninians, and for ſome time at the grammar-ſchool of Stirling. He completed his courſe of academical ſtudy at the univerſity of Edinburgh, and afterwards became maſter of the grammar-ſchool of Annan. He was licenſed to preach on the 27th of March 1746, and was the firſt licentiate of the preſbytery of Annan after its erection into a ſeparate preſbytery. Soon after, he received a call from a congregation of Preſbyterian diſſenters at Carliſle, where he was ordained in November 1748. In this ſtation he remained 12 years, and on the 13th of Auguſt 1760 became paſtor of a diſſenting congregation in Berwick upon Tweed. Here he married, in 1763, Ann Balderſton daughter of Thomas Balderſton ſurgeon in Berwick; by whom he had no children, but with whom he enjoyed to the end of his life a large ſhare of domeſtic happineſs. He was removed from Berwick to be one of the miniſters of Edinburgh in November 1768; was miniſter of the church of the New Grey Friars from that time till November 1776; and then became colleague-miniſter in the Old church, and remained in that ſtation till his death. The degree of Doctor in Divinity was conferred on him by the univerſity of Edinburgh in 1770; and in 1774 he was unanimouſly choſen moderator of the general aſſembly of the church of Scotland, and is the only perſon on record who obtained that diſtinction the firſt time he was a member of aſ- Henry. ſembly.

From theſe facts, which contain the outlines of Dr Henry's life, few events can be expected to ſuit the purpoſe of the biographer. Though he muſt have been always diſtinguiſhed among his private friends, till he was tranſlated to Edinburgh he had few opportunities of being known to the public. The compoſition of ſermons muſt have occupied a chief part of his time during his reſidence at Carliſle, as his induſtry in that ſtation is known to have rendered his labours in this department eaſy to him during the reſt of his life. But even there he found leiſure for other ſtudies; and the knowledge of claſſical literature, in which he eminently excelled, ſoon enabled him to acquire an extent of information which qualified him for ſomething more important than he had hitherto in his view.

Soon after his removal to Berwick, he publiſhed a ſcheme for raiſing a fund for the benefit of the widows and orphans of Proteſtant diſſenting miniſters in the north of England. This idea was probably ſuggeſted by the proſperity of the fund which had almoſt 30 years before been eſtabliſhed for a proviſion to miniſters widows, &c. in Scotland. But the ſituations of the clergy of Scotland were very different from the circumſtances of diſſenting miniſters in England. Annuities and proviſions were to be ſecured to the families of diſſenters, without ſubjecting the individuals (as in Scotland) to a proportional annual contribution, and without ſuch means of creating a fund as could be the ſubject of an act of parliament to ſecure the annual payments. The acuteneſs and activity of Dr Henry ſurmounted theſe difficulties; and, chiefly by his exertions, this uſeful and benevolent inſtitution commenced about the year 1762. The management was entruſted to him for ſeveral years; and its ſucceſs has exceeded the moſt ſanguine expectations which were formed of it. The plan itſelf, now ſufficiently known, it is unneceſſary to explain minutely. But it is mentioned here, becauſe Dr Henry was accuſtomed in the laſt years of his life to ſpeak of this inſtitution with peculiar affection, and to reflect on its progreſs and utility with that kind of ſatisfaction which a good man can only receive from "the labour of love and of good works."

It was probably about the year 1763 that he firſt conceived the idea of his Hiſtory of Great Britain: a work already eſtabliſhed in the public opinion; and which will certainly be regarded by poſterity, not only as a book which has greatly enlarged the ſphere of hiſtory, and gratifies our curioſity on a variety of ſubjects which fall not within the limits preſcribed by preceding hiſtorians, but as one of the moſt accurate and authentic repoſitories of hiſtorical information which this country has produced. The plan adpoted by Dr Henry, which is indiſputably his own, and its peculiar advantages, are ſufficiently explained in his general preface. In every period, it arranges, under ſeparate heads or chapters, the civil and military hiſtory of Great Britain; the hiſtory of religion; the hiſtory of our conſtitution, government, laws, and courts of juſtice; the hiſtory of learning, of learned men, and of the chief ſeminaries of learning; the hiſtory of arts; the hiſtory of commerce, of ſhipping, of money or coin, and of the price of commodities; and the hiſtory of

Henry. of manners, virtues, vices, cuſtoms, language, dreſs, diet, and amuſements. Under theſe ſeven heads, which extend the province of an hiſtorian greatly beyond its uſual limits, every thing curious or intereſting in the hiſtory of any country may be comprehended. But it certainly required more than a common ſhare of literary courage to attempt on ſo large a ſcale a ſubject ſo intricate and extenſive as the hiſtory of Britain from the invaſion of Julius Cæſar. That Dr Henry neither over-rated his powers nor his induſtry, could only have been proved by the ſucceſs and reputation of his works.

But he ſoon found that his reſidence at Berwick was an inſuperable obſtacle in the minute reſearches which the execution of his plan required. His ſituation there excluded him from the means of conſulting the original authorities; and though he attempted to find acceſs to them by means of his literary friends, and with their aſſiſtance made ſome progreſs in his work, his information was notwithſtanding ſo incomplete, that he found it impoſſible to proſecute his plan to his own ſatisfaction, and was at laſt compelled to relinquiſh it.

By the friendſhip of Gilbert Laurie, Eſq. lord provoſt of Edinburgh, and one of his majeſty's commiſſioners of exciſe in Scotland, who had married the ſiſter of Mrs Henry, he was removed to Edinburgh in 1768; and it is to this event that the public are indebted for his proſecution of the Hiſtory of Great Britain. His acceſs to the public libraries, and the means of ſupplying the materials which theſe did not afford him, were from that time uſed with ſo much diligence and perſeverance, that the firſt volume of his Hiſtory in quarto was publiſhed in 1771, the ſecond in 1774, the third in 1777, the fourth in 1781, and the fifth (which brings down the Hiſtory to the acceſſion of Henry VII.) in 1785. The ſubject of theſe volumes comprehends the moſt intricate and obſcure periods of our hiſtory; and when we conſider the ſcanty and ſcattered materials which Dr Henry has digeſted, and the accurate and minute information which he has given us under every chapter of his work, we muſt have a high opinion both of the learning and induſtry of the author, and of the vigour and activity of his mind: eſpecially when it is added, that he employed no amanuenſis, but completed the manuſcript with his own hand; and that, excepting the firſt volume, the whole book, ſuch as it is, was printed from the original copy. Whatever corrections were made on it, were inſerted by interlineations, or in reviſing the proof ſheets. He found it neceſſary, indeed, to confine himſelf to a firſt copy, from an unfortunate tremor in his hand, which made writing extremely inconvenient, which obliged him to write with his paper on a book placed on his knee inſtead of a table, and which unhappily increaſed to ſuch a degree that in the laſt years of his life he was often unable to take his victuals without aſſiſtance. An attempt which he made after the publication of the fifth volume to employ an amanuenſis did not ſucceed. Never having been accuſtomed to dictate his compoſitions, he found it impoſſible to acquire a new habit; and though he perſevered but a few days in the attempt, it had a ſenſible effect on his health, which he never afterwards recovered.—An author has no right to claim indulgence, and is ſtill leſs intitled to credit, from the public for any thing which can be aſcribed to negligence in committing his manuſcripts to the preſs; but conſidering the difficulties which Dr Henry ſurmounted, and the accurate reſearch and information which diſtinguiſh his hiſtory, the circumſtances which have been mentioned are far from being unintereſting, and muſt add conſiderably to the opinion formed of his merit among men who are judges of what he has done. He did not profeſs to ſtudy the ornaments of language; but his arrangement is uniformly regular and natural, and his ſtyle ſimple and perſpicuous. More than this he has not attempted, and this cannot be denied him. He believed that the time which might be ſpent in poliſhing or rounding a ſentence, was more uſefully employed in inveſtigating and aſcertaining a fact: And as a book of facts and ſolid information, ſupported by authentic documents, his hiſtory will ſtand a compariſon with any other hiſtory of the ſame period.

Henry.

But Dr Henry had other difficulties to ſurmount than thoſe which related to the compoſition of his work. Not having been able to tranſact with the bookſellers to his ſatisfaction, the five volumes were originally publiſhed at the riſk of the author. When the firſt volume appeared, it was cenſured with an unexampled acrimony and perſeverance. Magazines, reviews, and even newſpapers, were filled with abuſive remarks and invectives, in which both the author and the book were treated with contempt and ſcurrility. When an author has once ſubmitted his works to the public, he has no right to complain of the *juſt* ſeverity of criticiſm. But Dr Henry had to contend with the inveterate ſcorn of malignity. In compliance with the uſual cuſtom, he had permitted a ſermon to be publiſhed which he had preached before the ſociety in Scotland for propagating Chriſtian knowledge in 1773; a compoſition containing plain good ſenſe on a common ſubject, from which he expected no reputation. This was eagerly ſeized on by the adverſaries of his Hiſtory, and torn to pieces with a virulence and aſperity which no want of merit in the ſermon could juſtify or explain. An anonymous letter had appeared in a newſpaper to vindicate the Hiſtory from ſome of the unjuſt cenſures which had been publiſhed, and aſſerting from the real merit and accuracy of the book the author's title to the approbation of the public. An anſwer appeared in the courſe of the following week, charging him, in terms equally confident and indecent, with having written this letter in his own praiſe. The efforts of malignity ſeldom fail to defeat their purpoſe, and to recoil on thoſe who direct them. Dr Henry had many friends, and till lately had not diſcovered that he had any enemies. But the author of the anonymous vindication was unknown to him, till the learned and reſpectable Dr Macqueen, from the indignation excited by the confident petulance of the anſwer, informed him that the letter had been written by him. Theſe anecdotes are ſtill remembered. The abuſe of the Hiſtory, which began in Scotland, was renewed in ſome of the periodical publications in South Britain; though it is juſtice to add (without meaning to refer to the candid obſervations of Engliſh critics), that in both kingdoms the aſperity originated in the ſame quarter, and that paragraphs and criticiſms written at Edinburgh were printed in London. The ſame

Henry. ſpirit appeared in Strictures publiſhed on the ſecond and third volumes; but by this time it had in a great meaſure loſt the attention of the public. The malevolence was ſufficiently underſtood, and had long before become fatal to the circulation of the periodical paper from which it originally proceeded. The book, though printed for the author, had ſold beyond his moſt ſanguine expectations; and had received both praiſe and patronage from men of the firſt literary characters in the kingdom: and though, from the alarm which had been raiſed, the bookſellers did not venture to purchaſe the property till after the publication of the fifth volume, the work was eſtabliſhed in the opinion of the public, and at laſt rewarded the author with a high degree of celebrity, which he happily lived to enjoy.

In an article relating to Dr Henry's life, not to have mentioned the oppoſition which his Hiſtory encountered, would have been both affectation and injuſtice. The facts are ſufficiently remembered, and are unfortunately too recent to be more minutely explained. That they contributed at firſt to retard the ſale of the work is undeniable, and may be told without regret now that its reputation is eſtabliſhed. The book has raiſed itſelf to eminence as a Hiſtory of Great Britain by its own merits; and the means employed to obſtruct its progreſs have only ſerved to embelliſh its ſucceſs.

Dr Henry was no doubt encouraged from the firſt by the decided approbation of ſome of his literary friends, who were allowed to be the moſt competent judges of his ſubject; and in particular by one of the moſt eminent hiſtorians of the preſent age, whoſe hiſtory of the ſame periods juſtly poſſeſſes the higheſt reputation. The following character of the firſt and ſecond volumes was drawn up by that gentleman, and is well intitled to be inſerted in a narrative of Dr Henry's life. "Thoſe who profeſs a high eſteem for the firſt volume of Dr Henry's hiſtory, I may venture to ſay, are almoſt as numerous as thoſe who have peruſed it, provided they be competent judges of a work of that nature, and are acquainted with the difficulties which attend ſuch an undertaking. Many of thoſe who had been ſo well pleaſed with the firſt were impatient to ſee the ſecond volume, which advances into a field more delicate and intereſting; but the Doctor hath ſhown the maturity of his judgment, as in all the reſt, ſo particularly in giving no performance to the public that might appear crude or haſty, or compoſed before he had fully collected and digeſted the materials. I venture with great ſincerity to recommend this volume to the peruſal of every curious reader who deſires to know the ſtate of Great Britain in a period which has hitherto been regarded as very obſcure, ill ſupplied with writers, and not poſſeſſed of a ſingle one that deſerves the appellation of a good one, It is wonderful what an inſtructive, and even entertaining, book the Doctor has been able to compoſe from ſuch unpromiſing materials: *Tantum ſeries juncturaque pollet.* When we ſee thoſe barbarous ages delineated by ſo able a pen, we admire the oddneſs and ſingularity of the manners, cuſtoms, and opinions, of the times, and ſeem to be introduced into a new world; but we are ſtill more ſurpriſed, as well as intereſted, when we reflect that thoſe ſtrange perſonages were the anceſtors of the preſent inhabitants of this iſland.—The object of an antiquary hath been commonly diſtinguiſhed from that of an hiſtorian; for though the latter ſhould enter into the province of the former, it is thought that it ſhould only be *quanto baſta*, that is, ſo far as is neceſſary, without comprehending all the minute diſquiſitions which give ſuch ſupreme pleaſure to the mere antiquary. Our learned author hath fully reconciled theſe two characters. His hiſtorical narrative is as full as thoſe remote times ſeem to demand, and at the ſame time his inquiries of the antiquarian kind omit nothing which can be an object of doubt or curioſity. The one as well as the other is delivered with great perſpicuity, and no leſs propriety, which are the true ornaments of this kind of writing. All ſuperfluous embelliſhments are avoided; and the reader will hardly find in our language any performance that unites together ſo perfectly the two great points of entertainment and inſtruction."—The gentleman who wrote this character died before the publication of the third volume.—The progreſs of his work introduced Dr Henry to more extenſive patronage, and in particular to the notice and eſteem of the earl of Mansfield. That venerable nobleman, who is ſo well intitled to the gratitude and admiration of his country, thought the merit of Dr Henry's hiſtory ſo conſiderable, that, without any ſolicitation, after the publication of the fourth volume he applied perſonally to his majeſty to beſtow on the author ſome mark of his royal favour. In conſequence of this, Dr Henry was informed by a letter from Lord Stormont, the ſecretary of ſtate, of his Majeſty's intention to confer on him an annual penſion for life of 100l. "conſidering his diſtinguiſhed talents and great literary merit, and the importance of the very uſeful and laborious work in which he was ſo ſucceſsfully engaged, as titles to his royal countenance and favour." The warrant was iſſued on the 28th of May 1781; and his right to the penſion commenced from the 5th of April preceding. This penſion he enjoyed till his death, and always conſidered it as inferring a new obligation to perſevere ſteadily in the proſecution of his work. From the earl of Mansfield he received many other teſtimonies of eſteem both as a man and as an author, which he was often heard to mention with the moſt affectionate gratitude. The octavo edition of his hiſtory, publiſhed in 1778, was inſcribed to his lordſhip. The quarto edition had been dedicated to the king. Henry.

The property of the work had hitherto remained with himſelf. But in April 1786, when an octavo edition was intended, he conveyed the property to Meſſrs Cadell and Strachan; reſerving to himſelf what ſtill remained unſold of the quarto edition, which did not then exceed eighty-one complete ſets. A few copies were afterwards printed of the volumes of which the firſt impreſſion was exhauſted, to make up additional ſets: and before the end of 1786, he ſold the whole to Meſſrs Cadell and Strachan. By the firſt tranſaction he was to receive 1000l. and by the ſecond betwixt 300l. and 400l.; about 1400l. in all. Theſe ſums may not be abſolutely exact, as they are ſet down from memory; but there cannot be a miſtake of any conſequence on the one ſide or the other. —Dr Henry had kept very accurate accounts of the ſales from the time of the original publication; and after

Henry || Hepar Sulphuris

ter his laſt tranſaction with Meſſrs Cadell and Strachan, he found that his real profits had amounted in whole to about 3300 pounds: a ſtriking proof of the intrinſic merit of a work which had forced its way to the public eſteem unprotected by the intereſt of the booksellers, and in ſpite of the malignant oppoſition with which the firſt volumes had to ſtruggle.

The proſecution of his hiſtory had been Dr Henry's favourite object for almoſt 30 years of his life. He had naturally a ſound conſtitution, and a more equal and larger portion of animal ſpirits than is commonly poſſeſſed by literary men. But from the year 1785 his bodily ſtrength was ſenſibly impaired. Notwithſtanding this, he perſiſted ſteadily in preparing his ſixth volume, which brings down the hiſtory to the acceſſion of Edward VI. The materials of this volume were left in the hands of his executors almoſt completed. Scarcely any thing remained unfiniſhed but the two ſhort chapters on arts and manners; and even for theſe he had left materials and authorities ſo diſtinctly collected, that there was no great difficulty in ſupplying what was wanting. This ſixth volume was publiſhed in the year 1793, with a life of the author prefixed; and it was found intitled to the ſame favourable reception from the public which had been given to the former volumes. It was written under the diſadvantages of bad health and great weakneſs of body. The tremulous motion of his hand had increaſed ſo as to render writing much more difficult to him than it had ever been; but the vigour of his mind and his ardour were unimpaired; and independent of the general character of his works, the poſthumous volume will be a laſting monument of the ſtrength of his faculties, and of the literary induſtry and perſeverance which ended only with his life.

Dr Henry's original plan extended from the invaſion of Britain by the Romans to the preſent times. And men of literary curioſity muſt regret that he did not live to complete his deſign; but he has certainly finiſhed the moſt difficult parts of his ſubject. The periods after the acceſſion of Edward VI. afford materials more ample, better digeſted, and much more within the reach of common readers.

Till the ſummer of 1790 he was able to purſue his ſtudies, though not without ſome interruptions. But at that time his health greatly declined; and, with a conſtitution quite worn out, he died on the 24th of November of that year, in the 73d year of his age.

HENTINGS, in *Agriculture*, a term uſed by the farmers for a particular method of ſowing before the plough. The corn being caſt in a ſtraight line juſt where the plough is to come, is by this means preſently ploughed in. By this way of ſowing they think they ſave a great deal of ſeed and other charge, a dexterous boy being as capable of ſowing this way out of his hat as the moſt ſkilful ſeedſman.

HENTING is alſo a term uſed by the ploughmen, and others, to ſignify the two furrows that are turned from one another at the bottom, in the ploughing of a ridge. The word ſeems to be a corruption of ending, becauſe thoſe furrows made an end of ploughing the ridges. The tops of the ridges they call *veerings*.

HEPAR SULPHURIS, or *Liver of Sulphur*, a combination of alkaline ſalt and ſulphur. See SULPHURET, CHEMISTRY, N° 918 and 1029.

HEPATIC, in *Medicine* and *Anatomy*, any thing belonging to the liver.

Hepatic || Heptachord.

Hepatic Air, or *Sulphurated Hydrogen Gas*, a permanently elaſtic fluid of a very diſagreeable odour ſomewhat like that of rotten eggs. See CHEMISTRY, N° 442.

Hepatic Aloes, the inſpiſſated juice of a ſpecies of ALOE. See MATERIA MEDICA *Index*.

Hepatic Stone. See *Liver Stone*.

Hepatic Water. See SULPHUREOUS WATERS, CHEMISTRY, p. 706.

HEPATICA, a ſpecies of ANEMONE. See BOTANY *Index*.

HEPATITIS, in *Medicine*, an inflammation of the liver. See MEDICINE *Index*.

HEPATOSCOPIA, (formed of ἡπαρ, *liver*, and σκοπεω, *I conſider*), in antiquity, a ſpecies of divination, wherein predictions were made by inſpecting the livers of animals.

HEPATOSCOPIA is alſo uſed as a general name for divination by entrails.

HEPHÆSTIA, in Grecian antiquity, an Athenian feſtival in honour of Vulcan, the chief ceremony of which was a race with torches. It was performed in this manner: The antagoniſts were three young men, one of whom, by lot, took a lighted torch in his hand, and began his courſe; if the torch was extinguiſhed before he finiſhed the race, he delivered it to the ſecond; and he in like manner to the third: the victory was his who firſt carried the torch lighted to the end of the race; and to this ſucceſſive delivering of the torch we find many alluſions in ancient writers.

HEPHTHEMIMERIS (compoſed of ἑπτα, *ſeven*, ἡμισυς, *half*, and μερος, *part*), in the Greek and Latin poetry, a ſort of verſe conſiſting of three feet and a ſyllable; that is, of ſeven half feet.

Such are moſt of the verſes in Anacreon:

Θελω	λεγειν	Ατρει	δας
Θελω	δε Καδ	μον α	δειν, &c.

And that of Ariſtophanes, in his Plutus:

Επεσθε μητρι χοιροι.

They are alſo called *trimetri catalectici*.

HEPHTHEMIMERIS, or *Hephthemimeres*, is alſo a cæſura after the third foot; that is, on the ſeventh half-foot. It is a rule, that this ſyllable, though it be ſhort in itſelf, muſt be made long on account of the cæſura, or to make it an *hephthemimeris*. As in that verſe of Virgil,

Et furiis agitatus amor, et conſcia virtus.

It may be added, that the cæſura is not to be on the fifth foot, as it is in the verſe which Dr Harris gives us for an example:

Ille latus niveum molli fultus Hyacintho.

This is not a hephthemimeris cæſura, but a henneamimeris, i. e. of nine half feet.

HEPTACHORD, in the ancient poetry, ſignified verſes that were ſung or played on ſeven chords, that is, on ſeven different notes. In this ſenſe it was applied to the lyre when it had but ſeven ſtrings. One of the intervals is alſo called an *heptachord*, as containing

Heptagon taining the same number of degrees between the extremes.
||
Heraclea.

HEPTAGON, in *Geometry*, a figure consisting of seven sides and as many angles. In fortification, a place is termed a *heptagon*, that has seven bastions for its defence.

HEPTAGONAL NUMBERS, in *Arithmetic*, a sort of polygonal numbers, wherein the difference of the terms of the corresponding arithmetical progression is 5. One of the properties of these numbers is, that if they be multiplied by 40, and 9 be added to the product, the sum will be a square number.

HEPTANDRIA, in *Botany*, (from ἑπτα, *septem*, and ανηρ, *a man*); the seventh class in Linnæus's sexual method, consisting of plants with hermaphrodite flowers, which have seven stamina or male organs. See Classification under BOTANY.

HEPTANGULAR, in *Geometry*, an appellation given to figures which have seven angles.

HEPTARCHY (compounded of the Greek ἑπτα, "seven," and αρχη, *imperium*, "government"), a government composed of seven persons, or a country governed by seven persons, or divided into seven kingdoms.

The Saxon heptarchy included all England, which was cantoned out into seven independent petty kingdoms, peopled and governed by different clans and colonies, viz. those of Kent, the South Saxons, West Saxons, East Saxons, Northumberland, the East Angles, and Mercia. The heptarchy was formed by degrees from the year 455, when first the kingdom of Kent was erected, and Hengist assumed the title of king of Kent immediately after the battle of Eglesford; and it terminated in 827 or 828, when King Egbert reunited them into one, made the heptarchy into a monarchy, and assumed the title of king of England. It must be observed, however, that though Egbert became monarch of England, he was not perfectly absolute. The kingdom which he actually possessed consisted of the ancient kingdoms of Wessex, Sussex, Kent, and Essex, that had been peopled by Saxons and Jutes. As for the other three kingdoms, whose inhabitants were Angles, he contented himself with preserving the sovereignty over them, permitting them to be governed by kings who were his vassals and tributaries.

The government of the heptarchy, reckoning from the founding of the kingdom of Mercia, the last of the seven Anglo-Saxon kingdoms, lasted 243 years; but if the time spent by the Saxons in their conquests from the arrival of Hengist in 449 be added, the heptarchy will be found to have lasted 378 years from its commencement to its dissolution. The causes of the dissolution of the heptarchy were the great inequality among the seven kingdoms, three of which greatly surpassed the others in extent and power; the default of male heirs in the royal families of all the kingdoms, that of Wessex excepted; and the concurrence of various circumstances which combined in the time of Egbert.

HERACLEA, an ancient city of Turkey in Europe, and in Romania, with the see of an archbishop of the Grecian church, and a sea-port. It was a very famous place in former times, and there are still some remains of its ancient splendor. Theodore Lascaris took it from David Comnenus, emperor of Trebisond; when it fell into the hands of the Genoese, but Mahomet II. took it from them; since which time it has been in the possession of the Turks. It is near the sea. E. Long. 27. 58. N. Lat. 40. 59.

Heracleonites
||
Heraclidæ.

HERACLEONITES, a sect of Christians, the followers of Heracleon, who refined upon the Gnostic divinity, and maintained that the world was not the immediate production of the Son of God, but that he was only the occasional cause of its being created by the demiurgus. The Heracleonites denied the authority of the prophecies of the Old Testament, maintaining that they were mere random sounds in the air; and that St John the Baptist was the only true voice that directed to the Messiah.

HERACLEUM, MADNESS, or *hogweed*; a genus of plants belonging to the pentandria class; and in the natural method ranking under the 45th order, *Umbellatæ*. See BOTANY *Index*.

HERACLIDÆ, the descendants of Hercules, greatly celebrated in ancient history. Hercules at his death left to his son Hyllus all the rights and demands which he had upon the Peloponnesus, and permitted him to marry Iole as soon as he came of age. The posterity of Hercules were not more kindly treated by Eurystheus than their father had been, and they were obliged to retire for protection to the court of Ceyx, king of Trachinia. Eurystheus pursued them thither; and Ceyx, afraid of his resentment, begged the Heraclidæ to depart from his dominions. From Trachinia they came to Athens, where Theseus the king of the country, who had accompanied their father in some of his expeditions, received them with great humanity, and assisted them against their common enemy Eurystheus. Eurystheus was killed by the hand of Hyllus himself, and his children perished with him, and all the cities of the Peloponnesus became the undisputed property of the Heraclidæ. Their triumph, however, was short; their numbers were lessened by a pestilence; and the oracle informed them, that they had taken possession of the Peloponnesus before the gods permitted their return. Upon this they abandoned Peloponnesus, and came to settle in the territories of the Athenians, where Hyllus, obedient to his father's commands, married Iole the daughter of Eurytus. Soon after he consulted the oracle, anxious to recover the Peloponnesus; and the ambiguity of the answer determined him to make a second attempt. He challenged to single combat Atreus, the successor of Eurystheus on the throne of Mycenæ; and it was mutually agreed that the undisturbed possession of the Peloponnesus should be ceded to whosoever defeated his adversary. Echemus accepted the challenge for Atreus, and Hyllus was killed, and the Heraclidæ a second time departed from Peloponnesus. Cleodæus the son of Hyllus made a third attempt, and was equally unsuccessful; and his son Aristomachus some time after met with the same unfavourable reception, and perished in the field of battle. Aristodemus, Temenus, and Chresphontes, the three sons of Aristomachus, encouraged by the more expressive word of an oracle, and desirous to revenge the death of their progenitors, assembled a numerous force, and with a fleet invaded all Peloponnesus. Their expedition was attended with much success; and after some decisive battles, they became masters of all the peninsula. The recovery of the Peloponnesus by the descendants of Hercules

Heraclides ‖ Heraclius.

cules forms an intereſting epoch in ancient hiſtory, which is univerſally believed to have happened 80 years after the Trojan war, or 1199 years before the Chriſtian era. This conqueſt was totally atchieved about 120 years after the firſt attempt of Hyllus, who was killed about 20 years before the Trojan war. As it occaſioned a world of changes and revolutions in the affairs of Greece, inſomuch that ſcarce a ſtate or people but were turned upſide down thereby, the return of the Heraclidæ is the epocha of the beginning of profane hiſtory: all the time that preceded it is reputed fabulous. Accordingly, Ephorus, Cumanus, Caliſthenes, and Theopompus, only begin their hiſtories from hence.

HERACLIDES *of* PONTUS, a Greek philoſopher, the diſciple of Speuſippus, and afterwards of Ariſtotle, flouriſhed about 336 B. C. His vanity prompted him to deſire one of his friends to put a ſerpent into his bed juſt as he was dead, in order to raiſe a belief that he was aſcended to the heavens among the gods: but the cheat was diſcovered. All his works are loſt.

HERACLITUS, a famous Epheſian philoſopher, who flouriſhed about the 69th Olympiad, in the time of Darius Hyſtaſpes. He is ſaid to have continually bewailed the wicked lives of men, and, as often as he came among them, to have fallen a-weeping; contrary to Democritus, who made the follies of mankind a ſubject of laughter. He retired to the temple of Diana, and played at dice with the boys there; ſaying to the Epheſians who gathered round him, "Worſt of men, what do you wonder at! Is it not better to do thus than to govern you?" Darius wrote to this philoſopher to come and live with him; but he refuſed the offer: at laſt, out of hatred to mankind, he retired to the mountains, where he contracted a dropſy by living on herbs, which deſtroyed him at 60 years of age. His writings gained him ſo great reputation, that his followers were called *Heraclitians*. Laertius ſpeaks of a treatiſe upon nature, divided into three books, one concerning the univerſe, the ſecond political, the third theological. This book he depoſited in the temple of Diana; and it is ſaid, that he affected to write obſcurely, leſt it ſhould be read by the vulgar, and become contemptible. The fundamental doctrine of his philoſophy was, that fire is the principle of all things; and the ancient philoſophers have collected and preſerved admirable apophthegms of this philoſopher.

HERACLIUS, an eaſtern emperor, was deſcended from a Cappadocian family, who was ſent to ſubdue the tyrant Phocas, whom he totally vanquiſhed in 610. In conſequence of this victory, young Heraclius was raiſed to the throne by the ſuffrages of the ſenate and people. He confined Criſpus, the ſon-in-law of Phocas, in a monaſtery, whoſe defection had contributed to his ſucceſs. Having humbly requeſted peace from the Perſian monarch, who was extending his conqueſts all over the Aſiatic part of the empire, his exorbitant and unjuſt conditions ſo exaſperated Heraclius, that at once he ſtarted from inglorious eaſe to a conſpicuous hero, raiſed a conſiderable army by vaſt exertions, conquered the king of Perſia, and eſtabliſhed his winter-quarters on the banks of the Halys. He next year penetrated into the very heart of Perſia, and having reſiſted the attack of a threefold army of Perſians, he ſurpriſed the town of Salban.

Herald.

Another of his expeditions was againſt the Tigris, and he fought a battle near the ſite of the ancient Nineveh in 627, about the end of the year, at which time he gained a complete victory over the Perſians, having ſlain three of their chiefs with his own hand. He recovered 300 Roman ſtandards, and ſet a vaſt number of captives at liberty. In 628, he made the Perſian king put an end to the perſecution of the Chriſtians, renounce the conqueſts of his father upon the Roman empire, and reſtore the true croſs taken from Jeruſalem. When at Emeſa, he firſt heard of the name of Mahomet, who invited him to embrace his new faith, but without ſucceſs. He brought a reproach on his name by adhering to the doctrine of the Monothelites, but chiefly by eſpouſing his niece Martina for his ſecond wife, by whoſe influence he divided the ſucceſſion between Conſtantine and Heracleonas, his ſon by Martina. He fell into a dropſical complaint, by which he was carried off in the month of February 641, in the 31ſt year of his reign.

HERALD, ſays Verſtegan, is derived from the Saxon word *Herehault*, and by abbreviation *Heralt*, which in that language ſignifies the champion of an army; and, growing to be a name of office, it was given to him who, in the army, had the ſpecial charge to denounce war, to challenge to battle and combat, to proclaim peace, and to execute martial meſſages. But the buſineſs of heralds with us is as follows, viz. to marſhal, order, and conduct all royal cavalcades, ceremonies at coronations, royal marriages, inſtallations, creations of dukes, marquiſes, earls, viſcounts, barons, baronets, and dubbing of knights; embaſſies, funeral proceſſions, declarations of war, proclamations of peace, &c. To record and blazon the arms of the nobility and gentry; and to regulate any abuſes therein through the Engliſh dominions, under the authority of the earl marſhal, to whom they are ſubſervient. The office of Windſor, Cheſter, Richmond, Somerſet, York, and Lancaſter heralds, is to be aſſiſtants to the kings-at-arms, in the different branches of their office: and they are ſuperior to each other, according to creation, in the above order.

Heralds were formerly held in much greater eſteem than they are at preſent; and were created and chriſtened by the king, who, pouring a gold-cup of wine on their head, gave them the herald-name: but this is now done by the earl marſhal. They could not arrive at the dignity of herald without having been ſeven years purſuivant; nor could they quit the office of herald, but to be made king at arms.

Richard III. was the firſt who formed them, in this kingdom, into a college; and afterwards great privileges were granted them by Edward VI. and Philip and Mary.

The origin of heralds is very ancient. Stentor is repreſented by Homer as herald of the Greeks, who had a voice louder than 50 men together. The Greeks called them κηρυκες, and ιερηφυλακες; and the Romans, *feciales*. The Romans had a college of heralds, appointed to decide whether a war were juſt or unjuſt; and to prevent its coming to open hoſtilities, till all means had been attempted for deciding the difference in a pacific way.

HERALDRY,

HERALDRY,

Definition, origin, &c. of Heraldry.

A SCIENCE which teaches how to blazon, or explain in proper terms, all that belongs to coats-of-arms; and how to marſhal, or diſpoſe regularly, divers arms on a field. It alſo teaches whatever relates to the marſhalling of ſolemn cavalcades, proceſſions, and other public ceremonies at coronations, inſtallations, creations of peers, nuptials, chriſtening of princes, funerals, &c.

Arms, or coats-of-arms, are hereditary marks of honour, made up of fixed and determined colours and figures, granted by ſovereign princes, as a reward for military valour, a ſhining virtue, or a ſignal public ſervice; and which ſerve to denote the deſcent and alliance of the bearer, or to diſtinguiſh ſtates, cities, ſocieties, &c. civil, eccleſiaſtical, and military.

Thus heraldry is the ſcience, of which *arms* are the proper object; but yet they differ much both in their origin and antiquity. Heraldry, according to Sir George Mackenzie, "as digeſted into an art, and ſubjected to rules, muſt be aſcribed to Charlemagne and Frederick Barbaroſſa, for it did begin and grow with the feudal law." Sir John Ferne is of opinion, that we did borrow *arms* from the Egyptians; meaning, from their hieroglyphics. Sir William Dugdale mentions, that arms, as marks of honour, were uſed by great commanders in war, neceſſity requiring that their perſons ſhould be notified to their friends and followers. The learned Alexander Niſbet, in his excellent ſyſtem of heraldry, ſays, that arms owe their riſe and beginning to the light of nature, and that ſigns and marks of honour were made uſe of in the firſt ages of the world, and by all nations, however ſimple and illiterate, to diſtinguiſh the noble from the ignoble. We find in Homer, Virgil, and Ovid, that their heroes had divers figures on their ſhields, whereby their perſons were diſtinctly known. Alexander the Great, deſirous to honour thoſe of his captains and ſoldiers who had done any glorious action, and alſo to excite an emulation among the reſt, did grant them certain badges to be borne on their armour, pennons, and banners; ordering, at the ſame time, that no perſon or potentate, through his empire, ſhould attempt or preſume to give or tolerate the bearing of thoſe ſigns upon the armour of any man, but it ſhould be a power reſerved to himſelf; which prerogative has been claimed ever ſince by all other kings and ſovereign princes within their dominions.

After theſe and many other different opinions, all that can be ſaid with any certainty is, that in all ages, men have made uſe of figures of living creatures, or ſymbolical ſigns, to denote the bravery and courage either of their chief or nation, to render themſelves the more terrible to their enemies, and even to diſtinguiſh themſelves or families, as names do individuals. The famous C. Agrippa, in his treatiſe of the vanity of ſciences, cap. 81. has collected many inſtances of theſe marks of diſtinction, anciently borne by kingdoms and ſtates that were any way civilized, viz.

Hereditary Arms, &c.

The Egyptians	bore	an ox,
The Athenians	bore	an owl,
The Goths	bore	a bear,
The Romans	bore	an eagle,
The Franks	bore	a lion,
The Saxons	bore	a horſe.

The laſt is ſtill borne in the arms of his preſent Britannic majeſty. As to hereditary arms of families, William Camden, Sir Henry Spelman, and other judicious heralds, agree, that they began no ſooner than towards the latter end of the 11th century. According to Father Meneſtrier's opinion, a French writer whoſe authority is of great weight in this matter, Henry l'Oiſeleur (the Falconer) who was raiſed to the imperial throne of the Weſt in 920, by regulating tournaments in Germany gave occaſion to the eſtabliſhment of family-arms, or hereditary marks of honour, which undeniably are more ancient and better obſerved among the Germans than in any other nation. Moreover, this laſt author aſſerts, that with tournaments firſt came up coats-of-arms; which were a ſort of livery, made up of ſeveral liſts, fillets, or narrow pieces of ſtuff of divers colours, from whence came the feſs, the bend, the pale, &c. which were the original charges of family-arms; for they who never had been at tournaments, had not ſuch marks of diſtinction. They who inliſted themſelves in the Croiſades, took up alſo ſeveral new figures hitherto unknown in armorial enſigns; ſuch as alerians, bezants, eſcalop-ſhells, martlets, &c. but more particularly croſſes, of different colours for diſtinction's ſake. From this it may be concluded, that heraldry, like moſt human inventions, was inſenſibly introduced and eſtabliſhed; and that, after having been rude and unſettled for many ages, it was at laſt methodiſed, perfected, and fixed, by the Croiſades and tournaments.

Theſe marks of honour are called *arms*, from their being principally and firſt worn by military men at war and tournaments, who had them engraved, emboſſed, or depicted on ſhields, targets, banners, or other martial inſtruments. They are alſo called *coats-of-arms*, from the cuſtom of the ancients embroidering them on the coats they wore over their arms, as heralds do to this day.

Arms are diſtinguiſhed by different names, to denote the cauſes of their bearing; ſuch as,

ARMS

Of Dominion,	Of Patronage,
Of Pretenſion,	Of Family,
Of Conceſſion,	Of Alliance,
Of Community,	Of Succeſſion.

Arms of *dominion* or ſovereignty are thoſe which emperors, kings, and ſovereign ſtates, do conſtantly bear; being, as it were, annexed to the territories, kingdoms, and

Hereditary Arms, &c.

and provinces, they poſſeſs. Thus the three lions are the arms of England, the fleurs-de-lis thoſe of France, &c.

Arms of *pretenſion*, are thoſe of ſuch kingdoms, provinces, or territories, to which a prince or lord has ſome claim, and which he adds to his own, although the ſaid kingdoms or territories be poſſeſſed by a foreign prince or other lord. Thus the kings of England have quartered the arms of France with their own, ever ſince Edward III. laid claim to the kingdom of France, which happened in the year 1330, on account of his being ſon to Iſabella, ſiſter to Charles the Handſome, who died without iſſue.

Arms of *conceſſion* or augmentation of honour, are either entire arms, or elſe one or more figures, given by princes as a reward for ſome extraordinary ſervice. We read in hiſtory, that Robert Bruce, king of Scotland, allowed the earl of Wintoun's anceſtor to bear, in his coat-armour, a crown ſupported by a ſword, to ſhow that he, and the clan Seaton, of which he was the head, ſupported his tottering crown. Queen Anne granted to Sir Cloudeſly Shovel, rear-admiral of Great Britain, a cheveron between two fleurs-de-lis in chief, and a creſcent in baſe, to denote three great victories he had gained; two over the French, and one over the Turks.

Arms of *community*, are thoſe of biſhoprics, cities, univerſities, academies, ſocieties, companies, and other bodies corporate.

Arms of *patronage*, are ſuch as governors of provinces, lords of manors, patrons of benefices, &c. add to their family-arms, as a token of their ſuperiority, rights, and juriſdiction. Theſe arms have introduced into heraldry, caſtles, gates, wheels, ploughs, rakes, harrows, &c.

Arms of *family*, or *paternal arms*, are thoſe that belong to one particular family, that diſtinguiſh it from others, and which no perſon is ſuffered to aſſume without committing a crime, which ſovereigns have a right to reſtrain and puniſh.

Arms of *alliance*, are thoſe which families, or private perſons, take up and join to their own, to denote the alliances they have contracted by marriage. This ſort of arms is either impaled, or borne in an *eſcutcheon of pretence*, by thoſe who have married heireſſes.

Arms of *ſucceſſion*, are ſuch as are taken up by them who inherit certain eſtates, manors, &c. either by will, entail, or donation, and which they either impale or quarter with their own arms; which multiplies the titles of ſome families out of neceſſity, and not through oſtentation, as many imagine.

Theſe are the eight claſſes under which the divers ſorts of arms are generally ranged; but there is a ſort which blazoners call *aſſumptive arms*, being ſuch as are taken up by the caprice or fancy of upſtarts, though of ever ſo mean extraction, who, being advanced to a degree of fortune, aſſume them without a legal title. This, indeed, is a great abuſe of heraldry; and common only in Britain, for on the continent no ſuch practice takes place.

We now proceed to conſider the eſſential and integral parts of arms, which are theſe:

The ESCUTCHEON, The CHARGES,
The TINCTURES, The ORNAMENTS.

CHAP. I. *Of the Shield or Eſcutcheon.*

Of the Shield, &c.

THE *ſhield* or *eſcutcheon* is the field or ground whereon are repreſented the figures that make up a coat of arms: for theſe marks of diſtinction were put on bucklers or ſhields before they were placed on banners, ſtandards, flags, and coat-armour; and wherever they may be fixed, they are ſtill on a plane or ſuperficies whoſe form reſembles a ſhield.

Shields, in *Heraldry* called *eſcutcheons* or *ſcutcheons*, from the Latin word *ſcutum*, have been, and ſtill are, of different forms according to different times and nations. Among ancient ſhields, ſome were almoſt like a horſe-ſhoe, ſuch as is repreſented by n° 1. in the figure of Eſcutcheons; others triangular, ſomewhat rounded at the bottom, as n° 2. The people who inhabited Meſopotamia, now called *Diarbeck*, made uſe of this ſort of ſhield, which it is thought they had of the Trojans. Sometimes the ſhield was heptagonal, that is, had ſeven ſides, as n° 3. The firſt of this ſhape is ſaid to have been uſed by the famous triumvir M. Antony. That of knights-banneret was ſquare, like a banner, as n° 4. As to modern eſcutcheons, thoſe of the Italians, particularly of eccleſiaſtics, are generally oval, as n° 5. The Engliſh, French, Germans, and other nations, have their eſcutcheons formed different ways, according to the carver's or painter's fancy: ſee the various examples contained from n° 6—16 of the figure. But the eſcutcheon of maids, widows, and of ſuch as are born ladies, and are married to private gentlemen, is of the form of a lozenge: See n° 17—20. Sir George Mackenzie mentions one Muriel, counteſs of Strathern, who carried her arms in a lozenge, anno 1284, which ſhows how long we have been verſant in heraldry.

Plate CCLIV.

Armoriſts diſtinguiſh ſeveral parts or points in eſcutcheons, in order to determine exactly the poſition of the bearings they are charged with; they are here denoted by the firſt nine letters of the alphabet, ranged in the following manner:

A——*the dexter chief.*
B——*the* preciſe *middle chief*
C——*the ſiniſter chief.*
D——*the honour point.*
E——*the feſs point.*
F——*the nombril point.*
G——*the dexter baſe.*
H——*the middle* preciſe *baſe.*
I——*the ſiniſter baſe.*

The knowledge of theſe points is of great importance, and ought to be well obſerved, for they are frequently occupied with ſeveral things of different kinds. It is neceſſary to obſerve, that the dexter ſide of the eſcutcheon is oppoſite to the left hand, and the ſiniſter ſide to the right hand, of the perſon that looks on it.

CHAP. II. *Of Tinctures, Furs, Lines, and Differences.*

SECT. I. *Of Tinctures.*

BY *tinctures* is meant that variable hue of arms which is common both to ſhields and their bearings.

According

The Tinctures. According to the French heralds, there are but ſeven tinctures in armoury; of which two are metals, the other five are colours.

The Metals are,

Gold, Silver,	termed	*Or.* *Argent.*

The Colours are,

Blue, Red, Green, Purple, Black,	termed	*Azure.* *Gules.* *Vert.* *Purpure.* *Sable.*

When natural bodies, ſuch as animals, plants, celeſtial bodies, &c. are introduced into coats of arms, they frequently retain their natural colours, which is expreſſed in this ſcience by the word *proper*.

Beſides the five colours above mentioned, the Engliſh writers on heraldry admit two others, *viz.*

Orange, Blood-colour,	termed	*Tenny.* *Sanguine.*

But theſe two are rarely to be found in Britiſh bearings.

Theſe tinctures are repreſented in engravings and drawings (the invention of the ingenious Silveſter Petra Sancta, an Italian author of the 17th century) by dots and lines, as in fig. ii. n° 1—9.

Or is expreſſed by dots.

Argent needs no mark, and is therefore plain.

Azure, by horizontal lines.

Gules, by perpendicular lines.

Vert, by diagonal lines from the dexter chief to the ſiniſter baſe points.

Purpure, by diagonal lines from the ſiniſter chief to the dexter baſe points.

Sable, by perpendicular and horizontal lines croſſing each other.

Tenny, by diagonal lines from the ſiniſter chief to the dexter baſe points, traverſed by horizontal lines.

Sanguine, by lines croſſing each other diagonally from dexter to ſiniſter, and from ſiniſter to dexter.

Sir George M'Kenzie obſerves, that "ſome fantaſtic heralds have blazoned not only by the ordinary colours and metals, but by flowers, days of the week, parts of a man's body, &c. and have been condemned for it by the heralds of all nations. Yet the Engliſh have ſo far owned this fancy," (the moſt judicious of them, as Mr Cartwright and others, reprobate it as abſurd), "that they give it for a rule, that the coats of ſovereigns ſhould be blazoned by the planets, thoſe of noblemen by precious ſtones; and have ſuited them in the manner here ſet down:

Or	Topaz	Sol.
Argent	Pearl	Luna.
Sable	Diamond	Saturn.
Gules	Ruby	Mars.
Azure	Sapphire	Jupiter.
Vert	Emerald	Venus.
Purpure	Amethyſt	Mercury.
Tenny	Jacinth	Dragon's-head.
Sanguine	Sardonix	Dragon's-tail.

The Furs. "But I crave leave to ſay, that theſe are but mere fancies; and are likewiſe unfit for the art, for theſe reaſons: 1ſt, The French (from whom the Engliſh derive their heraldry, not only in principles, but in words of the French language) do not only not uſe theſe different ways of blazoning, but treat them *en ridicule*. 2dly, The Italian, Spaniſh, and Latin heralds uſe no ſuch different forms, but blazon by the ordinary metals and colours. 3dly, Art ſhould imitate nature; and as it would be an unnatural thing in common diſcourſe not to call red *red* becauſe a prince wears it, ſo it is unnatural to uſe theſe terms in heraldry. And it may fall out to be very ridiculous in ſome arms: for inſtance, if a prince had for his arms an *aſs couchant* under his burden *gules*, how ridiculous would it be to ſay he had an *aſs couchant Mars*?—A hundred other examples might be given; but it is enough to ſay, that this is to confound colours with charges, and the things that are borne with colours. 4thly, It makes the art unpleaſant, and deters gentlemen from ſtudying it, and ſtrangers from underſtanding what our heraldry is; nor could the arms of our princes and nobility be tranſlated in this diſguiſe into Latin or any other language. But that which convinces moſt that this is an error is, becauſe it makes that great rule unneceſſary, whereby colour cannot be put upon colour, nor metal upon metal; but this cannot hold but where metals and colours are expreſſed."

The Engliſh heralds give different names to the roundlet (N° 10), according to its colour. Thus, if it is

Or, Argent, Azure, Gules, Vert, Purpure, Sable, Tenny, Sanguine,	it is called a	*Bezant.* *Plate.* *Hurt.* *Torteau.* *Pompey.* *Golpe.* *Pellet.* *Orange.* *Guze.*

The French, and all others nations, do not admit ſuch a multiplicity of names to this figure; but call them *Bezants*, after an ancient coin ſtruck at Conſtantinople, once *Byzantium*, if they are Or and Torteaux; or of any other tincture, expreſſing the ſame.

Sect. II. *Of Furs.*

Furs repreſents the hairy ſkin of certain beaſts, prepared for the doublings or linings of robes and garments of ſtate: and as ſhields were anciently covered with furred ſkins, they are therefore uſed in heraldry not only for the linings of the mantles, and other ornaments of the ſhields, but alſo in the coats of arms themſelves.

There are three different kinds in general uſe, viz.

1. *Ermine;* which is a field argent, powdered with black ſpots, their tails terminating in three hairs. (Fig. ii. N° 11.)

2. *Counter-ermine*, where the field is ſable, and the powdering white. (N° 12.)

3. *Vair* (N° 15.), which is expreſſed by blue and white ſkins, cut into the forms of little bells, ranged in rows oppoſite to each other, the baſe of the white ones