DIAMONDS AND PRECIOUS STONES

BY

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F.R.G.S.

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AND PRECIOUS STONES:

THEIR

HISTORY, VALUE, AND DISTINGUISHING CHARACTERISTICS.

WITH SIMPLE TESTS FOR THEIR IDENTIFICATION.

BY

HARRY EMANUEL, F.R.G.S.

SECOND EDITION,

WITH A NEW TABLE OF THE PRESENT VALUE OF DIAMONDS.

LONDON:
JOHN CAMDEN HOTTEN, PICCADILLY.
1867.

PREFACE TO NEW EDITION

THE rapid exhaustion of the first edition, and the numerous demands for more copies, having proved to the Author that, contrary to his expectation, a plain and unvarnished statement of facts connected with precious stones has proved interesting—not only to the trader in gems, and to the amateur in mineralogy, but to the general public—he has been emboldened to publish another edition, in which he has made several important corrections and additions which have been necessitated by the course of events. The prediction of the *rise* in the value of diamonds has been verified, as will be seen by a comparison of the present table of values with that of the preceding edition—in spite of an unprecedented crisis and subsequent commercial depression, and notwithstanding the number of purchasers of gems must have been lessened by the ruin of the thousands of persons who, when making, according to their idea, a solid investment, were in fact only purchasing an unlimited liability. Notwithstanding this commercial crisis and depression, *the value of diamonds has steadily augmented.*

The Author has incurred considerable animosity in some quarters from 'having disclosed the secrets of the trade,' but he considered at the time, and still thinks, that to an honest dealer, knowledge on the part of the public is a benefit instead of an evil; and against those who bring a stigma on an honourable profession by unfair means, he is only too delighted to put the public on their guard. As stated in the first edition, this work has been written with no view to benefit the Author in any manner.

H. E.

Clarence Terrace, Regent's Park.
June 1867.

are numerous, and the task is apt to be little better than a farce. In default of more satisfactory work not a few unions fall back in the last resort on oakum-picking. One union, indeed, avoids the difficulty by making scarcely any attempt to get any work done at all.

In respect of the length of time worked, the out-door pauper has a distinct advantage over the ordinary workman. In no trade in London does a week's work consist of less than $52\frac{1}{2}$ hours' work. In no stone-yard does it imply more than 45, in the majority only 42 ; in several it is 36 ; in one union last winter it was actually 32. Moreover, carpenters or engineers have to be at work by 7 o'clock even in the coldest weather. The stone-yard never opens its gates till 8 ; and 8 30 or 9 is a still commoner hour. One union last winter only commenced operations at 10. The theory was excellent—namely, that the men would have had time to go round to seek employment before coming in. In practice, however, it was found a considerable convenience by the class of applicants who preferred to lie in bed till their wives had got the breakfast ready, and when the hour was altered to 9 a.m. the numbers promptly dropped to little more than half.

At this point the question will doubtless be asked—" How much does a man earn in a week ?" Strictly speaking, the answer is that he earns nothing. The task set him is not remunerative work at which he can earn wages, but merely a test to prove his sincerity. Accordingly, the relief given him depends not on the amount of work he has accomplished, but simply on his necessity as measured by the number of his family. A single man receives on the average, in money and food taken together, 3s. 9d., a man with a wife and three children 7s. 4d., and a man with a wife and six children 9s. 9d. It may be thought that this is too low, but it must be remembered, in the first place that no allowance is made for rent. If a man has not sufficient credit to be allowed to " run his rent" till he gets back into work, he is supposed to be a fit case for the workhouse rather than the stone-yard. Further, the scale for a man with a large family is only slightly below what the best class of workmen secure for themselves as " unemployed benefit" from their trade societies. If a mechanic can keep the wolf from the door on 12s., 9s. 9d. cannot be much too small for the applicants to the stone-yard, who are almost entirely unskilled labourers. But the scale given above is the average between two widely separate extremes, either of which it is difficult to justify. For example, a single man is expected to subsist for a week on 2s. 4d. at Rotherhithe; in Battersea he is allowed 5s. 6d. for the same period. Similarly 6s. 8d. will hardly suffice for a man with a wife and six children, but to judge by the standard just attempted

1867

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DIAMOND CUTTING.

TO THE EDITOR OF THE TIMES.

Sir,—My attention has been drawn to some statistics given in your paper of October 18 regarding the diamond cutting industry of Amsterdam. The public are probably not aware of the extent to which this interesting industry has been revived in London.

Nearly 200 years ago Englishmen were the finest diamond cutters in the world, and the trade was nearly all carried on in London, and at the present time old English cut diamonds will always fetch a very high price, as the cutting is still so much prized. Through religious persecution the cutters migrated to Amsterdam, where they have since remained. At the present time anyone visiting one of the largest diamond cutting factories in Amsterdam will be shown a model of the Koh-i-noor and told that it was cut and polished at their factory, when it is an undisputed fact that both Her Majesty the Queen and the late Prince Consort took so great an interest in the cutting that Messrs. Garrard, the Queen's jewellers, had a room specially fitted up for it to be cut in, and it was all done at Messrs. Garrard's present establishment in the Haymarket. The Duke of Wellington put the first facet on and Her Majesty and nearly all the members of the Royal Family assisted in putting on those most perfect facets that it now has; and there are at least 72 of them on the stone.

At the time that the African diamond fields were discovered there was only one diamond cutter in London. Dutchmen were accordingly engaged to work in London from Monday morning till Friday sunset, and they were to receive £10 per week each man. There was a very large supply of rough diamonds to be cut, so they struck several times successfully for higher wages. They would allow no person to be in the room that they worked in, being afraid the secrets of their art might be discovered. At last they demanded £18 per week each man, when they were discharged and English precious gem cutters were put at the work. At first they were only able after a deal of trouble to cut a class of diamond in one month which they could now cut in about four days. As soon as it was clearly proved that Englishmen had once more gained the art, the Worshipful Company of Turners had their attention called to it by their Past Masters, the late Professor Tennant, the Queen's Mineralogist, and Mr. John Jones. They at once decided to give English cutters every encouragement, and have, with the valuable assistance of the Baroness and Mr. Burdett-Coutts, who are both members of this company, offered money awards in competition against the Dutch for the best cut diamonds. After several contests the Englishmen gained the first prize and most of the others. Great credit and thanks are due to this company and the Baroness and Mr. Burdett-Coutts for giving such valuable assistance to this industry.

In 1869 there was only one diamond cutter in London, as I have already said. At the taking of the last census the census committee went to a lot of trouble to get the exact number of diamond cutters in London, and I gave them several foreign terms and their meanings that the men might give in describing their trade, but the return was not a success, as a great number of the men put down other trades. They nearly all have some other occupation which they can return to when a depression comes on in the diamond trade, but at the present time there are now a great number actually in full work.

Up to the end of 1885 out of four of the principal mines of South Africa—viz., Kimberley, De Beers, Bultfontein, and Du Toit's Pan, no less than 33 million carats of diamonds (or more than six-and-a-half tons' weight) have been extracted, realizing about £40,000,000. The diamonds now discovered are nearly all found in British possessions, viz., Africa and India. Mines are now being developed in New South Wales, and yet the vast majority of the stones are still sent to foreign countries to be cut and polished, which, I am sure, every Englishman will consider ought not to be, especially as we have so many good workmen with no employment. With the aid of the British public and the Press the trade could be developed into a very large and thriving industry,as not only is there an immense opening for men to cut and polish the large stones, but at the present time the supply of small brilliants to use as decorations round other gems, &c., is not equal to the demand. As one of the greatest secrets connected with the trade consists in the one word "patience," there is an immense field for the employment of women.

As a nation, the Americans are the finest judges of diamonds in the world. American buyers insist on getting the finest stones and the most perfect of cutting. India takes a very large quantity of the white stones, as the natives invest their capital in them as we do in stocks and shares, but they will not take yellow or coloured diamonds nor stones with flaws or specks in them. Russia takes the large and yellow stones. China has only lately opened up her country to the diamond trade,as until recently Chinese subjects were not allowed to decorate themselves with these magnificent gems, but just recently the Empress of China has broken through that custom by wearing at Court a very superb diamond necklet, so there is now a demand in that vast continent.

In the report you quoted were these words, "Besides Antwerp, the diamond industry is carried on extensively nowhere else." If that be so where does America go to for her finest cut diamonds? Well, I am very thankful to say, London. I believe the last official report published was that America took about £3,000,000 worth of cut diamonds annually from England.

It is a well known fact that where the British workman has mastered his art, no matter what art that may be, he is absolutely unsurpassed. We are actually at the present time permitting the diamond cutting industry to extend from Amsterdam to Antwerp, New York, and Paris, and even Switzerland is employing large numbers of both male and female workpeople in this art. It only requires a determined effort for us to regain it entirely as our own, and at the present time, I am glad to say, the serious attention of some of our leading men is occupied in trying to develop this industry. If any information with regard to this subject be required, I shall be most happy to give whatever I can, as it is a subject that I have studied with great interest for some years now.

In fairness to the British diamond industry, I sincerely hope you will not only let the public know these facts, but will also aid us in our endeavours to recover a lost trade.

I remain your obedient servant,

LEWIS ATKINSON, Manager of the British Diamond Industry exhibited in the Cape of Good Hope Court, Colonial and Indian Exhibition.

33, Brook-street, Grosvenor-square, W.

Alexandra, which turned out to be the Dreadnought engaging the Scout. A few minutes afterwards the latter was seen escaping towards the land. The Alexandra's men immediately stood to their guns; but as the armour-clad could not get within range she did not open fire. At a quarter past 6 the Scout turned round and made a dash at the flagship in the hope of being able to fire her torpedo before being put out of action. In this she failed, as both the Alexandra and Agamemnon opened a tremendous fire on her and claim to have "destroyed" her. The same fate is declared to have befallen the Dolphin and Albacore at the hands of the Dreadnought and Thunderer. When entering the channel the Commander-in-Chief observed the Polyphemus and detached the Dreadnought to "destroy" her and protect his rear. The "destruction" was completed by directing the whole of the ships to assemble outside the bay, where they were ordered into formation. The Admiral then entered the harbour at the head of the now combined forces and anchored off the town before noon. The final act of the manœuvres was an attack by a flotilla of eight torpedo-boats on the ships at anchor. This came off during the night of the 14th-15th of October. Several torpedoes were fired, none of which passed through the defence nets of the ships, which again justified the confidence placed in them as a protection to anchored ships. The advantage, or indeed the possibility, of using them by ships under way is more than doubtful. It is quite certain that to do so would be to resign all advantages due to superior speed, for they greatly reduce a ship's way through the water, and, consequently, put her at the mercy of a comparatively insignificant antagonist.

The completion of the manœuvres, which had now lasted from noon on Monday till near midnight on Friday, by no means indicated the finishing of the work. Ships had to be restored to their original trim; mines had to be raised and examined; electric cables had to be got on board, dried, and overhauled; search-light projectors, guns, signal establishments to be brought back to their ships; torpedo-boats to be refitted; and the blocked channel to be "swept." This meant a week of hard and incessant labour, which was greatly increased by the necessity of at the same time clearing store ships that had arrived from England with stores for the fleet. In his original memorandum his Royal Highness the Commander-in-Chief had pointed out that the lessons which it was hoped might be learnt from the manœuvres were :—1. The practicability of using mechanical mines for blockade. 2. If it is possible for cruisers to hang about outside a port for the purpose of laying these mines

exact number of diamond cutters in London, and I gave them several foreign terms and their meanings that the men might give in describing their trade, but the return

ADDITIONAL NOTES

ON

DIAMONDS.

THE KOH-I-NOOR, p. 79.

The important task of cutting this fine diamond was entrusted to Messrs. Garrard, of the Haymarket, London, who gave it into the hands of Mr. Coster, of Amsterdam.

THE POLAR STAR, p. 81.

It was purchased in 1845, by Messrs. Garrard, of Count Koutousoff; subsequently it was purchased by the Princess Tousoupoff, of St. Petersburgh, in whose possession it now remains. It weighs 40¼ carats.

THE SANCY DIAMOND, p. 83.

It was sold by Godoy, the Prince of Peace, who ruled Spain under Charles XIV. and Ferdinand VII., to Prince Demidoff, who has very recently parted with it to Sir Jamsetjee Jejeebhoy for £20,000.

VALUE OF DIAMONDS, p. 88.

The value here quoted for a one-carat stone is slightly incorrect. Such a stone is now worth £21, but a stone of five carats is not worth £525, which would be its value according to the rule laid down by Jeffries; it is worth actually about £350. 1867

Dresden Diamond, p. 85.

This fine diamond recently passed into the possession of a Parsee, who, it is said, has disposed of it to a native Indian prince.

Value of Diamonds, p. 90.

The present value of stones of the first quality, of a less weight than two grains, is from £10 10s. to £11 per carat; the second quality £9 per carat; the third £7 10s. per carat.

Prices of the Pearl, p. 200–201.

The values mentioned in the tables on the above pages have increased in the following manner since the publication of the first edition, two years since:—

	Value in 1865.		Value in 1867.
A pearl of 3 grains	12s. to 16s.	...	18s. to 20s.
" 4 "	22s. " 28s.	...	28s. " 35s.
" 5 "	35s. " 45s.	...	40s. " 50s.
" 6 "	55s. " 65s.	...	70s. " 80s.
" 8 "	90s. " 110s.	...	100s. " 120s.
" 10 "	£ 8 " £ 9	...	£10 " £11
" 12 "	12 " 15	...	14 " 16
" 14 "	15 " 18	...	18 " 20
" 16 "	20 " 30	...	20 " 30
" 18 "	30 " 40	...	30 " 40
" 20 "	40 " 50	...	40 " 50
" 24 "	60 " 72	...	60 " 72
" 30 "	80 " 100	...	80 " 100

Value of Brilliants, p. 93.

Since the first edition of this work appeared the value of brilliants has considerably increased, as the following table will show :—

	Value in 1865.		Value in 1867.
A brilliant weighing $\frac{2}{4}$ of a carat	£5 10	...	£6
" " $\frac{3}{4}$ "	9 10	...	11
" " 1 "	18 0	...	21
" " $1\frac{1}{4}$ " . . .	28 0	...	35
" " $1\frac{1}{2}$ "	38 0	...	45
" " $1\frac{3}{4}$ "	48 0	...	55
" " 2 "	65 0	...	80
" " $2\frac{1}{4}$ "	70 0	...	90
" " $2\frac{1}{2}$ "	88 0	...	110
" " $2\frac{3}{4}$ " . . .	100 0	...	120
" " 3 "	125 0	...	140
" " $3\frac{1}{4}$ "	135 0	...	150
" " $3\frac{1}{2}$ " . . .	150 0	...	175
" " $3\frac{3}{4}$ "	175 0	...	190
" " 4 "	220 0	...	220
" " $4\frac{1}{4}$ " .	230 0	...	240
" " $4\frac{1}{2}$ "	250 0	...	300
" " $4\frac{3}{4}$ "	280 0	...	330
" " 5 "	320 0	...	350

*** *The least defect, want of (or over) spread, or faintest tinge of any colour, reduces these values considerably.*

Jade, p. 210.

The ornamental objects in this substance which have come to Europe from Japan, are said to have been only manufactured there, as the stone is not a native of the island.

Doublet or Semi-Stone, p. 218.

A new species of fraud has lately been introduced by some unprincipled persons, which consists in using a plate stone, painted at the back, and then foiled. This is extremely difficult of detection, and the system cannot be too severely reprimanded; for although the practice of foiling stones of pale colour is universal, still, if the purchaser be warned that the stone *is foiled*, he knows what he is buying; but, by means of painting the stone, its natural colour is entirely disguised. A piece of crvstal may be, and often is, sold for a sapphire, topaz, amethyst, &c.

PREFACE.

THE object of the present work may be stated in a few words.

For many years the author has been a collector of the various scattered treatises which exist on the subject of Precious Stones. In all of these—whether English or French, German or Italian—he has failed to find that particular information, compact within a single volume, which is required by the inexperienced *purchaser* as well as the *trader*. Hints and rules of considerable value are to be met with here and there in different works, but these instructions are so buried in scientific disquisition, or lost amongst anecdotes and gossip, that for purposes of ready reference the books are almost valueless. By amateurs, as well as traders, he has often been asked for a manual or handbook upon the subject of Precious Stones, one giving advice and instructions for the buyer as well as the seller, but with the exception of Jeffries—now a century old, and out of date—there exists no such work in the English language.

In the following treatise, the author sets up no claim to literary or scientific skill; what he has done is merely to record his own experience with Precious Stones, adding those facts and instructions given in preceding works which seemed of special value. The work has been written in odd portions of time, taken up when a little leisure afforded opportunity, and laid aside when business compelled its relinquishment. The several sheets were printed off as written, and the author is sorry to find, from an examination just made, that many colloquialisms and trade technicalities have thus crept in. However, this much he can say in its favour, that no one fact or suggestion which he thought would be of the least value to the amateur or the trader, and which he was acquainted with, has been withheld. Compiled in the manner stated, and notwithstanding the absence of literary elegancies, the writer cannot but think his book will prove useful to the merchant, in supplying him without trouble with the distinguishing characteristics of each gem, and to the amateur as affording him simple and easy means for distinguishing the false from the real, and the valuable from the worthless.

To many persons, doubtless, a treatise upon the subject of Precious Stones may appear an unworthy, if not an idle task; but when the immense amount of capital, which lies dormant in the Imperial and Royal Treasuries, and in private hands, is considered, and when the fact is remembered that there is scarcely a home where jewels of one sort or another—all representing a money value—are not to be found, the subject assumes an importance, which it lacks at first sight. To the political economist, this hoarded and time-honoured wealth must possess a singular interest. Next to gold, any sudden and considerable check—whether in supply or demand—would be attended with startling consequences in the case of Precious Stones. In times of revolution and political trouble, jewels, from their extreme portability, have always risen in price: in Paris, during the great Revolution of 1789–96, diamonds doubled their previous value, and even now, in foreign countries, many personages of note make a practice of keeping them in their possession in case of emergency.

The historical outlines, the opinions of the ancients, together with what may be termed the Geography of Precious Stones, given under each division, were added more for the benefit of the general reader than for the amateur or trader. A recital of constituents, methods of polishing, with the characteristics of each stone, seemed such dry materials for an entire book, that he deemed it advisable to add historical and other particulars for the benefit of those who might desire information upon these matters. A great deal of curious as well as important matter regarding gems lies scattered in odd chapters of books of travel and in old Government Reports. A selection from such out-of-the-way sources has been included in the present treatise.

The author has endeavoured to give the approximate trade value of the various gems, but his readers must please remember that Precious Stones obey (although in a somewhat less degree) the same laws that regulate the price and value of every other commodity—those of supply and demand. Of late years, certainly, the tendency has been towards a rise, and from the influx of gold, and the increasing difficulty of finding gems, they appear likely to attain a still greater value, yet it is impossible to predict what changes may occur, or to fix a standard value to jewels any more than to any other articles of commerce. The average price of a carriage horse may, perhaps, be £80, yet one of extreme beauty or faultless action will probably realize £150, or even £200. So, though a fine diamond of one carat will ordinarily be bought for £18, still if it be a specimen stone it may realize £20 or £21. The value of extremely large stones is also, as may readily be supposed, somewhat arbitrary, for although Nature seems to produce them in comparatively regular proportion, *i. e.* the small ones in profusion, and the larger sizes in a progressively smaller number; still the number of persons able and willing to purchase them becomes extremely limited, and it is impossible at any time to predict the prices they may realize. For instance, the diamond called the Regent, belonging to the Crown Jewels of France, would, if estimated according to the system hitherto practised, be worth £175,000, yet if compelled to be sold it would be impossible to say what amount it might realize.

Coloured stones and pearls also, when of extraordinary beauty, size, or brilliancy, are worth, and will sell for, sums extravagant in proportion to the prices named; and the reason is obvious, for so soon as any stone surpasses in any marked degree the ordinary quality of that particular gem, it is removed from the common category, and its price will depend more upon the fancy of purchasers than on any system of valuation.*

* This remark also holds good with regard to diamonds when of a rare tint. £300 was lately paid for a diamond of a vivid green colour, weighing 4¾ grains, which, if perfectly white, would not, under any circumstances, have sold for more than £22.

liants' at present are universally worn, "roses" in general being only used where the space in the setting prohibits the introduction of the "brilliant" form. With regard to his tables of value, as he fixes the price of a perfectly white and spread brilliant of one carat at £8, and as now from £17 to £18 may be readily obtained for that size, no reliance can be placed upon them. The book was admirable for its day, but, like most other practical works, became an uncertain guide as values changed and fashions varied.

One remark the writer must make. When a merchant turns author, it is not unusual for some of his readers to conclude that business purposes or personal advantage induced him to take pen in hand; but this, the inquirer is very plainly assured, was not the reason of the present publication, or the intent of the compiler In all probability there may be found those in his profession who will unthinkingly blame him for making known what are usually deemed trade secrets; but he is confident that on reflection any such censure will be withdrawn, especially as no names are mentioned which can either injure or advantage; and in enabling the public to test by their own knowledge and observation the truth of the statements made to them, he does not surely render himself liable to reproof.

In the rendering of the several Eastern terms, and in the preparation of the Table of Comparative Translation in various Semitic languages of the Precious Stones mentioned in the Bible, the author has to acknowledge the valuable assistance he has received from the Rev. Mr. Loewe, one of our most accomplished Oriental scholars.

H E.

8, *Clarence Terrace, Regent's Park,*
June. 1865.

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APPENDIX.

INTRODUCTION.

BY precious gems are meant minerals remarkable for hardness, lustre, beauty of colour, transparency, or for the extreme rarity of their occurrence in nature, and which are used in personal ornaments, such as jewellery.

This definition excludes many gems so classed by mineralogists, but which have no commercial value, and many others that were prized by the ancients on account of the supernatural properties, and health-restoring charms they were supposed to possess, and which, if true, must have rendered them indeed precious and priceless to the possessor and wearer. The estimation in which these flowers of the mineral kingdom have been held from the very earliest ages, alike by the most refined and the most barbarous nations, is extraordinary, so that gems really seem to possess some occult charm which causes them to be coveted. The fixed, and, so to say, intrinsic value of jewels (coupled with their extreme portability), has always made them a favourite form of investment. In the French revolution of 1789, diamonds rose enormously in value, and, perhaps from the same causes, we observe a large increase in their price in the United States of America at the present time.

Precious stones are disseminated about the globe in profusion; they occur alike amid the torrid deserts of Africa and the icy steppes of Siberia; under the burning sun of India and Ceylon, and amidst the glaciers of Switzerland; in the beds of the mighty rivers of South America; in Germany, Spain, and even in our own land; generally in the midst of some substance or deposit differing entirely from them. The tropical countries, however, are far more prolific in this respect than the other parts of the globe: it would seem as if the countries where the sun shines with most splendour produce gems in greater quantities; and perhaps the volcanic changes to which they are subject may have something to do with the matter. They are found most generally in the older formations, such as granite, gneiss, etc., in the beds of rivers, where they have been brought by torrents, generally accompanied by the precious metals; and often various kinds of gems are found together. When we consider the wonderful combination of seemingly fortuitous circumstances which are required for the formation of these beautiful crystals, to give them the required transparency, brilliancy, and lustre, the freedom from defects and flaws, and the presence of the exact quantity of colouring matter to furnish the desired tint, it will be no matter of astonishment that they occur so seldom; and the idea that one day precious stones may become as plentiful as marble may be dismissed as groundless, when the numerous qualifications which are necessary for a stone to enter into this aristocratic and exclusive family are considered; for there must not only exist the crystallization to give the required form, but the hardness to allow of the proper polish and lustre, and the colouring matter to produce the desired hue; and should one of these requisites be wanting, the gem loses its value in the eye of the connoisseur.

The minerals which are the component parts of gems are plentiful throughout the globe; we can obtain magnesia, glucina, alumina, metallic oxides, etc., in profusion, and we can separate the gems themselves into their component parts; but, not all the researches of learned chemists, not all the accumulated science of the nineteenth century, has succeeded in wresting the secret from nature, or of producing them of any size or value by artificial means. The material of the diamond, for instance, "carbon," is found almost everywhere,—in the bread we eat, in the coal and wood we burn; uncrystallized, it is brittle and opaque, but when crystallized, is the hardest known substance, pure as the limpid stream, and shining with the greatest brilliancy when cut and polished; whilst the amorphous variety, *carbonate,* although of precisely the same composition, and of nearly equal specific gravity, is black and lustreless, and is degraded to the purpose of cutting and polishing other gems. Again, the emerald is composed of identically the same substances as the beryl, minus the required colouring matter; yet the emerald commands a large price, and the beryl is comparatively valueless. The amethyst and rock-crystal are exactly the same substance, except that one is white and the other coloured; the amethyst, when of fine quality, has considerable value, rock-crystal very little. The oriental topaz and the ruby are the same stones, but of different colour; yet the value of the ruby surpasses that of the topaz a hundredfold.

In fact, precious stones must not only have the desired colour, but the exact hue and shade in demand to obtain the extreme value. No matter how brilliant the ruby, or how free from defects and flaws, it must have the precise pigeon's-blood-red to make it the gem which surpasses the diamond in value.

Almost all gems conceal their true beauties in a natural state. The diamond in the rough is most unattractive, and would be thrown away by a casual observer as a worthless pebble; its perfections are hidden under a hard crust, which can only be removed by its own powder. The deep velvety hue of the sapphire, the glowing brilliant red of the ruby, the soft clear green of the emerald, and the delicate strata of the onyx, alike only display themselves in their true character after the lapidary has exhausted his skill in cutting them into facets and polishing them; and on the perfection of this operation depends in a great measure the beauty of the gem. It may be here observed, that many pure and perfect jewels have been irretrievably spoilt by unskilful hands.

THE PROPERTIES AND CHARACTERISTICS OF PRECIOUS STONES.

Hardness.

BY the term hardness, must not be understood the ordinary acceptation of the word, "difficulty of breakage," but the scientific definition, namely, the resistance one body offers to the mechanical pressure of another, or, in other words, liability or non-liability to scratch. In the Table A. it will be seen that on the one side is given the mineralogical scale of hardness of Moh, the German author, who has taken ten different substances as standards of various degrees, and classed them in numbers from one to ten; ten being the diamond, as the hardest-known body. On the other side, the substances which scratch one another are indicated, and as glass and quartz, or rock-crystal, are easily procured, and most precious stones are of equal or superior hardness, the gems are described as scratching, or being scratched by them.

This experiment can be tried upon cut stones, but it must be remembered that then, the mineral is not in its normal state, and presents different surfaces to those offered by nature in the rough crystals, and, in some instances, one part of a stone, from some extraneous cause—such as flaws or imperfect crystallization—is softer than the other.

In direct proportion to the hardness of a crystallized mineral is its susceptibility of receiving and retaining a good polish, which is the principal cause of the superior brilliancy and beauty of jewels over all other natural ornaments worn as decorations. It is this hardness, also, that preserves gems from the effects of time so visible on all other works of nature and art—in ancient architectural remains, statuary, and paintings, the original beauties of which have faded away; whereas jewels of the same date have been handed down from generation to generation, forming links in the history of man which might otherwise have been lost for ever. The gems found in the catacombs of Egypt, the buried cities of Pompeii and Herculaneum, and elsewhere, have not been without their uses to the student of history.

Lustre.

By lustre is meant the peculiar kind of brilliancy which precious stones possess, and which is called by various names, corresponding to the appearances presented

The various kinds of lustre have been classed by mineralogists under the following heads :—

Adamantine—possessing the brilliancy of the diamond.
Vitreous—resembling the surface of glass.
Resinous—shining as if rubbed with an oily substance.
Pearly—exhibiting the peculiar lustre of a pearl.
Silky—having a fibrous reflection similar to silk.

Other substances have a lustre called metallic, but it is not named here, as it is not possessed by any precious stone. It must be remembered that in classifying the various kinds of lustre by these names, the nomenclature is only general, and must be taken as describing as approximately as possible the peculiar appearance of each kind.

Colour.

Although gems differ from each other in colour, still this forms a very imperfect test of their identity with any particular class. Gems differing from each other in hardness, specific gravity, etc., have frequently the same colour. The ruby, the spinelle, and the garnet, are often met with of exactly similar tints. On this qualification, as much as on any other, depends the commercial value of a precious stone; and none of the other characteristics, such as form, brilliancy, or purity, are of any avail if the colour be not of the required hue.

The colouring matter in gems is generally found to arise from the presence of various metallic oxides, otherwise they would be like rock-crystal. Sometimes the colour which tinges the whole mass is found to arise from a small speck of colouring matter, which is only apparent when held in a particular manner against the light, and which is turned to account by the lapidary, who diffuses the colour by means of repeated internal reflection throughout the whole mass. The colours of precious stones are the most brilliant with which we are acquainted in nature, and approach more nearly than those of any other known bodies to those exhibited by the solar spectrum.

The colour of a gem frequently changes its commercial name. The red sapphire is a ruby; the yellow a topaz; the white emerald is a beryl; the green chrysolite is called a peridot; and quartz changes its name and value as the colours which tint it differ.

Gems are also found, which not only show gradations of the same colour, but two or even three different colours in the same specimen; this is frequently the case with oriental sapphires, which have been found coloured red, blue, and yellow in the same crystal, and in tourmalines, which are also found parti-coloured in the most eccentric manner.

The asteroids, or star-stones, are gems that emit a variable lustre, which seems generally to proceed from some crystallographic imperfection; their reflections often take the form of a four- or six-pointed star, and are particularly observable by sun- or gaslight.

In some gems, the colour by reflected or by transmitted light, differs; that is to say, they show a different colour when looked through or looked at. The opal and tourmaline are instances of this fact.

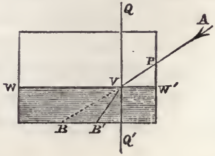
Optical Qualities.

Precious stones are eminently endowed with several of those physical properties which belong to that extensive class denominated optical. Of these, the most important to the subject, and which at the same time serve in many cases as tests of individuality, are single and double refraction and polarization of light, and a short description of them may prove serviceable. In proof of the importance of this branch of the subject, it may here be stated, that the high refractive power of the diamond led the illustrious Newton to the conclusion of its combustibility, a fact verified by subsequent experiments.

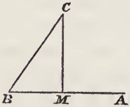
By refractive power is meant the property inherent in all transparent substances of altering the direction of a ray of light, impinging on their surfaces.

Single Refraction.

When a ray of light falls obliquely on the surface of any transparent body, it is bent or refracted from its original course, and proceeds in another direction. Thus, suppose a closed box—



having a small hole at P. Let A be a luminous point, as a candle. Then the light proceeding from it would, if the box were empty, go on in a right line to B. But let the box be filled with water up to the level *w w′*, then the ray falling on the water at V would not as before go on to B, but would be bent or refracted, and proceed to some other point, B′. If we draw a perpendicular to the surface of the water at V, then the angle A V Q is called the angle of incidence; the angle B′ V Q′ is called the angle of refraction. And between these two angles, or rather their sines, a certain relation or proportion holds, which relation is different for different transparent bodies, as water, glass, etc. To explain this relation, let A B C be any angle—



C M a perpendicular on one side of the angle, then the length of C M divided by C B is called the sine of the angle.

In the case of refraction this relation is such, that however the angle of incidence may vary, the sine of that angle (for the same substance) bears an invariable proportion to the sine of the angle of refraction, which is called the refractive index of that substance, and is usually indicated by the Greek letter μ; thus—

$$\frac{\text{Sin. angle incidence}}{\text{Sin. angle of refraction}} = \mu$$

It may moreover be remarked, as an almost general rule, that the value of μ is high in proportion to the density of the substance.

Double Refraction.

When a ray of light is transmitted through certain crystalline and other bodies, it becomes divided into two rays, which proceed in different directions within the crystal. Of these rays, one (the ordinary ray) follows the law of refraction given above, the other (the extraordinary ray) a different law. Such crystalline, etc., bodies are called doubly refractive; and it is found that the amount of double refraction—that is, the amount of separation of the two refracted rays—is dependent on the direction in which the light is transmitted through the crystal; and that in all substances there is at least one line along which the ray of light suffers no separation, and simply obeys the ordinary law: this line is called the axis of the crystal, or the axis of double refraction. This property is difficult of investigation in the ordinary forms in which precious stones are met with in commerce; a method of ascertaining it, which in many cases is convenient, is indicated at the end of the description of Polarization of Light.

Gems also possess the power of polarizing light, which may be thus explained:—

Polarization of Light.

When a ray of light falls on a plate of transparent glass inclined at an angle of about 56°, and after reflection therefrom falls on a second plate of glass at an angle of 56°, it will be found that when the second

plate C is horizontal like A, the ray will be reflected from C; but when the plate C, still preserving its inclination of 56°, is turned round so as to be vertical, the ray will no longer be reflected, and will disappear.

The ray after incidence on A is said to be polarized, the test of its polarization being that it refuses to be reflected from C when C is at a plane at right angles to the plane of incidence A.

The angle, 56°, by which light becomes polarized by incidence on glass is called the polarizing angle This angle is different for different bodies. The diamond is about 68°. Light may also be polarized by transmission through tourmaline, Iceland spar, or other double refracting bodies. To determine the polarizing angle of a body, we have only to reflect a ray of light from its surface at such an angle that it shall refuse to be reflected by a plate of glass inclined at an angle of 56°, and placed in a plane at right angles to the first plane of reflection, or that it shall incapable of transmission through a plate of tourmaline properly disposed. As alluded to before, double refraction may sometimes be conveniently determined from this property of light; for which purpose the substance to be examined should be interposed between the two reflecting plates, when so arranged that the original ray refuses to be reflected, in which case, should the body be doubly refracting, a position will be found in which a great portion of the previously intercepted light will be more or less transmitted. The refractive index of a body may also be ascertained from the polarizing angle by the following relation:—

$$\mu = \text{tan. polarizing angle.}$$

Specific Gravity.

By specific gravity is meant the proportion the weight of any body bears to an equal volume of water; that is to say, supposing four substances whose volume was so exactly equal as to fill exactly the same mould, and that each had different weight when weighed in the balance, then these different weights, considered in relation to a common term of comparison, would signify the specific gravity of the various substances. But as the bodies of which the specific gravity is required must have different volumes, the way to ascertain the specific gravity of any body is to weigh first in air and then in water, and to divide the weight in air by the difference between the weight in air and the weight in water. This principle is too well known to require any further explanation.

The following is a simple mode of ascertaining the specific gravity of any gem :—

The stone of which the specific gravity is to be obtained, is first weighed in the ordinary manner in the scales, and having noted the exact weight, it is then fixed by means of a piece of wire bent in the form of a hook, and a small piece of wax to one side of the scale, whilst in the other is placed a piece of wire and a piece of wax of the same weight, or their equivalent in weights. The scale, with the stone attached, is now allowed to fall in a cup of distilled or even filtered water, and weights are put in the opposite scale till the weight of the stone is counterbalanced, and the scales exactly even. It is evident that a less weight is required to counterbalance the stone submerged in water compared with that when it was weighed in the air, as the water in some measure supports it. The weight in water is then subtracted from the weight in air, and the weight in air divided by the difference, viz.—

Weight in air	17 carats.
Weight in watei	12 „
	5 ÷ 17 = 3·5′

In order to ascertain the specific gravity of a stone accurately, the following conditions must be fulfilled :—The gem must be perfectly clean, and free from dust, grease, or any adherent substance. It must be free from holes or porosities; and, before being weighed in water, it must be rubbed in it to remove the adherent air, and, if the stone be of a porous description, it must be allowed to absorb as much as it is capable of, before being weighed.

The ascertainment of the specific gravity is a matter of great necessity for the proper comprehension of gems. It affords in many instances a test of the greatest value, and prevents the possibility (when the specific gravity differs) of one gem being substituted for another; such as jargoon and white sapphire for diamond, which occasionally happens by fraud or error; also, in the case of stones which are cut and polished, it is a valuable assistance in determining the family to which they belong, without the possibility of the slightest injury to the gems.

There are many valuable instruments made for determining the specific gravity, the hydrometer, etc., which may be used where great accuracy is required, such as in scientific experiments; but, for all ordinary purposes, the manner I have indicated will suffice.

This test was well known to the ancients, and was practised in India several centuries ago.

Electrical Properties.

Electricity is the property inherent in some bodies of attracting and repelling smaller bodies, and it can be excited in minerals by friction, heat, and pressure. Some are conductors, some non-conductors of electricity. If a conductor, the stone must be isolated by placing it on some non-conducting body, such as glass or sealing-wax. This property is either positive or negative, or, as formerly expressed, vitreous or resinous. The faculty of the retention of the electricity produced is very varied in all minerals; and the time which elapses before they lose it, forms a valuable distinguishing mark and test of their identity. The Abbé Haüy, in his valuable work on gems, dedicated to Mr. Hope, speaks of this property at great length, and used some valuable instruments for determining it. A very simple mode, however, is to use an ordinary electrometer, and to communicate a known electricity to it, by touching it with a piece of rubbed sealing-wax, until, on approaching the wax slowly to the needle, it repels it. The needle has then acquired a negative electricity, and will be attracted by a positive electric crystal, and repelled by a negative one. This experiment should, however, be tried on a dry day.

Some crystals become electric by pressure,—Iceland spar, for instance, to a very high degree. The topaz, amethyst, and all the stones which come under the denomination of quartz, slightly so.

The electricity which is produced in some bodies by heat is called pyro-electricity. The Indians have long been acquainted with this property. The tourmaline derives its name of "aschentrekker," in Dutch, from the fact of its alternately attracting and repelling hot ashes if placed amidst them.

The diamond, garnet, topaz, and emerald, possess this property in a less degree.

It is to be observed, that it is not the heat, but the change of temperature which causes the electricity; so that if a stone be kept at the same degree of heat, no effect will be produced. It is only by the increase or decrease of temperature that it is to be observed. This experiment is usually tried by a decreasing temperature, and in certain stones two sorts of electricity are developed at the opposite ends or poles. By increase of heat the positive pole becomes negative, the negative pole positive. To examine the pyro-electric properties of a gem, it can be held during its heating or cooling against the needle of a sensitive electrometer, avoiding carefully any friction. The longer the crystal, the greater the quantity of electricity produced in proportion. In order to ascertain the length of time during which a stone retains its electricity, it must be left in contact with some metallic body. The topaz continues to affect the needle after twenty-four hours. This property was well known to the Greeks; their name of amber, "electron," was given to it from its power of attracting small bodies by friction.

Diaphaneity.

Most gems are transparent to a greater or less degree; that is to say, they possess the power of transmitting light. The following terms are made use of to distinguish the various degrees:—

Transparent, when objects can be seen distinctly through it.

Semitransparent, when the outlines of objects seen through it are indistinct.

Translucent, when only light is transmitted, and objects are invisible.

Semitranslucent, when translucent at the edges only.

Opaque, where no light is transmitted.

Fusibility.

The ease or difficulty experienced in fusing gems forms another distinguishing characteristic, and also affords a mode of ascertaining their composition and colouring matter. Most precious stones are infusible or fusible with great difficulty by means of fluxes, such as borax or soda.

The diamond is infusible although combustible. The ruby, sapphire, and all corundums are fusible with borax, but with great difficulty. The emerald, zircon, spinel, etc., likewise.

The application of heat to the various gems produces very different results; some change colour, some swell and decrepitate, some burn; in some, globules are produced; in some, an enamel; in some, dust; and in some, phosphorescence may be observed.

The description of all these chemical changes belongs, however, more properly to a scientific work than to the province of a simple treatise like this; and the manner of using the blowpipe, which is the mode usually adopted for fusing minerals for experimental purposes, is too well known to require explanation.

One of the most important points to be observed, however, is the part of the jet of flame to be used.

If the outside flame is used, metallic bodies become oxidized; if the inner flame, which is of a bluish-red colour, and which is the hottest portion of it, the mineral becomes fused.

Experiments are usually tried on small quantities of the gem, ground to powder, and held in a small platina cup.

Some gems are affected by acids. The opal is affected by potash; the turquoise, garnet, chrysolite, and tourmaline by acids. Some are unassailable by any chemical substance, particularly the diamond, the corundums, and spinel.

IDEAS OF THE ANCIENTS RESPECTING PRECIOUS GEMS.

THE origin of the taste for gems is lost in the most remote ages. The most ancient records to which we have access bear evidence of its previous existence. In ancient Egypt jewels were engraved in the form of scarabæi, and are even now disinterred from the mummy-pits. The Jews adorned the breastplate of the High-Priest with precious stones, and the similarity of the names in both their languages would lead us to suppose that they derived their knowledge from them. The conquerors of Mexico and Peru found the Montezumas and the Incas in possession of gems engraved and cut into the forms of animals and other objects, to which their traditions gave a remote antiquity. The Hindu mythology speaks of gems in a manner which shows that they were in general estimation. In their songs and ballads, precious stones are often spoken of. Pliny records that the garments and utensils of the Indian nations were ornamented with gems, and no doubt this custom was of the greatest antiquity. With what stones they were acquainted we do not know, as the names given them both in Scripture and in other early accounts, do not correspond with ours. Indeed, the only stone of whose identity with the one described in the Holy Writ, we are somewhat certain, is the sapphire, as it bears the same name in Hebrew, ספיר, and is described as a transparent blue stone, 'like unto the vault of heaven,' which shows that this could not have been the sapphire of the Greeks and Romans, which is described as intermixed with gold.

The twelve stones which were in the breastplate of the High-Priest were—the sard, the topaz, the carbuncle, or ruby, the emerald, the sapphire, the diamond, the ligure, the agate, the amethyst, the beryl, the onyx, and the jasper; also the two onyx stones on the shoulder-knot were engraved with the names of the twelve tribes, to each of which one of these stones was consecrated. The translations, however, of the Hebrew names differ in many Oriental versions from the authorized text; but in the next Chapter will be found some information upon this interesting subject.

The monarchs of the East, with their fondness for display and pomp, no doubt then, as now, decorated their horse-trappings, their thrones, and their persons with gems, long even before they knew how to cut them; and they attributed, as they even now attribute, magic and talismanic properties to them. This belief is shared by almost every nation, and even in this country, at the present moment, is not yet extinct, as many persons wear a turquoise in the belief that it preserves them from contagion.

Precious stones were no doubt brought from the East to the Egyptians and Greeks by the Phœnicians. In Egypt there certainly exist mines of emerald, but they have not been worked for centuries: very recently, however, they have been visited by travellers. Homer mentions the earrings of Juno as containing shining gems, and it is well known that the Greeks used gems for seals, rings, etc. Ancient Greek intaglei are still extant of turquoise, onyx, and even ruby. And in a poem by Orpheus, or, as some suppose, by Onomacriton, written at least 400 years before the Christian era, the supernatural powers of gems, in which the Greeks had implicit belief, are mentioned.

One of their early writers ascribed to rock-crystal the power of producing the sacred fire used in the Eleusinian mysteries; it was laid upon chips of wood in the sun, when first smoke and then flame was produced, and this fire was supposed to be most grateful to the gods. It is well known that a great part of the Grecian mythology was derived from the Egyptians; and as the priests were well acquainted with the use of many scientific instruments, which were carefully concealed from the vulgar, it seems probable that this tradition simply arose from the use of glass or crystal lenses (burning-glasses).

Plato and Aristotle were both acquainted with the existence of gems, and Theophrastus, the disciple and friend of Aristotle, has written a treatise on the subject, which is extant. Plato supposes the origin of precious stones to be the vivifying spirit abiding in the stars, which, longing to form new things, converts the most vile and putrid matter into the most perfect objects. He describes the diamond as being found like a kernel in the gold, and supposed it to be the purest and noblest part, which had become condensed into a transparent mass.

Theophrastus, in his work on stones, relates that water is the basis of all metals, earth of all stones; and that from the difference of all matter, and from the manner of their coalescence and concretion, the stones have assumed their various qualities, such as smoothness, density, transparency, etc. This concretion he describes as produced in some instances by heat, and in some by cold. The emerald, he says, has the property of causing water to assume its colour. He describes a common belief extant at the time he wrote, of the power some stones have of generating others, although he does not attach belief to this idea. He also mentions that the carbuncles found in Carthage and in Massilia, were bright red, and that when held against the sun, resembled glowing coal, which perfectly corresponds with the stones we now call by the same name. Although the ancients classed all stones of similar colour together as, for instance, by the Greek name 'anthrax'—in Latin, 'carbunculus'—they included all gems of a red colour, such as hyacinths, rubies, garnets, etc.; by 'sapphirus,' all blue stones, etc.: this arose solely from their want of chemical knowledge, and not from their want of appreciation of the difference existing between the various stones of similar colour. The Greeks considered rock-crystal a congelation like ice, and supposed it to be only found in the coldest regions. Theophrastus, Aristotle, and Pliny, all concur in this belief. The emerald pillars in the Temple of Hercules, at Tyre, the emerald sent from Babylon as a present to a king of Egypt, four cubits in length and three in breadth, and the emerald obelisk described by Herodotus, were doubtless green jasper; for Theophrastus mentions having seen an emerald, which was partly emerald and partly jasper. Pliny* ascribes the non-fusibility of some stones to the idea that they contain no moisture, and he describes a sapphire as a stone spotted with gold, which would lead to the belief that what in his time was called sapphire was a blue stone resembling lapis lazuli, or aventurine, and totally different from the blue corundums we call sapphire at the present day.

The 'lapis lyncurius' he describes as produced from an animal; the gems were of two sorts, that called the male, dark; that called the female, pale yellow (most probably this was a species of amber).

As said before, he classified the gems according to their colour, placing the diamond in the first rank as

* Pliny, book xxxvii. cap. iv.

the most precious of all telluric productions; and it is clear that he was acquainted with the true Indian diamond (although he mentions six different sorts), for he described it as resembling rock-crystal in transparency, and that the crystals terminated at both ends by a point resembling two pyramids joined together, which description exactly tallies with the octahedral form of the diamond; the hardness as very great, so as to resist fracture on an anvil, and, in fact, breaking both hammer and anvil before the diamond. He imagines it, however, to become soft if immersed in goat's blood; and remarks that small pieces were used by gem engravers, as at the present day. After the diamond he values the pearl, and it is clear that he must have seen several gems in their natural state, as he describes some of the crystals most accurately. He however has clearly copied much from Aristotle, Theophrastus, and Democritus, and he mentions many stones which are either unknown to us, or are called by different names. He declaims against the extravagance of the age, and especially against the fashion of jewelled drinking-cups.

In the buried cities of Pompeii and Herculaneum, rings have been found with devices engraved on green jasper and chalcedony.

Juba, king of Mauritania, was said to have had a statue, four cubits long, made of one single piece of chrysolite, which he presented to Arsinoë, the wife of Ptolemy.

The Romans, when they conquered Greece and

Egypt, took home this taste with them, and carried it to a stupendous pitch, the patricians vying with each other in extravagance. Lucan mentions the meeting of Cæsar and Cleopatra in a hall of tortoise-shell, studded with emeralds and topaz. Cleopatra is said to have dissolved a pearl of the value of 150,000 aureos, or golden crowns, in vinegar, in the presence of Antony, and to have drunk it off: this however is untrue, as it would require a very much stronger acid, and a larger quantity than any one could take with impunity, to dissolve a pearl of that magnitude. Cæsar is said to have paid a sum equal to fifty thousand pounds sterling for a single pearl. The fellow drop to the pendant destroyed by Cleopatra, was sawn in two by command of the Emperor Augustus, and used to adorn the statue of Venus. As we approach the later periods of Roman history, we find numberless instances of the appreciation in which jewels were held. In the time of the Ptolemies, they were used in profusion for ornamenting arms, drinking cups, and even the altars of the gods. A poem by Dionysius Periegetes contains several allusions to precious stones,—the asterios, the lustre of which is like a star, the lychnis, of the colour of fire, the amethyst, with a tint like purple, are all mentioned. Caligula adorned his horse with a collar of pearls, the shoes of Heliogabalus were studded with gems, and the statues of the gods had eyes of precious stones, a custom which was clearly derived from the East; even in later days one of the largest diamonds in the

Russian treasury is known to have formed the eye of an idol of an Eastern temple, and was stolen by a European, who had become a priest of the shrine.

A particular stone was supposed to be sacred to each month, and they were called zodiac stones; they were all set together in an ornament called an amulet, so as to be sure to have the one in connection with, or corresponding to the particular sign or month of the year.

The order is as follows:—

January	Aquarius	Jacinth, or Garnet.
February	Pisces	Amethyst.
March	Aries	Bloodstone.
April	Taurus	Sapphire.
May	Gemini	Agate.
June	Cancer	Emerald.
July	Leo	Onyx.
August	Virgo	Cornelian.
September	Libra	Chrysolite.
October	Scorpio	Aquamarine.
November	Sagittarius	Topaz.
December	Capricorn	Ruby.

This superstition is evidently connected with the twelve stones in the breastplate of the High-Priest, and even still exists. The Jews had a tradition, that when, on the day of atonement, the High-Priest asked the Almighty forgiveness for the sins of the whole nation, if they were forgiven, the stones in the Urim and Thummim shone most brightly; if the contrary, they became black. Gems were also supposed to indicate the state of health of the donor or possessor. If they became dull, he was conjectured to be unwell or in danger; and their becoming opaque or colourless would give rise to the most dismal forebodings. The turquoise was conceived to have an affinity with its possessor or master, and to change in colour as his state of health altered. The fact that some turquoises do change their colour may have given rise to this superstition; the real cause of their variation seems to arise from the difference of temperature and state of the weather. The knowledge of the properties of gems common to writers of the Middle Ages, differs but little from that possessed by Pliny and Aristotle, and they seem to have copied very generally from each other. Marbodus, Boetius, Cardanus, and Rhave adopted the statements of Pliny in many instances; and in a book written by Thomas Nicolls, published at Cambridge in the year 1652, the statements of Pliny and Theophrastus about the diamond are quoted as being perfectly true.

Albertus Magnus, Langius, Cardanus, Boetius, and others have written at length on this subject, and their speculations as to the origin of gems, and their supernatural effects, are most amusing. Serapius ascribes to the diamond the power of driving away lemures, incubes, and succubos, and of making men courageous and magnanimous; and says that if the gem is placed with a loadstone, it nullifies its power.

According to Boetius, in his work 'De Natura Gemmarum,' the ruby is a sovereign remedy against the plague and poison; it also drives away evil spirits and bad dreams. The jacinth, if worn on the finger, procures sleep, and brings riches, honour, and wisdom. The amethyst dispels drunkenness, and sharpens the wit. He says of the balas-ruby, that it restrains passion and fiery wrath, and is a preservative from lightning; of the emerald, that it discovered false witnesses by suffering alteration when it met with such persons; of the sapphire, that it procured favour with princes, and freed from enchantments. The chrysolite was said to cool boiling water and assuage wrath, and if placed in contact with poison, it lost its brilliancy until removed.

Boetius supposed gems to be generated by the powerful working of lapidific spirits, and augmented by the acquisition of new matter, and the pearl to be formed of the morning dew drunk in by shell-fish.

Certain stones were also supposed to symbolize the Twelve Apostles :—

Peter is represented by the	Jasper
Andrew	Sapphire.
James	Chalcedony.
John	Emerald.
Philip	Sardonyx.
Bartholomew	Cornelian.
Matthew	Chrysolite.
Thomas	Beryl.
Thaddeus	Chrysoprase.
James the Lesser . . .	Topaz.
Simeon	Jacinth.
Matthias	Amethyst.

If these and similar superstitious notions are to be found in the works of the most learned of their time, it is not marvellous that the most extravagant and absurd notions should have prevailed amongst the ignorant.

The art of cutting gems was in its infancy until a late period, and was confined to a very few, and their use for personal adornment was limited to kings and princes, who prized them more for the superstitious uses attributed to them than for aught else. The first authentic account of the jewels existing in India is given by Tavernier, who made several journeys to the East, and who, when speaking of what he saw himself, is trustworthy; but when he relates what was told him, falls into numberless exaggerations. His account of the gems he saw in his travels through Hindostan and the East affords great insight into the production and estimation of precious stones in his time.

Some gems were also used for medical purposes powdered, and were supposed sovereign in their effects; even now immense quantities of seed-pearl are used in China and the East for various purposes. In a curious medical work by Antonius Musa Brassarobus, lapis lazuli is prescribed as a laxative. Camillus Leonardus, of Pisa, prescribes coral in powder for newly-born children. Further on, in the notes at foot of the description of lapis, coral, etc., several of these prescriptions are transcribed.

The natives of India imagine that when diamond-powder is taken into the mouth, it causes the teeth to fall out, and that it acts as a preservative against lightning. Some stones are also supposed to give light in the dark. The Vedas of the Brahmins speak of a place lighted by rubies and diamonds, which emit light like that of the planets.

When chemistry however began to be understood, the ideas which had been handed down by tradition, and by the works of ancient authors, were proved erroneous, and the clouds which hung over the subject were dispelled by the analysis and classification of gems, according to their composition, hardness, etc. The old system of classing all stones of similar colour together was abandoned, and latterly immense light has been cast on the subject of the formation of precious stones by the researches of learned chemists and mineralogists. But although science has advanced with giant strides, and our means of knowledge are far more extended than those of our ancestors, we have still much to learn on this subject, and perhaps may find that future researches may prove our notions as unsound and our theories as erroneous as those entertained by our forefathers.

ON THE PRECIOUS STONES MENTIONED IN THE BIBLE.

A BRIEF sketch of the knowledge which the Semitic nations possessed of the precious stones, may not be out of place in the present volume. A full and exhaustive treatment is not within the scope of this work; nor is it possible, as yet, to offer complete information, since Oriental scholars have not sufficiently occupied themselves with this subject, which might help to throw light on the state of ancient civilization, on the intercourse between various nations, and on the mechanical and artistic knowledge cultivated in the remote regions of the East.

The very names of the precious stones, if studied by the aid of those languages which were once spoken in the vast tracts of country situated between the

Ganges and the Nile, would assist in lifting the veil which now conceals from our view the intercourse and connection of the bygone Eastern races. Should the present remarks have the effect of inducing any scholar to pursue this inquiry, the result of his investigations might prove interesting, and perhaps useful.

A small treasury of useful information is disclosed to us in several parts of the Bible. Precious stones, according to this ancient record, were not in the possession of the majority of the opulent classes; amongst the contributors of the materials towards the erection of the Tabernacle, the chiefs of the Twelve Tribes alone are mentioned as supplying the "shoham stones, and the stones to be set" (Exodus xxxv. 27). We find the most important enumeration of the precious stones known to the ancient Hebrews in Exodus xxviii., verses 17 to 20; and the same list is repeated in that book, chapter xxxix., verses 10 to 13. It deserves to be noticed that, with the exception of *three* precious stones, the gems worn by the High-Priest on his breastplate were also to be found among the royal ornaments worn by the king of Tyre. (See Ezekiel xxviii. 13.) These stones are enumerated in the accompanying Table, Nos. 1–12, with their renderings in several Semitic languages, in Greek, Latin, etc.

It will be observed in this Table that the Hebrew terms are variously interpreted in the several ancient versions, and it would appear that the translators had in many instances lost the chain of trustworthy tradition, and were obliged to resort to conjecture. The copyists of these versions have, moreover, added their share of errors; the differences between them and the authorized version are suggestive, and merit investigation. On the following pages is given the "Table of Comparative Translations" alluded to :—

TABLE OF COMPARATIVE TRANSLATIONS FROM THE
MENTIONED IN THE BIBLE AS

(The words in small letters are the literal translations of the words in their

Nos.	*Hebrew.*	*Authorized version.*	*Vulgate.*	*Greek.*	*Chaldean.* Targum or paraphrase of Onkelos.
1	Odem Red	Sardius	Sardius	Sardion	Samkan Red.
2	Pitdah	Topaz	Topazius	Topazion	Jarkan Green.
3	Bareketh Flashing	Carbuncle	Smaragdus	Smaragdos	Barkan Brilliant.
4	Nophek	Emerald	Carbunculus	Anthrax	Ismaragdan Emerald.
5	Sappir	Sapphire	Sapphirus	Sapphiros	Shabzez
6	Jahalom	Diamond	Onychius	Onychion	Sibhalom
7	Leshem	Ligure	Ligurius	Ligyrion	Kankera
8	Shebo	Agate	Achates	Achates	Tarkja Turquoise.
9	Achlamah	Amethyst	Amethistus	Amethistos	En Egla Calf's-eye.
10	Tharshish	Beryl	Chrysolithus	Chrysolithos	Krum Yama Sea colour.
11	Shoham	Onyx	Beryllus	Beryllion	Burla Beryl.
12	Jashpeh	Jasper	Jaspis	Jaspis	Panthireh Panther.

ORIGINAL HEBREW OF THE TWELVE STONES WORN BY THE HIGH-PRIEST.

respective languages, where the names have any peculiar signification.)

Chaldean. Targum or paraphrase of Jonathan ben Usziel.	*Chaldean.* Targum Jerushalmi, or Jerusalem paraphrase.	*Syriac.*	*Arabic.*	*Samaritano-Arabic version.*
Semuktha Red.	Samketha Red.	Sumoko Red.	Jakuth Achmar Red Hyacinth.	Achmar Red.
Jarketha Green.	Jarketha Green.	Sorgo	Azphar Yellow.	Azphar Yellow.
Barketha Brilliant.	Barketha Brilliant.	Borko	Samurod	Achzar Green.
Esmorad	Kadkedana Carbuncle.	Zadiro	Cochli	Somurod Emerald.
Sapirinon Sapphire.	Simbulina Sapphire.	Saphilo	Maha al-Ballur	Saha
Kadkodin Carbuncle.	En Egla Calf's-eye.	Neketho	Bahraman	Firusg
Kankernon	Zozin	Konkenun	Gasa	Gasg Onyx.
Tarkin Turquoise.	Birulin Beryl.	Karkedno Carbuncle.	Sebh	Saych
En Egla Calf's-eye.	Samaragdin Emerald.	En Eglo Calf's-eye.	Firusag	Bahraman
Krum Yama Rabba Colour of the Great Sea.	Krum Yama Sea colour.	Thorshish	Asrak	Sórak
Beruluth-chala Sand beryl	Beroltha Beryl.	Berulo Beryl.	Ballur Crystal.	Ballur Crystal.
Margniath apanturin. Panther gem.	Marglitha Gem or pearl.	Jashpeh Jasper.	Jashaph Jasper.	Jashm Jasper.

THE STONES IN THE BREAST-PLATE OF THE HIGH-PRIEST.

THE following description of the various gems mentioned in the Bible is extracted from the Talmud and several Rabbinical commentators, and may be interesting as an evidence of the amount of knowledge of this subject that was then current:—

1. Odem.

(*Authorized Version*, Sardius.)

The Hebrew word *odem*, like the Arabic *akik*, is capable of denoting the cornelian, the ruby, or any other precious stone of *red* hue. Among the Hebrews and Arabs, the cornelian was considered an important prophylactic; the former ascribed to it the virtue of preserving life from the dangers of the plague; the latter even now, according to Niebuhr, continue to employ it as an efficient agent in stopping hæmorrhage. Hebrew legends state that the *blushing* ruby became the symbolical representative of Reuben, who brought a blush upon himself by irreverent conduct to his father.

2. Pitdah.

(*Authorized Version*, Topaz.)

This stone derives its name (topaz) from the island Topazion, which was supposed to be situated in the Red Sea. There are two kinds of topazes; the superior is gold-coloured, the other inclines to a greenish yellow. The second species was called chrysoprase, a name which indicates the blending of gold and leek colour. In allusion to the latter colour, this stone is called in the Chaldean dialect jarkan (green), which is the equivalent of prase.

3. Bareketh.

(*Authorized Version*, Carbuncle.)

Bareketh, literally "flashing stone;" this name being apparently derived from "barak," lightning. Eastern legends assert that a carbuncle was suspended in the Ark of Noah to diffuse light. The word bareketh has been translated by the Greek word "keraunos," aerolite—literally, thunder-stone. Some authors state that it resembles the crystal in transparency, and drops from the clouds amidst the flashes of lightning. The same myth is also applied to the origin of the diamond.

4. Nophek.

(*Authorized Version*, Emerald.)

The Hebrew name signifies "carbuncle," or the stone which shines with the brilliancy of a glowing coal. This stone belongs to a class which is divided into various species. The most esteemed are the Indian and Garamantine carbuncles; the latter term has given rise to the modern name of garnet: the same gem was also called the Chalcedonian. The Ethiopian carbuncles rank very high, and are nearly connected with the almandine and the essonite. Carbuncles of superior brilliancy are termed *males,* those of a duller description are called *females,*—a distinction which, among ancient lapidaries, prevailed in reference to the majority of precious stones. One author observes, that the carbuncle at first appears as if smoke were rising from it, and afterwards, as if burning with a bright flame, and that the Chalcedonian inclines to blackness, but when held against fire or the light of the sun, it surpasses in lustre all other carbuncles; when placed in a dark room, it presents a rose-colour, but when exposed to the open daylight, it glows like a burning coal; when held against the sun, it has the lustre of a flame.

5. Sappir.

(*Authorized Version*, Sapphire.)

This stone is frequently mentioned in the Bible as being of great value and exquisite beauty. Legendary traditions assert that the Tables on which the Ten Commandments were engraved were made of sapphire. The superstitious assigned to this stone the virtue of preserving the sight, and invigorating the frame as well as the soul.

6. Jahalom.

(*Authorized Version*, Diamond.)

The Hebrew term Jahalom is said to be derived from the verb "halam," to strike, and is applied to the diamond to describe the superior hardness of this gem, which can be employed in cutting other precious stones. For a long time the diamond was only known to some Eastern kings, and an opinion prevailed that it could only be found in gold-mines. The fact however is, that it is discovered in many places yielding the crystal, to which it bears an affinity. There are six kinds of diamonds, viz. the Ethiopian, the Indian, the Arabian, the Macedonian, the Cyprian, and the Siderite, which resembles polished steel. The last two kinds are brittle, the others are exceedingly hard; they resist the ordinary blow of the hammer, and the heat of the fire. One author mentions the following ludicrous anecdote:—"A noble lady inherited two diamonds, which for many years remained hidden among her treasures; from time to time these stones gave birth to indisputable facsimiles and likenesses of themselves." He accounts for this strange phenomenon by stating that the peculiarly pure atmosphere which must have surrounded the gems facilitated the formation of the generated crystals!

7. Leshem.

(*Authorized Version*, Ligure.)

Some authors translate this as turquoise, which, in ancient times, was considered of inestimable value, and was imported from the East Indies. An inferior description, of dark green colour, was found in Spain, and was sold at a very low price. The following anecdote, quoted from an old treatise on precious stones, illustrates the peculiar value which this class of gems derived from superstition :—

"One of my relatives possessed a turquoise set in a gold ring, which he used to wear on his finger as a superior ornament. It happened that the owner of this ring was seized with a malady of which he died. During the whole period in which the wearer enjoyed his full health, the turquoise was distinguished for unparelleled beauty and clearness; but scarcely was he dead, when the stone lost its lustre, and assumed a faded, withered appearance, as if mourning for its master. This sudden change in the nature of the stone made me lose the desire I originally entertained of purchasing it, which I might have done for a trifling sum; and so the turquoise passed into other hands. However, no sooner did it obtain a new owner, when it regained its former exquisite freshness, and lost all traces of its temporary defects. I felt greatly vexed that I had lost the chance of procuring such a valuable and sensitive gem."

8. Shebo.

(*Authorized Version*, Agate.)

The Rabbins translated this word by hyacinth.

The hyacinth and the amethyst are somewhat alike in colour; the latter approaches more the tint of the violet, the former is of a paler description, and inclines to sky-blue. There are three kinds of hyacinths; one has the glowing hue of a burning coal: this kind is of the highest value.

9. Achlamah.

(*Authorized Version*, Amethyst.)

Rabbinical authors consider Achlamah to signify onyx, and they state that it is classified either according to colour, or according to the place whence it is exported. In regard to colour, the onyx occurs in five varieties: the first, which is white, resembles the human nail, for which reason, in fact, it has received the Greek name onyx (*ὄνυξ, nail*); this variety is not marked by any stripes, whilst the second kind is white striped with red, the third is white striped with black, the fourth is all black without stripes, and the fifth, the most valuable of all, is black with white stripes. Mediæval writers have sought to find a Scriptural basis for current superstitions, by connecting "achlamah" (onyx) with the verb "chalam," to dream, and assert that this precious stone occasioned to the wearer a multiplicity of bewildering dreams.

10. Tharshish.

(*Authorized Version*, Beryl.)

The commonly received rendering of "Tharshish" is "chrysolite." Four species of this stone are mentioned, which respectively came from Arabia, Germany, India, and Ethiopia. The colour of the Arabian species was not clear and transparent. The German chrysolite was of whitish hue, bordering on orange colour, and peculiarly brittle. The Indian chrysolite had a slight cerulean tinge; in some instances it resembled translucent olive oil, in others it was a kind of sea-green, intermixed with a reddish shade. The Ethiopian chrysolite was soft green, and reflected the sunlight, glistening like a golden star. The latter two species were most esteemed.

11. Shoham.

(*Authorized Version*, Onyx.)

The Rabbins translate this by "emerald," and assign to it the third rank among precious stones. They say that the pleasure derived from looking at the emerald is due to the refreshing influence exercised by the green colour, this stone bearing the nearest resemblance to the luxuriant verdure of the fields and trees. Engravers and workers in precious stones, according to these writers, place this stone before them to rest their eyesight upon whilst engraving minute objects. There are twelve kinds of emeralds, if classed according to the countries where they are found, viz. the Siberian, Britannic, Egyptian, Cyprian, Ethiopian, Armenian, Persian, Athenian, Median, Chalcedonian, Laconian, and Sicilian.

The first-mentioned variety surpasses the rest in value, is of greater hardness, and not liable to the peculiar defects which are found in the others; moreover, this kind is found in the rugged, mountainous tracts amongst the gold mines, and is excavated by dint of excessive and painful toil. The griffin is said to build there its nest, and to be zealously watchful in guarding the treasures of gold and emeralds. Others assert that this gem originates in copper mines, where verdigris is formed. Fine emeralds are of a perfect green, which seems to flash upon the surrounding objects; in a good gem, the surface must be perfectly straight and smooth, so as to cast no darkening shade on any of its particles.

12. Jashpeh.

(*Authorized Version*, Jasper.)

It is most probable that this stone became known through the extensive use which was made of it by artists for ornamental and commemorative works, such as cameos, etc. The name of "Jashpeh" (in Greek, jaspis) must have travelled along with the wide distribution of this stone, which so readily yields to the engraver's burine. If it could be ascertained whether "jashpeh" was first so named by the Semitic nations, or whether the Grecians were the first to adopt the name of jaspis, we might be able to decide in what country this stone was first applied to the purposes of ornamental art.

According to tradition, the "jashpeh" in the breastplate represents the name of "Benjamin." The following anecdote, extracted from the Talmud, enables us to form some idea of the value in which this stone was held in the rabbinical period. It is related that during the existence of the second temple, the "jashpeh of Benjamin" was lost. Great exertions were made to replace it, and at last it was ascertained that Dama ben Nethinah was in possession of a fine specimen. The price ultimately paid for it is stated to have been one hundred denarii (100 gold denars were in value equal to about £60).

In addition to the twelve stones contained in the breastplate of the High-Priest, the following names occur in various parts of the Bible:—

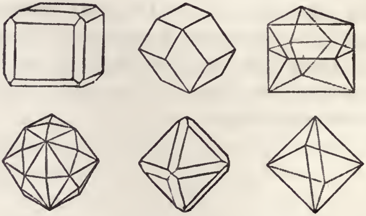
Kadkod and *Ekdoch* (Isaiah, liv. 12), both of which signify the glowing of fire, are, not inappropriately, translated "carbuncle;" the Alexandrian version of the Bible renders the former word by "jasper."

Ramoth, mentioned in Ezekiel (xxvii. 16) and Job (xxviii. 18), is of doubtful meaning, and supposed to signify "coral.

Gabish, or *Elgabish,* occurring in the just-mentioned passage of Job, means in its primary signification "hail-stone," and hence is applied to the crystal; according to the Chaldean paraphrase it denotes "beryl."

Shamir (diamond). The passage in Ezekiel (iii. 9), "as an adamant, harder than flint," etc., confirms the supposition that shamir means diamond. Tradition asserts that the stones which were used in the construction of the temple of Solomon, were hewn by means of the "shamir," as the law of Moses prohibited the use of iron implements. It must, however, be observed that, in this instance, the word "shamir" has been interpreted by commentators as relating to a miraculous worm, which, being placed on the stone, performed the wonder of cleaving it in those parts which had been previously marked

THE DIAMOND.



Crystals of Diamond.

THE diamond is the glorious gem which surpasses all others in hardness and brilliancy. Its specific gravity is about 3·5, its cleavage very perfect, its refraction simple; it is transparent and translucent, combustible, infusible, and unassailable by acids, and is composed of pure crystallized carbon. It frequently becomes phosphorescent on exposure to light; the smaller stones by a much shorter exposure than the larger. It is found both in regular crystalline forms and in an amorphous state. The crystals are principally octahedrons or dodecahedrons, the planes of which have frequently the peculiarity of being either concave or convex; sometimes they are worn by attrition or other causes into heterogeneous forms, being nearly round balls, occasionally transparent, or covered with a thick crust.

The diamond is found of all colours—white, yellow, orange, red, pink, brown, green, blue, black, and opalescent. There is a slight difference between the specific gravity of the Indian, or Oriental diamond, and the Brazilian, as also between the white and coloured. The result of numerous experiments is as follows:—

The Specific Gravity of Indian or Golconda Diamond.

White	3·524
Yellow	3·556

Brazilian.

White	3·442
Yellow	3·520

The Indian diamond is generally found in octahedral, the Brazilian in dodecahedral, crystals.

The diamond is one of those bodies which reflect all the light falling on their posterior surfaces at an angle of incidence greater than 24° 13′. The diamond does not appear to possess the power of polarizing light, although Sir David Brewster gives it as his opinion, that in some instances light was slightly changed in passing through it, and its power of refraction is enormous, and its dispersion comparatively small, as a comparison with that of common glass will show:—

The Diamond.

Refraction	2·487
Dispersion	0·38

Glass.

Refraction	1·525
Dispersion	0·32

To these qualities are attributable its extraordinary brilliancy and play, and it was the observation of these properties which led Newton to the conclusion that it was a combustible body, and, later, caused several scientific men to endeavour to apply it to optical and microscopical purposes. It was, however, found by Sir David Brewster, that the inequalities of its structure caused too much aberration of light to make it serviceable for these purposes.

It is a non-conductor of electricity, and becomes positively electric by friction; but soon loses its power, namely, at the expiration of half an hour.

The diamond cuts glass with great facility, but not every stone can be used for that purpose. It is required to find one whose angles are naturally acute. These stones are called "glaziers," and fetch £10 the carat Although most gems will scratch glass, it is only the diamond which is capable of cutting it.

The diamond is not acted upon by any acid, but is a combustible body, becoming entirely consumed when exposed to a very strong degree of heat (14° Wedgwood). Although Newton early surmised the fact of its combustibility, the first record of its having really been burnt was in 1694, at the Academy of Florence, under the dukedom of Cosmo III., by means of powerful burning-glasses, when it first split, then emitted sparks, and at last disappeared, leaving no trace behind. The Emperor Francis I. exposed diamonds and rubies together in an assayer's furnace for twenty-four hours, when the diamonds had disappeared, and the rubies remained in their normal state. Some French chemists also burnt a fine diamond in the year 1771; but the point was still mooted among the learned, whether diamonds were burnt, became vaporized, or split into impalpable powder. A French jeweller named Maillard, however, declared that he had frequently exposed diamonds to heat as intense as that which had consumed the others without injury, and offered to submit some to the test. He imbedded them in charcoal dust, and sealed them hermetically in a clay pipe bowl, when, after leaving them in the furnace for the same time, brought them forth uninjured; thus solving the problem, and clearly proving that the diamond, like other combustible bodies, only really burns when in connection with the oxygen of the air. Lavoisier burnt a diamond in oxygen, and obtained the same result as arises from the combustion of pure carbon—carbonic acid. Another chemist, Clouet, made steel by exposing iron and diamond together, thus proving its identity with other carboniferous bodies, and showed that the diamond burns readily when exposed in the open air, or in gas, to an intense heat, with a bright red flame, and gives out sparks during combustion.

As yet, no one has proposed a theory which could account for the formation of the diamond, nor has succeeded in discovering the matters which lend a tinge or colour to the gem. Liebig has given it as his opinion, that it arises from the presence of uncrystallized vegetable matter. The black specks and flaws which so frequently present themselves, would lead to the supposition that they must arise from carbon imperfectly crystallized, and analogous to the amorphous and porous variety, called carbonate, to which I shall allude hereafter; but this point has never yet been satisfactorily solved. Many chemists and mineralogists have declared, that by means of heat they can expel or improve the natural colour of the diamond; but experience has shown that this idea is fallacious, for, although the stone when exposed to strong heat appears whiter, this arises solely from a crust being formed on the outside, which impairs the transparency, and when repolished, the original colour returns. Red flaws however, which are sometimes apparent in the rough diamond, do occasionally lose their colour by exposure to great heat; in other instances, the red flaws become black. A gentleman of the name of Barbot is said to have employed for the last ten years a process which he keeps secret, but which, it is said, enables him to remove the opaque crust which covers the diamond in its rough state, so as to show the colour it will have when cut; if true, this might render the work of the lapidary more easy, but the fact is much to be doubted.

At the great fire in Hamburg, many diamonds were sold for trifling sums which had remained in the burning buildings, and, to an unexperienced eye, appeared totally valueless, but when repolished they regained their pristine brilliancy, though with a slight loss in weight.

The diamond can be cloven with facility in a direction parallel with the planes of the octahedron or dodecahedron, or, to use the lapidaries' expression, "splits easily with the grain." This quality much assists the otherwise tedious operation of cutting or grinding the diamond, particularly where it is desirable to get rid of flaws. In spite of its hardness, it is capable of being reduced to powder, and the mistaken idea which used to prevail, and even now exists, that the best test of the reality was to put it on an anvil and strike it with a hammer, when, if genuine, it either broke the hammer or buried itself in the anvil, has been the cause of the loss of many fine gems, which were either crushed or thrown away as valueless.

The diamond is found in Hindostan, Brazil, Sumatra, Borneo, the Ural Mountains, and occasionally in North America · in some instances in Australia; gene rally in octahedral crystals, in quartz conglomerates containing oxides of iron, also in alluvium, in loose and imbedded crystals, almost always of small size, and most frequently in company with grains of gold and platinum; ordinarily, in strata of plutonic origin. In India, in the Deccan, in the river Pennair, in the Lower Kistna, and Ellore, and Pannah, and the river Sonar; and some in the Bundlecund, at Sumbhulpore, on the Mahanuddy; also in Malacca, in Borneo, Celebes, and Java. Numbers of places in India which produced diamonds in large quantities,—according to the account of Tavernier, a French jeweller and a trustworthy authority, who travelled in the East,—have latterly become so unproductive, that not only the places themselves, but the very names are unknown to the present inhabitants; and India, which used to be the great source of diamonds, seems to have become gradually exhausted. In Tavernier's time, the mines of Golconda employed 60,000 persons, and were once so productive, that it is recorded by the historian Ferichta, that the Sultan Mahmoud (A.D. 1177–1206) left in his treasures, after a reign of thirty-two years, more than four hundred pounds weight of this precious gem. The use of the diamond used to be one of the regal privileges of the Hindoo rajahs and sultans, but with the overthrow of Indian kingdoms and dynasties it became more generally worn. The finest diamond which remained in the possession of the Mahratta of Peshawur was that called by the East India Company the Nassak, which they valued at the sum of £30,000; it was however sold by auction at Messrs. Christy and Manson's rooms to the Marquis of Westminster, for the sum of £7200, since which time this fine diamond has been re-cut. (See description of the Nassac or Nassak diamond.)

It is a curious fact, that in Sumbhulpore the diamond-washing trade is hereditary in two tribes, whose origin is unknown, but who appear, from the traces of negro blood, to be descendants of slaves imported by one of the conquerors of India for that labour; they are called respectively Thara and Tora, and possess sixteen villages in free Jhageer, or freehold; they now number about 400 to 500 persons, working in the dry season in the bed of the Mahanuddy, from Kunderpore to Sinepore. The largest diamond found there, since the transfer of this country from the Mahratta to British rule, has been of eighty-four grains. The quality of the diamonds is here distinguished by the names of the Hindoo castes. The first quality is called Brahma, the second Kschetri, the third Bysch, the fourth Sudras. The weights used are the mascha and the ruttee; the mascha consists of seven ruttees, and the ruttee is something less than 2½ grains carat weight.

In the Bundlecund, the finest diamonds are called Motigul; the second quality, greenish, Manek; the third, yellowish, Pannah; the fourth, brownish, Bunsput. The origin of the carat weight is from an Arabic word, "kuara," the name of the seed of a pod-bearing plant growing on the gold-coast of Africa, which are almost invariably of an equal weight, and were formerly used for weighing against the grains or dust of gold. This weight was adopted in Hindostan, and has thence spread all over the world. The Indians call the diamond "pakha," or ripe, and rock-crystal "kacha," or unripe.

The Indian diamond is of a different specific gravity to the Brazilian, and even when only of equal whiteness, seems to possess more lustre and brilliancy; from this and other causes, the old diamonds, which all came from India, are worth rather more than the new, or Brazilian.

By far the largest quantity are, however, now imported into Europe from the Brazils. They are found mostly in alluvial soil in the district of Cerro di Fria, Minas Geraes, and San Paulo; in the beds of the rivers Jequitinhonha, Matto-Grosso, Diamantina, and Rio des Areios, Santa Anna, San Francisco, Paulo Vehas, San Francisco di Xavier, Rio Sumedouro, Bahia, and other places.

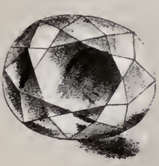
The Brazilian miners distinguish the various diamond-producing soils by the following names:--

Grupiara is an alluvial deposit, whose surface shows it to be the unused bed of a stream or river.

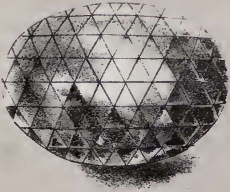
Burgalhao are small angular fragments of rock, bestrewing the surface of the ground.

Cascalho are fragments of rock and sand mixed up with clay, and forming the bed of a river.

Takoa Carza are the above materials cemented to-

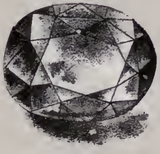


THE EUGENIE
Brilliant 51 Cts

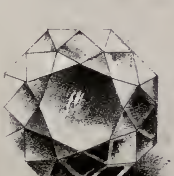


AUSTRIAN YELLOW BRILLIANT

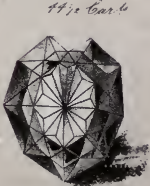
THE SHAH
86 Carts



THE HOPE BLUE DIAMOND
44½ Carts



THE POLAR STAR



THE SAN[illegible]
53½ Carts

gether into a conglomerate mass. All the above, however, are known by the generic name of Cascalho. The masses of stone themselves, which rarely exceed a cubic foot in size, contain Itacolumite jasper, and often peridots and garnets. The Itambe, the highest mountain in the diamond-producing district, giving rise to the rivers Copay and Jequitinhonha, is about 5598 feet above the level of the sea, and diamonds are sometimes found on its highest peaks.

Diamonds were found in the Brazils when searching for gold, but their true nature was unsuspected, and they were thrown away or used as counters for card-players. Bernardo Fonseca Lobo, an inhabitant of the Minas Geraes, who had seen rough diamonds in a previous visit to the East Indies, first discovered their true nature and value. He brought some to Lisbon, and established their identity with diamonds. The European traders, who had never seen or dreamt of any other but the Indian diamond, and who feared that if an infinite number were thrown on the market by this discovery of new mines, their stocks would thus be depreciated, and perhaps become valueless, endeavoured by every means to discourage their sale, and spread a report that the so-called Brazilian diamonds were only the refuse of the Indian mines, exported from Goa to Brazil, and thence to Europe;* and at first succeeded in preventing the sale. The Portuguese merchants, how-

* In the work published by David Jeffries, A.D. 1750 he indorses this belief, and endeavours to prove it by several arguments.

ever, turned the tables on them by exporting them from Brazil to Goa, and then offering them for sale as Indian diamonds.

On the inhabitants of the diamond-producing districts this discovery acted as a curse, for as soon as the government found the valuable nature of the product, and of the treasures it had in its grasp, it took forcible possession of the land, expelled the original inhabitants, and declared the diamond trade a monopoly, and themselves the exclusive proprietors. Nature even seemed to have a spite against the expatriated exiles; the year of the discovery the whole district was afflicted with a dreadful drought, and, to add to the distress and misery of the unfortunate inhabitants, a fearful earthquake took place, in which numbers of them perished; and it was only on the 13th of May, 1803, that the sad remnant was reinstated in their rightful property. It seemed as if the genii, guardians of the treasure, were indignant at the presumption of man, and tried by every means to prevent the dispersion of their buried treasures.

The riches of these places are incalculable; the gold is abandoned to the slaves as unworthy the attention of their owners. Children, after the rains, collect the grains of gold, which lie strewn over their path. The crops of all fowls killed are carefully examined, and often found to contain diamonds; and it is recorded that a negro once found a stone of five carats adhering to the roots of a cabbage he had plucked for his dinner.

In 1754, a slave, who had been working at the Minas Geraes, was transferred to the district of Bahia. Suspecting, from the similarity of the soil with that of the place he had been working, that it contained diamonds, he searched and found a considerable quantity. This news soon became public, and the province was inundated with emigrants trying to make rapid fortunes in the same way as the tide of population flowed to Australia when the news of the gold discoveries arrived here.

The production of the Brazilian mines has been enormous, but has decreased, and is decreasing, every day; in the first fifty years after their discovery, it is calculated that the astonishing amount of twelve millions in value was exported. The yield from the Bahia mines was at first so considerable, as to reduce the value of the diamond one-half; now, however, the total produce does not exceed 240,000 carats annually, the value of which is about £1,000,000. The most productive district is at the present time the province of Matto-Grosso, in the vicinity of the town of Diamantina.

A short description of the mode of washing for diamonds may not prove uninteresting. When the dry season, which lasts from April to the middle of October, has diminished the depth of the different rivers, their waters are diverted in various places into canals dug for this purpose, so as to leave the bed of the stream dry. The soil is then dug out to a depth of ten to twelve feet, and deposited near the washing-huts. As long as the dry season lasts, the workmen continue to dig out the soil, called there by the generic name of cascalho; and it contains diamonds in so regular a proportion, that the miners are enabled to foretell, with some degree of certainty, what any given quantity of cascalho will produce. Sometimes they find holes containing quantities of diamonds and nuggets of gold.

The dry season over, the labour of washing commences, and the digging of the soil perforce terminates, in consequence of the quantities of water brought down by the rains. The huts, which are constructed near the heaps of cascalho, are furnished with long troughs, called canoes, with elevated seats for the overseers, who are always present.

The labourers, who are all negroes, take each a mass of "diamondiferous" soil, sufficient to fill the trough (about a hundredweight), and then allow a stream of water to run in; and continue to stir up the mass with the hands, until the water runs clear, and all the earthy particles are washed away. They then examine the pebbles which remain one by one, and when they find a diamond, give the signal by clapping their hands to the overseer, who takes it and puts it in a vessel filled with water, which hangs in the middle of each hut. The day's labour over, the weight produced is entered in a book. Large diamonds, as may be supposed, are of very rare occurrence. When a slave finds a diamond of eighteen carats he receives his freedom, and is led.

crowned with flowers, to the proprietor in a sort of triumphal procession, who generally gives him a present and allows him to work on his own account. For smaller stones proportional rewards are given. In spite of all precaution, numberless thefts take place; sometimes the slave, under the very eye of the overseer, conceals a stone in his hair, mouth, or ears, sometimes between his fingers or toes; and they have even been known to throw stones away in the hope of finding them again after night-fall.

When the labour and pains bestowed on this search is considered, the result appears hardly commensurate with the toil: the product of the yearly labour of 500 men can be readily carried in the hand. As previously stated, the discovery of large diamonds is very rare. On an average of 10,000 stones, there will not be one of eighteen carats found. The largest which has ever been found in the Brazils is the Star of the South, which, when rough, weighed 254 carats.

When a sufficient quantity has been collected, the diamonds are sent to Rio Janeiro; and as the distance is great, and the roads lie through endless primeval forests, the transit occupies a considerable period. In Rio, the miner sells his gems to the merchant, who ships them to Europe, or holds them, as the price and demand may induce him to act.

Diamonds are also found in Borneo, in the mountain-chain which borders the great river Banger, massing in the district of Jannah-Laut. Here, as in other places, they are accompanied by grains of gold. These mines employ some 400 persons, and the search is conducted in much the same manner as in other places.

Diamonds are also found in Sumatra, Java, and in the Ural Mountains.

Crystals of diamond have been found in Australia, but as yet of too isolated occurrence to warrant Australia being classed as a diamond-producing country.

When parcels of rough diamonds arrive here, they are sorted by an experienced person, and the various qualities separated. The stones that have a natural point, and which can be used for cutting glass, are first selected, and the badly-shaped and defective pieces are sent to be manufactured into roses; the worst quality, called "boart"—granular and imperfectly crystallized, and not infrequently worn by attrition into spherical globules, being quite unfit for cutting—is crushed into powder and used for cutting and polishing other diamonds, rubies, etc., and for engraving on hard stones, or other purposes. The "boart" is worth from 22*s.* to 30*s.* per carat.

Carbonate, or Diamond Carbon.

The substance called *carbonate* is found in the province of Bahia, and occurs, according to all accounts, in sandstone of very old formation, apparently of the same era as the gneiss and syenite rocks of Norway and Greenland. Its hardness is identical with the diamond, and its specific gravity 3·012 to 3·416; some specimens show an imperfect crystalline structure of a brownish-green opaque colour, others of a granular structure, porous enough to resemble pumice-stone, dense, very massive, and found sometimes in lumps as large as a walnut. It is extremely hard, in some cases, taking a polish equal to diamond, and appears to be carbon imperfectly crystallized; when burnt it leaves a residue of clay and some other substances. It is used in commerce in the form of powder to cut and polish diamonds and other gems, and is worth a few shillings per carat, according to the demand. Large quantities are exported to Switzerland for polishing rubies used in jewelling watches. It is said that specimens of this substance have lately been discovered in Mexico.

When carbonate was first discovered, it might have been purchased for a mere trifle; but now, as stated above, it commands a large price, which continues to increase with the demand.

This substance would appear to be the connecting link between uncrystallized carbon and the diamond, and a scientific examination of it might lead to important results.

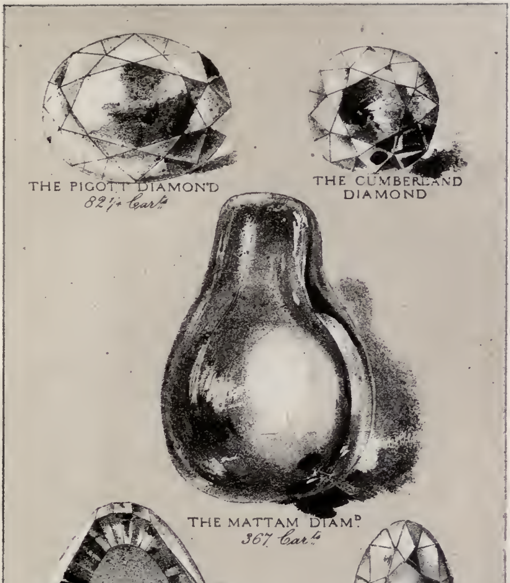
Diamond Cutting and Polishing.

The transcendent brilliancy of the diamond, its transparency and its refraction, are displayed very meagrely in rough stones. In order to render them susceptible of employment as personal ornaments, they must undergo the processes of cutting and polishing, which bring out the latent beauty in its true light; and, in fact, on the regularity of the facets and the perfect polish depends the value of the stone, nearly as much as on the original material; for, although no art can render a yellow brilliant white, still the purest stone, cut by unskilful hands, remains a dull mass, without life or lustre.

It is generally supposed that Louis van Berghem, or Berguem, was the first discoverer of the art of cutting and polishing diamonds by their own powder, in 1456; but this must be somewhat inaccurate, as already in 1373 the Emperor Charles had the clasp of his cloak ornamented with diamonds; and in church ornaments of even earlier date, were set diamonds with a table and four ground edges, and with the lower part cut as a four-sided pyramid.

In the inventory of the effects of the Duke of Anjou, made between the years 1360 and 1368, there is mentioned a diamond cut into the form of a shield. As yet, however, the mode of cutting was rude, and added scarcely at all to the lustre of the diamond, causing it to be ranked as less in value than many other gems.

In 1407, the art had made sensible progress under the direction of a clever artificer named Herman; and although the stones were still imperfectly cut, yet they must have had some lustre, as we find, that at an entertainment given to the King of France by the Duke of Burgundy, in 1410, the Duke of Burgundy gave away ten diamonds, which were valued at four hundred gold crowns, a considerable sum in those days.


THE PIGOTT DIAMOND
82¼ Carts
THE CUMBERLAND DIAMOND
THE MATTAM DIAMD
367 Carts
NASSAC DIAMOND
89 ¾ Carts
DRESDEN GREEN BRILLIANT
THE FLORENTINE BRILLIANT SIDE VIEW 139½ CTS

In 1456, Louis van Berghem, who had studied in Paris, discovered the art of cutting the diamond into regular facets; this discovery made so complete a revolution in the trade, that he was regarded as the parent of the art of diamond cutting, and he established in Bruges a guild of diamond cutters. In the year 1475 he made the first trial of his improved mode of cutting upon three large rough stones which were confided to his care by Charles the Bold, Duke of Burgundy. The largest was the stone known as the Sancy, which was lost in the disastrous fight of Granson; the second came into the possession of Pope Sixtus IV.; and the third, which was cut in the form of a triangle, was set in a ring, and was given to the faithless Louis XI. Robert van Berghem relates that his grandfather Louis received 3000 ducats for cutting these three stones. The pupils of Berghem established themselves in Antwerp and Amsterdam, leaving Bruges on account of the intolerance of the priests. Cardinal Mazarin patronized this industry greatly; he caused the diamonds in the French crown to be re-cut, and they obtained thence the name of the twelve Mazarins.

In the inventory of the French Crown jewels in 1774, the number 349 is described as the tenth Mazarin it is not known what has become of the rest.

The powerful protection of the Cardinal, and his example, caused a taste for these jewels to pervade all classes; and it is recorded that at this period Paris possessed seventy-five diamond cutters, who were well employed. Later, however, the trade declined, and from this date it seems gradually to have taken firm root in Amsterdam, where it still continues one of the principal branches of industry, and more than fifteen-sixteenths of the diamonds found are now cut there.

The so-called double cutting, "Brillants recoupés," was introduced by Vincenti Peruggi, or Peruzzi, at Venice, about the end of the seventeenth century. In England there used to be several cutters, who were renowned for the excellence and perfection of their work, and whose diamonds, still called old English, fetch a much larger price than any others. As in everything else, however, the reduction of the price of labour produced a corresponding falling off in the quality of workmanship. This trade in England is now nearly extinct.

In India, where numbers of diamonds are still cut, the work is rough and defective, as the natives, with the mistaken idea of enhancing the value of their gems, leave them as heavy in weight as possible; often preserving the natural shape of the stone, and disregarding one of the first rules of diamond cutting, that over- as well as under-weight detracts from the value of the stone; and ignoring the fact, that a diamond weighing, for example, seven carats, with only the spread of five carats, is worth only the price of a five-carat stone.

Of late years, the lapidaries have adopted a very injudicious method of cutting, leaving the stone, from the girdle to the culet, round, instead of angular, thus detracting from the play of the diamond; and, although increasing the weight of the polished stone obtainable from a given quantity of rough material, producing an inferior lustre and brilliancy; added to which, the edges of the stones, which should be sharp as a knife-blade, are left blunt and often quite rough, which causes a greyish appearance and detracts from the so-called "play" of the stone.

In Amsterdam this branch of industry occupies several thousand persons, mostly of the Jewish religion. The largest mills there are those of Mr. Coster, employing from 500 to 600 workmen. To this firm was entrusted the cutting of the Koh-i-Noor, after the Exhibition of 1851, and, later, the stone called the Star of the South.

Diamond Cutting.

By the operation of cutting, the natural crust of the diamond is removed, and the stone is formed into the shape required. In order to cut a diamond, two stones are employed, which are fastened into two sticks, the tops being filled with cement, into which each diamond is inserted, leaving exposed the part to be cut. The workman, who has leathern gloves on his hands, as well as a leathern stall on the right thumb, takes a stick in each hand, and leaning them against two upright pieces of iron, fastened on the edge of the cutting-bench, rubs the two diamonds together until he has produced a flat even surface (which is a facet), instead of the concave or convex form of the natural stone. The dust or diamond powder which falls is received in a square box, containing oil, and the powder is burnt before being used, to free it from the particles of cement that become mixed with it. By this means two facets are cut on two different stones at the same time. During the cutting, the workman examines the facets by means of moistening the stone with the tongue, first taking care to remove any powder with a camel's-hair pencil. When the facet is formed, the cement is heated, and the diamond taken out, and replaced so as to expose a different surface until the cutting is completed. It must be understood that by this operation only the general outline of the form is made. A stone which would have when quite completed fifty-eight facets, including the table and culet, receives in cutting only eighteen, eight of which are the surfaces of an octahedron or double pyramid, and are formed by the taking away eight edges or angles of these eight surfaces, one for the whole table, and one for the culet.

Diamond Polishing.

By the next process the diamond is not only polished, but the remaining facets are formed. This is done by means of diamond powder, on a steel disk, called "skaif," which is made to revolve at a very high degree of velocity, by means of steam- or horse-power. These wheels, or "skaifs," are prepared in the following manner :—The surface of the metal is rubbed with an ordinary whetstone, in such a direction as to form tangents of a circle, whose diameter is about a third of that of the "skaif." By this means the whole surface becomes covered with deep indentations, or scratches. Then a fine hone or Turkey stone is rubbed over again in the direction of the diameter, until the former marks are nearly obliterated; and by the crossing of the scratches a kind of soft grain is formed, which makes the metal fit to receive and retain the diamond powder, which is then spread on the skaif with olive oil, and the flat surface of a finished diamond held against it whilst in motion; by these means the powder is forced into the wheel.

The diamond to be polished is then inserted into a stick having a handle made of brass, with a hollow top filled with solder, into which the diamond is pressed whilst melting, and then allowed to cool; the diamond is thus fixed in its proper position. Of course, when one facet of the stone is polished, the solder must be melted, and the stone removed and replaced in another position.

This process completes at the same time the required shape of the diamond, and gives the necessary polish when the stone is ready for use. The work, as may be supposed, demands the greatest nicety: the least inattention or irregularity may spoil the stone; and when the minuteness of the facets required on a stone, some of which are so small that a thousand only weigh one carat, is considered, it will be readily understood that this process demands workmen skilled in a high degree.

The stones which, from their formation, are not adapted for the double cutting, as well as the splinters from other diamonds, are made into single cut,—a description of which is given hereafter. The rest are cut into brilliants or roses, of which the finest are sorted out for this country, the second quality sent to the Paris market, and the inferior descriptions to South America, Poland, Turkey, etc.

The best and most experienced judges are however unable to determine with certainty what any stone will be when polished, as, in the process of cutting, flaws and imperfections are often laid bare, which go much deeper than the appearance of the rough diamond would predict; and, on the other hand, the colour, apparent in the rough stone, is sometimes found to arise from the presence of flaws or specks, which are removed in cutting, thus leaving the stone white.

Diamond Crushing.

In order to reduce the boart to powder, it is placed in a steel crushing-mortar, fitted with an air-tight pestle; this, when struck violently with a hammer, reduces the stone into splinters; it is then put into a hardened steel mortar, with a little olive oil, to prevent the powder from flying about. The pestle, also a piece of hardened steel, is placed on it, and it is struck by a hammer, at the same time moving the pestle about until the whole of the fragments are completely crushed into an impalpable powder, which as well as the powder rubbed off in the cutting process previously described, is (when burnt to remove the oil) of a grey colour, and is worth from 16*s.* to 18*s.* per carat.

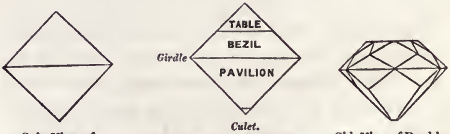
Diamond Splitting.

The splitting or cleavage of diamonds has a double purpose,—namely, the removal of defective parts, fissures, or specks in the stone, and the formation of facets in the rough. This operation is only applied to a diamond when its natural form does not admit of its being cut in the regular way without a great expenditure of time and labour. Stones of a rhombic dodecahedral form are nearly round, and the cutting is immensely shortened by splitting the facets from the rough; sometimes "usable" pieces are split off.

The workman must have an exact knowledge of the structure and cleavage of the diamond, and as the form of the brilliant corresponds nearly with that of the octahedron or dodecahedron, the natural direction of cleavage much assists the lapidary. In order to split a diamond it is fastened into a stick, the top of which contains cement, and the part required to be split off is left uncovered; to avoid missing the proper plane of cleavage, a line is scratched on the surface with another diamond, to mark the exact place. To make this line, three diamonds are used successively: the first a complete crystal, which marks out the direction; then a sharp splinter, to deepen the impression, and lastly a very fine splinter, to make a very deep mark. The cement-stick is placed upright in a piece of lead fastened to the workman's bench, a very fine knife is then inserted in the mark made, and the stone is split by a smart blow from the hammer.

There are some stones difficult to be split, and which are sawn with fine iron-wires fitted in a saw-bow, and anointed with diamond powder and olive oil. The same is sometimes done with large stones, on which the risk of splitting is too great to be incurred, or where the natural cleavage direction would reduce the size too much.

NAMES OF DIFFERENT FORMS INTO WHICH DIAMONDS ARE CUT.



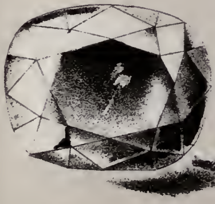
Side View of Rough Diamond.

Side View of Diamond Partially Cut.

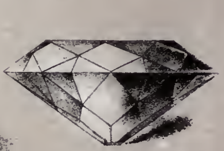
Side View of Double-Cut Diamond.

The woodcut annexed shows, first, a side view of a diamond in its natural state; next, when its upper and lower facets, which are called respectively the table and the culet, are made, the broadest part or edge of

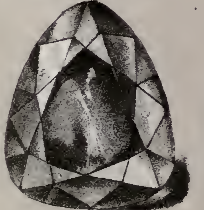
STAR OF THE SOUTH
Rough 254½ Cts



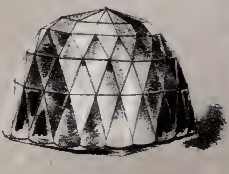
STAR OF THE SOUTH
Front view 125 Cts



STAR OF THE SOUTH
Side view



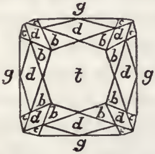
DROP SHAPED BRILLIANT 76½ Cts.
belonging to Mr E. Z. Dresden



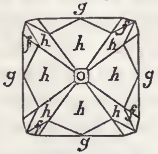
THE ORLOFF
194½ Cts

the stone being the girdle. The space from the upper part or table to the girdle is called the bezil or bizil; that from the girdle to the lower part, the pavilion. The facets on the bezil touching the table and forming triangles, are called star-facets; those touching the girdle are called skill-facets; and the lozenge-shaped facets touching both table and girdle, are formed by the meeting of the star and skill facets. The triangular facets touching the girdle of the under part are the under skill-facets; the culet is square or octagonal.

Front View of Double-Cut Brilliant.

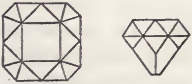


Back View of Double-Cut Brilliant.



t. The Table.
g. The Girdle.
d. The Pavilions.
b. The Star Facets.
c. The Skill Facets.
o. The Culet.
h. The Lower Sides.
f. The Under-Skill Facets.

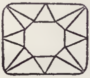
The double-cut brilliant is the most common form at the present day. The general form of the rough diamond is of two pyramids joined at the base: if a diamond is not naturally of this form, it must be made so by art; and in order to produce the table, there must be taken away from the upper pyramid five-eighteenths, and from the lower one-eighteenth of the total thickness. The upper or flat part is called the table, and from thence to the girdle or centre edge, and broadest part of the stone, are facets, called star-facets; from the girdle to the lower or pointed part, called the culet, and which is nearly pointed, are facets, called skill-facets. These facets meet in the middle of each side of the table and girdle, and also at the corners, forming regular lozenges on the four upper sides or corners of the stone. The triangular facets, on the under side from the culet to the girdle, must be half as deep again as the upper or star facets. The thickness of the stone should be in this proportion,—from the table to the girdle one-third, and from the girdle to the culet two-thirds of the total thickness; the diameter of the table four-ninths of that of the girdle, the culet one-fifth of the table. The girdle of the stone should be of the same dimensions as the thickness or depth. A stone, if well cut, should have a very thin edge at the girdle; and any overweight or substance retained to make a diamond heavier, only detracts from its play or beauty.



Front View. Side View.
Single-Cut Diamond.

The Single-Cut Brilliant.

In this form of cutting the table is square and there are sixteen triangular facets touching it on the girdle, the under part has (touching the girdle) twelve triangular facets, and underneath them eight long facets, making altogether thirty-eight facets. This is the old form of cutting.



Old English Single-Cut.

The old English single-cut, also called star single-cut, has, however, the table cut in the form of a star, like the above illustration.

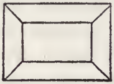


Table Diamond.
Front View.

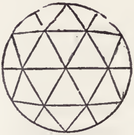
Table Diamond.
Side View.

The Table Diamond.

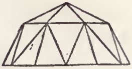
This form, which is occasionally seen on diamonds dismounted from old ornaments and stones coming from India, consists simply of a table, a culet, and eight or sometimes sixteen facets.

The Rose Diamond.

This mode of cutting differs from that of the brilliant, in that, instead of a pointed culet, the under part of the rose is quite flat, and the upper terminates in a point. The work on the stone consists of triangles, whose apices meet at the point or crown of the rose, and which are called the star-facets. The bases of these



Rose Diamond.
Front View.



Rose Diamond.
Side View.

touch another row of triangles reversed, so as together to form lozenges; and the apices of these under triangles touch the girdle of the stone, leaving spaces which are each cut into two facets. To be well pro portioned, the depth of the stone must be half the diameter of its under side; the diameter of the crown, three-fifths of the diameter of the base; and the perpendicular, from the base to the crown, three-fifths of the depth of the stone.

The round form is the most adapted for this mode of cutting, as this shape is much easier to cut well, and when skilfully treated has a great deal of fire. Roses are frequently cut drop-shaped, oval, and, indeed, any form of which the rough piece admits, care always being taken that the least waste of material is effected.

The rose diamond is frequently cut with many less facets, particularly those called Antwerp roses; but these are much less brilliant, and are only used for the commoner kind of work.

Rose diamonds have been unfashionable for a long time, being superseded by the brilliant form; lately, however, many persons have been purchasing and wearing rose diamonds, as the same amount of display is thereby secured at less than half the cost of the brilliant.

The Brilliolette, or Briolet.

In this mode of cutting, the diamond is formed exactly like two rose diamonds, joined together at the base; this is a very beautiful form, particularly for pendeloques; but these stones are very rarely met with.

SOME ACCOUNT OF LARGE DIAMONDS.

The Braganza.

THE Braganza forms part of the Portuguese crown jewels. It was found in 1741, in Brazil; its weight is 1880 carats, but great doubts exist of its being a diamond. Indeed, many persons imagine it to be a white topaz; but, as the Portuguese government will not suffer it to be examined, it is difficult to ascertain any facts regarding it.

The Mattam Diamond.

This diamond belongs to the Rajah of Mattam, in Borneo. It is of pure water, weighs 367 carats, and is of a pear-shaped form, indented at the thick end. It was found about the year 1760 at Landak, in Borneo, and has been the cause of a sanguinary war.

It still, however, remains in the possession of the Rajah of Mattam. The Dutch governor of Batavia offered two gunboats, with stores and ammunition complete, and £50,000 for it; but the offer was refused, the rajah replying, that on its possession depended the fortunes of his family.

The Koh-i-Noor.

The history of this gem has been so often told, that it would be superfluous to give any lengthened notice of it. The Hindoo accounts deduce it from the time of the god Krischna. We know, however, for a certainty, that it was in the treasury of Delhi, and was taken at the conquest of that city by Ala-ed-Din. Thence it came into the possession of the Sultan Baber, of the Mogul dynasty, in 1526. This prince esteemed it at the sum of the daily maintenance of the whole world. The jewel was seen by Tavernier among the jewels of Aurengzebe; it had however been reduced by the unskilfulness of Hortensio Borgio from 793 carats to 186 carats, the weight it possessed at the Exhibition of 1851. The Emperor Aurengzebe was so incensed, that he refused to pay Borgio the sum agreed on for the cutting, confiscated the whole of his possessions, and with great difficulty was persuaded to leave him his head.

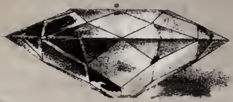
Nadir Shah, the conqueror of India, obtained by means of an artful trick, possession of this stone, and from the hands of his descendants it passed into the possession of Achmed Shah. His son, Shah Sujah, was in turn forced to deliver it into the hands of Runjeet Singh. After the capture of Lahore, at the time of the Sikh mutiny, it fell into the hands of the British troops, who presented it to Her Majesty Queen Victoria, on the 3rd June, 1850.

This brilliant was shown at the Exhibition of 1851; it then had an irregular form, with several hollows in its sides and base, and showed clear traces of natural cleavage planes. There were also several fissures, or cavities, in its surface. It was shown to several of the first scientific men of the day, Sir David Brewster among the number, who were of opinion that the stone presented great difficulties in the way of cutting. After much consideration, it was entrusted to Mr. Coster, of Amsterdam, who expressed himself confident as to the result of re-cutting; and the event proved the correctness of his judgment, for the stone, although of less weight than before, possesses nearly the same size, and, instead of being a lustreless mass, scarcely better than rock-crystal, it has become a brilliant, matchless for purity and fire.

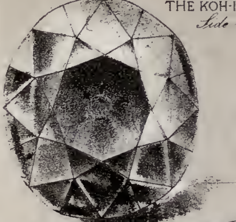
This diamond now weighs $106\frac{1}{16}$ carats, and forms part of the crown jewels of England.

The Cumberland Diamond.

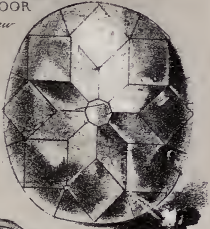
The sum of £10,000 was paid for this stone by the City of London, who presented it to the Duke of Cumberland after the battle of Culloden. It was one



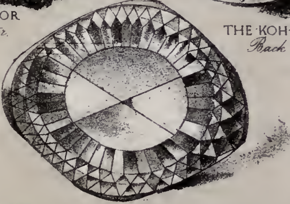
THE KOH-I-NOOR
Side view



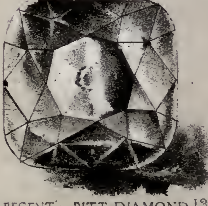
THE KOH-I-NOOR
recut by Coster.
102½ Car^ts
Front view.



THE KOH-I-NOOR
Back view



THE KOH-I-NOOR BEFORE RECUTTING
186 Car^ts



THE REGENT or PITT DIAMOND 136 C^TS

THE REGENT *Side view*

of the stones claimed by the crown of Hanover, and recently has been restored by Her Majesty Queen Victoria. It weighs 32 carats.

The Orloff Diamond.

This diamond is set in the sceptre of the Czars of Russia. It weighs $194\frac{1}{4}$ carats; like the Koh-i-Noor, it has the underside flat, and is rose-cut.

This diamond is supposed to have formed one of the eyes of an idol in a Brahmin temple. It is also said to have been set in the famous peacock-throne of Nadir Shah. Be its origin what it may, it is certain that it was stolen by a Frenchman, who sold it in Malabar for £2800. It was purchased by the Armenian Schaffras, who sold it to the Empress Catherine II., in the year 1774, for 450,000 roubles, a pension of 20,000 roubles, and a patent of nobility. It is now placed in the Russian Imperial sceptre.

The Polar Star.

Remarkable purity and brilliancy are the characteristics of this diamond, preserved among the Russian Crown jewels. At one period it was owned in this country.

The Shah.

Cosroes, the son of Abbas Mirza, presented this diamond to the Emperor of Russia. It weighs eighty-six carats, and is perfectly pure and free from blemish.

It is engraved with a Persian inscription, and has a groove cut into its edge.

The Regent or Pitt Diamond.

This jewel forms part of the French crown jewels. Its weight is $136\frac{3}{4}$. It was bought by the Duke of Orleans, then Regent of France, of Pitt, the Governor of Fort St. George, in the year 1717, for £135,000. When rough, the stone weighed 410 carats, and the cutting cost £2000. Pitt had purchased this stone in Golconda, of Jamelchund, a Hindoo merchant, as he informs us in a pamphlet published to clear himself from the reports made about his having stolen it. Pope mentions it:—

> "Asleep and naked as the Indian lay,
> An honest factor stole the gem away."
>
> *The Man of Ross.*

This diamond was stolen from the Garde Meuble, in 1792, but was restored in a mysterious manner. Its cutting cost £3500, and occupied two years. The Emperor Napoleon I. wore it in the pommel of his sword. It was shown at the French Exhibition of 1855.

The Eugénie Brilliant.

The Empress Eugénie possesses a perfect brilliant of fifty-one carats, of an oval shape, blunt at one end, very beautifully cut. It was purchased some years ago, by the Emperor Napoleon III.

The Florentine Brilliant.

This brilliant belongs to the Emperor of Austria. It weighs 139½ carats; it is of a yellowish colour, is rather thick, and is covered with facets like a rose diamond, being pointed both at top and bottom. The stone is supposed to be one of those lost at the battle of Granson, by Charles the Bold, Duke of Burgundy. It was found by a Swiss soldier, who sold it to a priest for one florin. It was then sold by a Genoese merchant to Ludovic Sforza, Duke of Milan, and afterwards came into the possession of Pope Julius II., who gave it to the then Emperor of Austria.

The Sancy.

This diamond is of an almond shape, and weighs 53½ carats. The stone was found on the body of the Duke of Burgundy, and was afterwards, in 1479, bought by the King of Portugal. In 1489, he sold it to Nicolas de Barly, Baron de Sancy, from whom it derives its name. Sancy sent it to the King as a present, by the hand of a servant, who being attacked by robbers, swallowed the stone, and after his death the stone was found in his body. It finally came into the hands of James II. of England, who sold it to Louis XIV., for £25,000. In the French Revolution it disappeared, along with the renowned blue diamond—which, strange to say, has never reappeared. Some years later the Sancy was sold to Prince Paul Demidoff.

The Pasha of Egypt.

As its name denotes, this brilliant belongs or did belong to Ibrahim Pasha. It weighs forty carats; is of octagonal form, and is brilliant cut; it is of very good quality and lively.

The Nassak, or Nassac, Diamond.

This diamond weighs $78\frac{5}{8}$, and before its recutting by order of the proprietor, the Marquis of Westminster, weighed $89\frac{3}{4}$ carats. It is of triangular form, with rounded facets, and was sold to Rundell and Bridge, in 1818, by the East India Company. Originally it was taken by the Marquis of Hastings at the conquest of the Deccan. When Messrs. Rundell and Bridge retired from business it was sold by auction.

The Piggott Diamond.

Late in the last century this diamond was sold by lottery for the sum of £30,000; it was subsequently bought by Rundell and Bridge for £6000. The weight is $82\frac{1}{4}$ carats. It was afterwards sold to the Pasha of Egypt for £30,000. The present possessor is not known.

The Hope Diamond.

This brilliant, formerly the property of the late Mr. Hope, is of a most brilliant sapphire-blue colour, and is unique of its kind. It weighs $44\frac{1}{2}$ carats, is of an oval form, and is a well-cut and good-proportioned stone. Since the disappearance of the French blue diamond, it is the most beautiful and important blue diamond in existence. At the Exhibition of 1851, it was universally admired.

The Star of the South.

This brilliant was found in 1853 at Bogagem, in the province of Minas Geraes, by a negro. When rough, it weighed 254½ carats, but since the cutting only 125 carats. It is of an oval form, and was cut by, and is the property of Mr. Coster, of Amsterdam. The fire is considerable, and although not perfectly white and pure, it is one of the finest large diamonds extant. At the Exhibition of 1862, it was exhibited in the Dutch department.

Other Large Diamonds.

One of the finest large diamonds at present in the market, is a drop-shaped diamond, in the possession of Mr. Dresden, a City merchant; it is perfectly pure, free from defects, and has extraordinary play and brilliancy, indeed the quality of the stone is superior to the Koh-i-noor; the weight is 76½ carats. It was lately found in the Brazils.

Besides those specified here, there exist several very large diamonds amongst the treasures of various countries. In the Russian treasury is a brilliant red diamond of 10 carats, bought by Paul I. for 100,000 roubles.

In the "Grüne Gewölbe," at Dresden, is a green diamond, of $48\frac{1}{2}$ carats, and of the most remarkable beauty, which belonged to Augustus the Strong.

The crown of Portugal possesses one of $138\frac{1}{2}$ carats, which was found in the river Abaïte, in Brazil, by three convicts. The Brazilian government also possesses some very large and curious stones. The Grand Duke of Tuscany has one of a most beautiful blue, faceted all over. The Sultan of Turkey has two, one of 84, one of 147 carats in weight. In the interior of India, Pegu, and China, there are said to exist some very large diamonds, but we have as yet no authentic particulars of them.

On the Value of Diamonds.

The diamond occupies the highest rank amongst precious stones, and possesses an intrinsic value in almost every part of the globe. The discrimination of the various qualities, colours, etc., which exercise an immense influence over its value, is however difficult, and requires a long experience; but it is easy for the most inexperienced to ascertain whether a diamond be perfect or not, so that the undermentioned particulars, and a comparison with the Table of Value and plate of Sizes, will enable such persons to arrive at the value of any particular stone if it be white and free from defect, although it will not enable them to value inferior or defective gems.

The value of the rough diamond is calculated at half its weight, as it is supposed to lose fifty per cent. in cutting and polishing; and the price of cutting may be estimated at about 15*s.* per carat. The value depends on the colour, size, and form of crystals, and for stones under two carats in weight ranges from £2 10*s.* to £5 per carat. Great caution must be exercised in purchasing rough diamonds, as parcels frequently contain colourless spinels, which have a similar form, pieces of quartz, topaz, etc.

For the valuation of polished diamonds, the only Tables used in the trade are those made by Jeffries, 1750, which are based on the assumption that a diamond increases in value in proportion to its weight, in the ratio to the square of its weight, that is to say, supposing the value of a one-carat stone be £8, one of two carats will be worth $2 \times 2 \times 8 =$ £32; and he continues the same mode of calculation up to stones of 100 carats. Possibly these Tables may have been correct in his time, but from various causes the price of diamonds has enormously increased during the last twenty years on all stones below five carats in weight, although not so in the larger sizes, or at all events in anything like the same proportion. Diamonds follow the same laws which govern the value of every other commodity—those of supply and demand—and as the production of these gems has diminished, and the number of wearers greatly increased, the price has gone on augmenting, and no doubt will continue to augment, unless some unforeseen occurrence, such as the discovery of a new diamond mine, or other source of large production, takes place.

The number of persons able and willing to invest the sum of money required for the purchase of large stones has not increased in anything like the same proportion, and therefore their value has not advanced in the same ratio as the smaller sizes. It is impossible to lay down any rule by which to calculate the value according to any arbitrary connection with the weight; as any particular size is in demand or not, so does that size augment in price or diminish; for instance, at the present moment a perfect one-carat stone is worth £18, but a five-carat stone is not worth £450, which is the value it would have according to Jeffries, but £320, and so on.

It is, therefore, a matter of infinite difficulty to fix a price which shall be a reliable one both to buyer and seller, and the prices given in the Table accompanying this book are the market prices of the present day, subject, however, to the same changes as other articles, although, from the scarcity of the rough material, and increasing demand, they seem likely still further to rise.

For a diamond to be worth the price fixed against it in my table, it must possess the following qualifications:—

1. It must be perfectly free from the faintest tinge of colour *of any sort;* from any flaws, specks, marks, or fissures in any part; must be bright and lively, and free from what is technically called 'milk' or 'salt,' which are semi-opaque imperfections in the body of the stone. In

order to ascertain this, it is sufficient to breathe on the stone, when any defect or colour will be apparent. It is necessary to look at a stone on all sides, as a defect may exist which is not visible in looking at the table.

2. The stone must be well proportioned and properly cut, and be of the size shown in the annexed plate. The culet must be one-sixth of the size of the table, from the table to the girdle must be one-third, and from the girdle to the culet two-thirds of the whole thickness of the stone. The size of the table should be four-ninths of the extreme size of the stone; any diamond having its substance otherwise divided, is badly proportioned, and therefore worth less than a properly proportioned stone.

The value of stones above five carats is not attempted to be given, as it is impossible to fix it with any accuracy, this depending entirely on the demand for any particular size, and the supply in the market. With regard to very large stones, their price is always a matter of negotiation, independent of any market rates, and in a great measure depending on the necessity of the seller, and the desire of the buyer.

When a diamond has a very decided colour, such as blue, red, green, &c., it is called a fancy stone, and will bring a most exorbitant price. A stone of five grains, of a brilliant emerald-green, for which if white not more than £28 could be obtained, has been known to sell for £320; and the price could readily be obtained again, did the possessor wish to part with it.

The terms, FIRST WATER, SECOND WATER, etc., mean only first and second quality. Diamonds when perfect should be clear as a drop of the purest water; and they are described as second or third water when more or less clear, until decidedly yellow or brown, when they are termed coloured. The value of coloured brilliants under one carat, is from £4 to £7 per carat, depending on the degree of tinge; but, as it requires the judgment of a practised eye to estimate the difference of the shade, and consequently of value, it would be useless to give any closer valuation.

The value of stones of the first quality, of a less weight than two grains, is £10 to £10. 10*s.* per carat, the second quality £8. 15*s.* per carat, the third £7. 10*s.* per carat.

The plates of sizes given in this work are drawn according to the rules laid down. Unfortunately, the diamond cutters of the present day turn their attention more to the production of the greatest weight from a given quantity of rough diamond, than to the production of perfectly-proportioned stones, for which reason we often meet with stones weighing three carats whose proper weight should be two, which renders them less valuable and not nearly so brilliant as one of two carats properly cut. Any over or under-weight only detracts from its beauty.

One great reason of the exorbitant prices sometimes charged to the public, is generally owing to the ignorance of the retailers of the real value. Consequently, they are at the mercy of the merchant, who makes them pay far more than the market value; and to the inexperienced purchaser, the best security for obtaining a fair value for his money will be found—in this commodity as in any other—in the knowledge and character of the vendor.

Many fluctuations have taken place in the value of this gem, since the discovery of the art of cutting it in 1457, which first gave it a value in Europe. At first the imperfect communication with India, and the small number of persons sufficiently wealthy to purchase them, confined their possession to the princes and nobles of the period. The value of money, also, was so much greater in proportion to the prices of the staples of life, that even if the values then obtained were known to us, it would give but a faint idea of their prices in comparison with those of this day. In 1606, at a sale by auction at Venice, of the effects of a great diamond merchant named Giovanni Ricardo, the price of a diamond weighing one carat, as recorded by Portaleone, in his work called 'Shilti Hageborim,' was £21. 13*s*. 4*d*.; in the year 1750, just before the discovery of the diamond mines in the Brazils, the price of a stone of the same weight was £8; and, in 1791, the commission of French jewellers, appointed by the National Convention to value the Crown jewels, fixed the price of diamonds of one carat (which we may infer were of fine quality) at no more than £6. Before this time, however, the importation of diamonds from Bahia had lowered the value still more, but the price of diamonds had then risen in consequence of the uncertainties of life and property in this time of trouble. After the fall of Napoleon, and the peace that ensued, the price rose steadily until the year 1848, when, on the outbreak of the revolution. carat stones fell to between £4 and £5 each, in consequence of the large quantities that were suddenly forced on the market. As in the previous revolution, however, they quickly began to rise in value, and since that time a steady rise of about ten per cent. per annum has taken place, and in consequence of the production of the diamond mines decreasing, and the desire for this gem becoming more universal, another augmentation is expected. Annexed is a Table of the present values, and following this is a Comparative Table of the values of diamonds in the year 1606 and 1750, which may prove of interest to those who desire to study the history of precious stones, or who care to note the rise and fall of prices, as fashion on the one hand, and supply on the other, affect the value of commodities.

THE PROPER SIZES OF WELL PROPORTIONED BRILLIANTS OF THE VARIOUS WEIGHTS.

The Black Lines underneath, show the relative thickness each should have, and the round dots the size of the Culet.

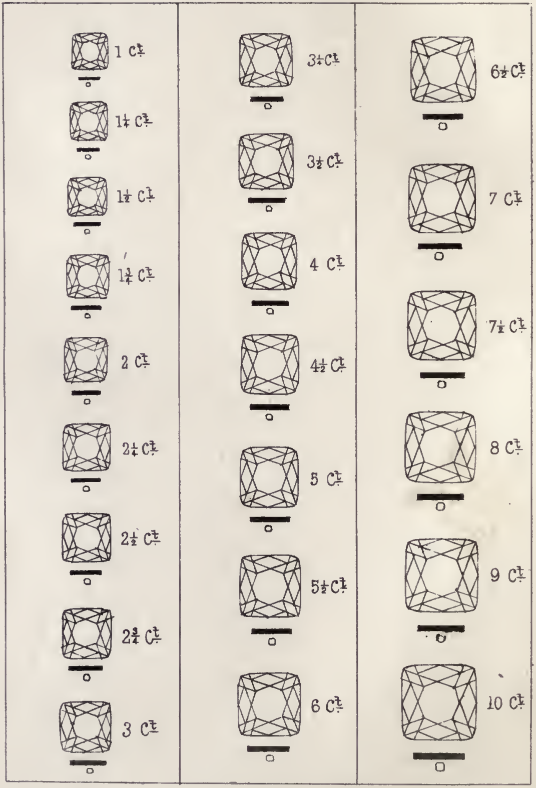


TABLE SHOWING
VALUE OF BRILLIANTS UP TO FIVE CARATS.

The Prices given below are those of perfectly white and pure Brilliants, free from defects or flaws, of the proportions shown, and liable to variation with the changes of the market.

				Value in 1865. £	s.
A Brilliant	weighing	$\frac{2}{4}$	of a carat . . .	6	0
,,	,,	$\frac{3}{4}$	,, . . .	11	0
,,	,,	1	,, . . .	21	0
,,	,,	$1\frac{1}{4}$	,, . . .	35	0
,,	,,	$1\frac{1}{2}$	,, . . .	45	0
,,	,,	$1\frac{3}{4}$	,, . . .	55	0
,,	,,	2	,, . . .	80	0
,,	,,	$2\frac{1}{4}$	,, . . .	90	0
,,	,,	$2\frac{1}{2}$	,, . . .	110	0
,,	,,	$2\frac{3}{4}$	,, . . .	120	0
,,	,,	3	,, . . .	140	0
,,	,,	$3\frac{1}{4}$	,, . . .	150	0
,,	,,	$3\frac{1}{2}$	,, . . .	175	0
,,	,,	$3\frac{3}{4}$	,, . . .	190	0
,,	,,	4	,, . . .	220	0
,,	,,	$4\frac{1}{4}$	,, . . .	240	0
,,	,,	$4\frac{1}{2}$	,, . . .	300	0
,,	,,	$4\frac{3}{4}$	,, . . .	330	0
,,	,,	5	,, . . .	350	0

Weight by which Diamonds and precious stones are calculated.

4 grains	. . . . . .	1 carat.
$151\frac{1}{2}$ carats	. . . . . .	1 oz. troy.

COMPARATIVE VALUES OF DIAMONDS IN 1606 AND 1750.

The value of Diamonds in the year 1606, as sold in Venice by the diamond merchant Giovanni Ricardo. Copied from a Hebrew work by Portaleone.	£.	s.	d.	*The value of Diamonds in the year 1750. Taken from the tables of David Jeffries.*	£.	s.
A brilliant weighing 3 grains	15	3	4	A brilliant weighing 3 grains	6	0
" " 1 carat	21	13	4	" " 1 carat	8	0
" " 1¼ "	36	16	8	" " 1¼ "	12	10
" " 1½ "	58	10	0	" " 1½ "	18	0
" " 1¾ "	75	16	8	" " 1¾ "	24	10
" " 2 "	86	13	4	" " 2 "	32	0
" " 2¼ "	97	10	0	" " 2¼ "	40	10
" " 2½ "	119	3	4	" " 2½ "	50	0
" " 2¾ "	162	10	0	" " 2¾ "	60	10
" " 3 "	195	0	0	" " 3 "	72	0
" " 3½ "	216	13	4	" " 3¼ "	84	10
" " 4 "	260	0	0	" " 3½ "	98	0
" " 4½ "	303	6	8	" " 3¾ "	112	10
" " 5 "	346	13	4	" " 4 "	128	0
				" " 4¼ "	144	10
				" " 4½ "	162	0
				" " 4¾ "	180	0
				" " 5 "	200	0

In this list of values the ducat of 6 liri 4 denari is computed at 4*s.* 4*d.* *per ducat.*

Rose Diamonds.

Rose diamonds are so called on account of the form in which they are cut, and were until lately but little used, except in the smaller sizes, to place in settings where the space or depth was too small to admit of a brilliant being employed. The rose-cut diamond has however lately again come into fashion, and the prejudice which has been entertained against them arises in a great measure from the ignorance of the purchasers, who, when told that such a stone is a rose, imagine it to be no diamond, being unaware that roses and brilliants are identically the same stone cut into different forms.

The rose-cut diamond is very lively, and makes a great display at a small cost, roses being manufactured from pieces of "rough" which from their thinness are incapable of forming brilliants. They are infinitely more lustrous than those stones called spread brilliants, which, from their want of depth, are lustreless and glassy. The smaller sizes are sold in packets containing generally 500, and have to be handled with great care, as the breath suffices to blow them away, and the delicate edges are very liable to break. They have sometimes been made so small, as to require 1500 to weigh one carat; and, when the number of facets on each is considered, the delicacy and minuteness of the work may be imagined.

Roses are still sometimes used for watch jewelling, but rubies are now preferred. Large rose diamonds fluctuate considerably in value, and their price can never be depended upon. They are not much used or esteemed in Europe, and it would be impossible to give any precise value, although they are supposed to be worth as much as brilliants of the same weight.

The small rose diamonds, if under 40 to the carat, are worth 1*s.* 6*d.* to 5*s.* each; above that size and up to one carat, they fetch from £9. 9*s.* to £11. 11*s.* the carat. In the Green Vaults at Dresden, and in the treasure chamber at Vienna, may be seen some very large and fine rose diamonds.

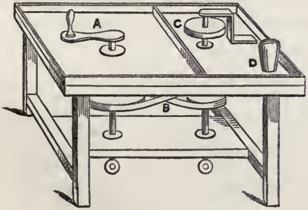
The Brilliolette, or Briolet.

This is a beautiful form of diamond, but is so rarely met with that it would be useless to give it any fixed value. It is generally considered more valuable than a brilliant of the same weight.

A description of the form has already been given.

ON THE CUTTING OF COLOURED STONES

A SHORT description of the mode of cutting and polishing gems, and an explanation of the shapes into which they are cut, may prove of interest.

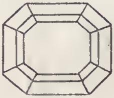


Lapidary's Bench and Wheel.

The accompanying woodcut shows a lapidary's bench

A is a handle which turns a large wheel on which runs an endless band moving a smaller wheel, B, which turns the disk or skaif, C,—made of various metals—at a high rate of speed. The lapidary turns the handle with one hand, and with the other, supported by the rest, D, holds the gem to be cut (firmly inserted on a cement-stick softened by heat) against the disk, which is covered with the diamond-powder or emery, according to the hardness of the stone. When one or two facets are made, he again heats the cement, removes the stone, and refixes it, exposing another part to the action of the wheel until the stone is completed; for polishing, a similar wheel of lead, zinc, or wood, is used with tripoli, rottenstone, vitriol, or rouge.

The names of the various parts and facets of a coloured stone are precisely the same as those of the diamond. The forms of the brilliant, rose diamond, single-cut diamond, etc., have been already described under the head of "Diamond;" it is therefore only necessary to describe the following, which are shown in the wood cuts. The first is the

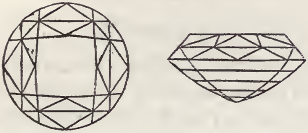


Front View.

Side View.

The Trap or Step Cut.

This is the most usual, besides being the most advantageous form of cutting emeralds and other coloured stones. In this mode of cutting, the facets run longitudinally round the stone from the table to the girdle, and from the girdle to the culet. There are generally only two or three steps from the table to the girdle, whilst the number of steps from the girdle to the culet depends on the thickness and depth of colour of the stone.



The Mixed or Brilliant Top Cut.

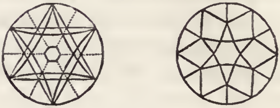
The Mixed or Brilliant Top Cut.

In this form the gem preserves the trap-cut up to the girdle, while the upper part has an elongated brilliant cut.

Front View. Side View.
Cabochon or Tallow-topped.

The Cabochon, or Tallow-Topped.

This form, which derives its name from the resemblance it bears to a drop of tallow, consists of two flat arches, the upper one more arched than the under; sometimes the edge and under side are faceted.



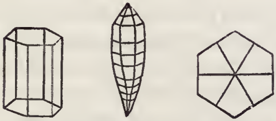
Back View. The Star Cut. Front View.

The Star Cut.

This form of cutting, which is only adapted for very fine gems, requires the utmost nicety; the table is hexagonal, and exactly a fourth of the whole diameter of the stone. From this table spring six equilateral triangles, whose apices touch the girdle, and these triangles, by a prolongation of their points, form a star.

THE RUBY, SAPPHIRE, ORIENTAL TOPAZ,

ETC.



Crystals of Ruby, Sapphire, etc.

ALL the above stones are properly corundums, being identical in every particular but that of colour, which difference may be said to be the only cause of a change in the name. The red sapphire is a ruby, the blue ruby a sapphire, the yellow a topaz, etc. The name corundum itself is of Indian origin, derived from the Sanskrit *korund*, and is applied only to the opaque massive varieties, which, however, present the characteristic hexagonal crystal, and are generally of a dull colour. The first European to class all the varieties of this gem under their proper names was Count Bournon, in the year 1802. The Eastern nations had, however, for several centuries adopted this classification.

A coarse variety of corundum is called emery, and is largely used for polishing metals, gems, marbles, etc. The principal source of this material is the island of Naxos, although it is found in Cornwall, Spain, Italy, and Asia Minor.

In the States of New York and New Jersey, red and blue corundum is found in crystals, in a matrix of micaceous limestone, accompanied by black spinels and other gems; these crystals are perfectly opaque, and although of a fine colour cannot be used for jewellery. They are of small size, seldom exceeding an inch in length.

The first and more important variety is the Ruby, or red sapphire, which is the most valuable of all gems when of large size, good colour, and free from flaws,—exceeding even the diamond itself in value. The specific gravity is 3·9 to 4·1; its hardness is superior to any known substance except the diamond, being numbered 9 in Mohs's scale. It is susceptible of electricity by friction, and retains it for a considerable time. As will be seen, it is composed of alumina, and coloured by traces of metallic oxides, chrome, etc.:—

Alumina	98·5
Oxide of Iron	1·0
Lime	0·5

The various analyses prove that it does not contain silica, as has sometimes been erroneousiy stated.

The ruby as well as all other corundums is infusible alone, but in combination with a flux melts with difficulty into a clear glass. It is possessed of double refraction, although not to a very high degree.

According to mineralogists, the system of crystallization to which all these stones belong is rhombohedral. The cleavage is basal, or in other words, the crystal breaks across the prisms with nearly a flat surface.

The lustre is vitreous. Occasionally specimens are found asteriated, or possessed of a star in the direction of the axis, the points of which terminate at the flat plane of the hexagonal prism, in a section across it.

Rubies are found associated with sapphires, zircons, spinels, oxide of tin, magnetic iron, rutile, topaz, etc., sometimes in perfect crystals but slightly abraded, taper at each end; often the crystal exhibits various colours, in section across the prism, perhaps blue at both ends, and white and red in the centre, sometimes reversed, sometimes with yellow instead of red; frequently the blue passes into black, at the extremities of the prism. These stones are usually found in hexagonal rounded prisms, in layers in the earth, or beds of rivers and streams, in various parts of the globe, never in a transparent crystal in any rock matrix, although the opaque variety of corundum called emery, is found in rocks in many countries. Where rubies and sapphires are met with, gold is almost sure to be present.

The finest rubies occur in the kingdom of Ava, in Siam, in the Capelan Mountains, ten days' journey from

Syrian, a city in Pegu. They are also found in Ceylon, at Hohenstein on the Elbe, in the Rhine and Danube, in Brazil, Hindustan, Borneo, Sumatra, in Australia, in France, in the rivers Espailly in Auvergne and Iser in Bohemia, etc. etc.

The ruby mines of Burmah, whence come the finest stones, have long been known, and the king is said to possess the rarest and most wonderful specimens. They are worked by sinking shafts, until the ruby-producing soil is met with, which occurs at various depths, sometimes within two feet of the surface, sometimes thirty feet below it; when this stratum is found it is followed up until it becomes necessary to sink another shaft, or until it is exhausted; the stones found are almost always small, and seldom free from defects; the rhombohedral crystals are rarely perfect, and usually worn down into rounded surfaces. These mines are rigorously guarded, no European being allowed to approach them on any pretence. They are a royal monopoly, and fine stones can only be smuggled away, as the order is to retain all for the king's treasury. When a particularly large and fine stone is found, it is usual to send out a procession of grandees with soldiers and elephants to meet it. One of the titles of the king of Burmah is Lord of the Rubies.

In Ceylon, whence occasionally come some fine rubies, they are found in the beds of rivers; the blue variety, the sapphire, is much more frequently met with, and the crystals are generally found of a much larger size than those found in Burmah.

Some specimens have lately arrived here from Australia, but they are not of good quality.

The colour of the ruby varies from the lightest rose-tint to the deepest carmine. Those too dark or too light are not esteemed. The most valuable tint is that particular shade called by jewellers the "pigeon's blood," which is a pure deep rich red, without any admixture of blue or yellow.

The stones called spinel and balas rubies are not rubies at all, but belong to the class of spinels, a stone of an entirely different nature, and form of crystallization. Many of these stones are sold by fraud or error for the true or Oriental ruby, but the difference may be easily detected, both by the different specific gravity and hardness. Several of the gems sold for Ceylon rubies are spinels, and even many persons in the trade are not aware of the difference. In ancient times the words ruby and carbuncle were applied indiscriminately to all red stones, and even now the words are frequently applied to various gems. The tourmaline is called a Brazilian ruby, when of a red colour; the same term is also occasionally given to the artificially coloured topaz. This loose nomenclature is very apt to deceive the inexperienced, who imagine a ruby only to mean the oriental corundum. Some very interesting experiments have lately been made by chemists, who have succeeded in forming by artificial means, minute crystals of a red colour, of precisely the same form of crystallization, and of equal hardness to the natural ones, but as the crystals produced are invariably minute, and as small rubies, such as are used for watch jewelling, are plentiful in nature, it is doubtful whether the trouble and expense of manufacture will ever prove remunerative.

These crystals are produced by heating alumina for a long period with borax in a platinum vessel. The borax first dissolves the alumina, and then the elements of the borax separate and disappear by volatilization, leaving the alumina in a crystallized state. Coloured crystals of alumina have also been made by bringing the gas, fluoride of silicon, into contact with the vapour of boracic acid at a high temperature; mutual decomposition takes place, fluoride of boron escapes, and the alumina is left distinctly crystallized. It is curious that the same matter, under identical circumstances, communicates sometimes a red and sometimes a blue colour, which fact corresponds with the conditions in which both rubies and sapphires are found in nature, both blue (sapphires) and red (rubies) crystals occurring together.

The asteriated corundums, which are called star ruby and star sapphire (*saphir, ou rubis astérié*), according to their colour, have a six-pointed star across the crystal, similar to the woodcut page 101. This star appears to be formed by a "silky" imperfection in the gem, and when examined by the light of the sun, or of a candle, shows forth with great distinctness. Large prices have frequently been obtained for such stones, and when the gem possesses a fine colour, the asteriation adds greatly to its beauty. They are cut *en cabochon*, and care is taken to get the centre of the star as nearly as possible in the middle of the gem. These stones are never found of a green colour. This variety has always been highly esteemed in the East. Brahmin traditions speak of the abode of the gods lighted by enormous rubies and emeralds, and one of the names of the kings of Pegu, as we have seen, was "Lord of Rubies." In China, rubies have been used from the earliest times for ornamenting the slippers of women, and there, as in India, they are to be met with incrusted into jade vases, sword handles, or pipe mounts. In the authorized version of the Bible they are spoken of in the Proverbs and in the Book of Job, and there can be no doubt that the ruby was well known to the ancient Greeks and Romans. The anthrax of Theophrastus, and the Indian carbuncle spoken of by Pliny, were no doubt rubies, and both authors ascribe to it the power of giving light in the dark. Ancient cameos and intaglios are still in existence, engraved on this stone, about 500 years B.C., which, as is well known, was the highest period of Greek art.

According to Pliny, the Ethiopians had a way of increasing the splendour of rubies by laying them for fourteen days in vinegar, which increased their lustre for a time, but afterwards made them softer and more brittle.

In later ages, the magical properties assigned to the ruby were that it was an amulet against poison, plague, sadness, evil thoughts, wicked spirits, etc. It also kept the wearer in health, and cheered his mind; and it was thought that if he or the donor were in danger, it would become black or obscure, and would not reassume its pristine colour until the peril had passed away.

The ruby is cut by means of diamond powder on an iron wheel or skaif, and polished on a copper one with tripoli and water. In the East they use corundum wheels for the cutting, but the work is not flat and sharp. The best and most usual form of cutting the ruby is the mixed or half brilliant, although silky and imperfect stones are frequently cut *en cabochon.*

The number of large rubies in existence, of fine quality, is very small; one of the largest in the French crown jewels adorns the order of the Golden Fleece, and is cut into the form of a dragon with extended wings.

The two large stones which were shown amongst the jewels of Her Majesty, at the Exhibition of 1862, as rubies, are simply spinels; an examination of their specific gravity and hardness would soon show the truth of this assertion.

In Tavernier's travels he speaks of a ruby in the possession of the king of Vishapoor, weighing fifty carats and of fine quality.

The king of Burmah is said to possess a ruby as large as a pigeon's egg, of extraordinary quality; but no European having seen it, its existence may or may not be a fact. In the Russian treasury is said to be one of a very large size, which was presented by Gustavus III., king of Sweden; and among the crown jewels of Austria are several of fine quality and considerable size

The value of the ruby, as before mentioned, exceeds, when perfect, that of any other gem. The rare occurrence of specimens of the desired vivid pigeon's-blood colour, of any size, causes the value to increase in an even greater proportion than the diamond, as a glance at the subjoined scale of prices will at once show, premising, however, that the prices given are for the *finest and purest rubies,* well spread and proportioned:—

A ruby of one-carat weight is worth	.	£14 to £20
One-and-a-half carats	,,	.	25 to 35
Two carats	,,	.	70 to 80
Three carats	,,	.	200 to 250
Four carats	,,	.	400 to 450

The value of rubies below the weight of one carat ranges from £2 to £8 per carat, whilst stones of greater weight than four carats are of such exceptional occurrence as to command fancy prices.

Of course, rubies which are flawed, specky, or which have any so-called silky or milky appearance, either on the table or beneath it, or which are of too deep or too pale a colour, are worth far less. A ruby of four carats, of a pale colour, might not be worth £12; violet-coloured and blackish rubies are also of very small value in comparison with those of the true blood-red tint.

The price of violet and pale-coloured rubies is also susceptible of great changes: at some times such stones bring comparatively large prices, at others, very small ones. Some years ago, the pale rubies were much sought after for the Paris market; but, latterly, the demand for them has slackened, and rubies of the same deep tint as are here most esteemed are preferred.

THE SAPPHIRE.

The Sapphire, as already mentioned, is identically the same stone as the ruby. It has the same composition, hardness, electrical and other properties. It differs in name from the ruby on account of the colour, which varies from white to the deepest blue and black. The blue of the sapphire is very seldom pure, or spread over the whole substance of the stone. Sometimes it is mixed with black, which gives it an inky appearance; sometimes with red, which, although imperceptible by daylight, yet by candle-light gives an amethystine appearance. Two sapphires, which by daylight may appear of the same hue, often differ extremely in colour by night. In many of these stones, where the colour is partially dark, the lapidary has a method of cutting, by which he takes away the dark-coloured part, with the exception of a small spot reserved for the culet, whilst the upper part of the stone is perfectly white; so that when such a stone is looked at from the table, it will present a most vivid blue hue, often superior in appearance to those stones which are coloured throughout. If the stone be held in a pair of ordinary forceps—or "corn-tongs," as they are termed in the trade—an inch beneath the surface of clean water, the parts of the stone coloured and uncoloured will be distinctly apparent.

This remark applies to all other gems.

The asteriated varieties, called star sapphires, are usually of a greyish-blue tint, and the star is exhibited in its greatest perfection when looked at by the light of the sun, or of a candle.

The sapphire is found of all tints and shades of blue, but the colour which approximates to blue velvet of the shade formerly called "*bleu du roi*" is the most valuable; a really fine sapphire should appear blue by candle-light as well as by day. This stone occurs generally in crystals of much larger size than the ruby. It is found principally in Ceylon, where the red variety is of unfrequent occurrence; it seldom occurs in very minute crystals. In Switzerland, sapphires of inferior quality are used in large sizes for jewelling clocks.

The name 'sapphire' is perhaps the only one which runs through all languages, with very slight alteration. The Hebrew name is ספיר, *sapphir,* the Chaldaic *sapirinon,* the Greek *zaffiros,* the Latin *sapphirus,* etc.

The ancients applied the name of this gem indiscriminately to all stones of a blue colour. Pliny, Theophrastus, Aristotle, and others, speak of a blue stone, spotted or veined with gold (which was most probably lapis-lazuli), which they called Sapphirus, although they were aware of the existence of the true or Oriental sapphire. Isidorus remarks, "Sapphirus cæruleus est cum purpura, habens pulveres aureos sparsos," the particles of pyrites, which are frequently disseminated through lapis-lazuli, having the appearance of gold.

To the sapphire has been ascribed the following magical properties:—That it prevents evil and impure thoughts. That it is such an enemy of poison, that if put into a glass with a spider or venomous reptile, it will kill it. St. Jerome, in his exposition of the 19th chapter of Isaiah, says that the sapphire procures favour with princes, pacifies enemies, frees from enchantment, and obtains freedom from captivity. This gem was sacred to Apollo, and was worn when inquiring of the oracle at his shrine. It was esteemed as a remedy against fevers, and hence the old distich:—

> "Corporis ardorem refrigerat interiorem
> Sapphirus, et Cypriæ languida vota facit."

Galen and Dioscorides also speak of its medicinal properties. Boetius says that on account of its attachment to chastity, it was worn by priests.

The ancients called sapphires male and female, according to their colours; the deep coloured or indigo sapphire was the male; the pale blue, approaching the white, the female.

The value of the sapphire does not, like that of the ruby, increase so enormously in proportion with its size. A fine, perfect, evenly coloured, spread sapphire, weighing one carat, of a deep rich blue colour by night as well as by day, is worth £20; whilst a sapphire equally fine, of 100 carats, would not be worth more than £2000 to £3000. A ruby of the same size and perfection would be the most valuable gem in existence, surpassing even that of the finest diamond.

When sapphires are of inferior quality they are worth much less, but as the value entirely depends on the degree of colour, which requires an experienced eye to distinguish, it would be useless to give any valuation; but it must be remembered, that when a stone is too thick in proportion to its surface, its value must not be estimated by the weight it possesses, but by the weight it should have were it properly proportioned.

The treasuries and regalias of Europe possess sapphires of very large size. In the green vaults at Dresden are, or were, several of remarkable size and beauty. In the Russian treasury are some of an enormous size, amongst them one of a light-blue tint, which formerly was in the possession of the late Mr. Hope.

In the Vienna Kronenschätze, there is one of marvellous beauty and great size.

A noble lady in this country formerly possessed one, which is perhaps the finest known. This lady, however, sold it during her lifetime, and replaced it by an imitation so skilfully made, as to deceive even the jeweller who valued it for probate duty; and it was estimated at the sum of £10,000, and the legacy duty paid on it by the legatee, who was doubtless chagrined when he discovered the deception. At the last Paris exhibition there might have been seen a collection belonging to a lady, distinguished alike for her magnificent charity and her wealth; also an oval sapphire and a drop of enormous size and great purity, belonging to a Russian countess.

The white sapphire resembles the diamond to such a degree, that when well cut and polished, it has been sold to persons conversant with the trade as a diamond. The difference, however, can be easily ascertained by taking the specific gravity, or by testing the hardness with another sapphire or with a diamond.

OTHER VARIETIES OF CORUNDUM.

The following varieties of corundum may be sometimes met with and are distinguished in commerce by the names which they acquire from their colour.

They are however, with the exception of the yellow sapphire, of rare occurrence, and generally pass for, or are confounded with, the gems whose name they bear.

The Oriental Amethyst.

The Oriental amethyst is a ruby or sapphire possessing an amethyst colour; it may be distinguished from the ordinary amethyst by its superior brilliancy and play, as well as by its hardness, etc.; it is a gem of rare occurrence, and even jewellers frequently confound it with the ordinary amethyst. There are some fine specimens in the Grüne Gewölbe at Dresden; there are also in the Vatican one or two engraved intaglios of this stone of very early date. Many sapphires, however, have an amethystine tint, which becomes very apparent by candle-light.

The Oriental Emerald.

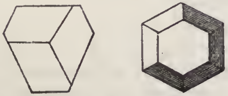
The green variety, or Oriental emerald, is the rarest of all gems, and is scarcely ever seen. In the whole course of my experience, I have only met with one specimen.

The Yellow Sapphire or Oriental Topaz.

This gem is of a yellow tint, seldom deep, but generally of a light straw-colour shade and is extremely brilliant; it is frequently mistaken for a yellow diamond, and is of very little value in commerce : even jewellers frequently confound it with the ordinary topaz.

The Oriental Aquamarine.

There exists also a pale greenish variety, called Oriental aquamarine, which is only to be distinguished from the ordinary stone of that name by its superior brilliancy, hardness, and specific gravity. When the green is of an olive tint, it is termed an oriental peridot.



Crystals of Chrysoberyl.

THE CHRYSOBERYL, CYMOPHANE, AND CAT'S-EYE.

The chrysoberyl, or, as it is sometimes called, Oriental chrysolite, is a very brilliant gem, of a yellow, greenish-yellow, or brownish-yellow colour, occasionally white; some varieties showing a reddish tint by transmitted light. Some specimens possess an opalescence, and these are generally cut *en cabochon,* when they are called chrysolite, or chrysoberyl cat's-eye, or cymophanes.

It belongs to the trimetric or rhombic system of crystallization, and possesses a vitreous lustre; it varies from being perfectly transparent to nearly opaque; its cleavage is not very perfect, and it breaks with a conchoidal fracture rather uneven; its specific gravity varies from 3·680 to 3·754, and its hardness is numbered in the scale as 8·5, being scratched by the sapphire, ruby, etc., and scratching quartz easily. It possesses double refraction to a high degree, and acquires positive electricity by friction, retaining it for several hours.

It is infusible before the blowpipe alone, but melts with difficulty to a clear glass with borax or salt of phosphorus. It is not affected by acids.

Its chemical composition is—

Alumina	80·2
Glucina	19·8

with traces of protoxide of iron, oxides of lead and copper, according to colour and locality where found.

This gem is found in rolled pebbles in the alluvial deposits of rivers in Ceylon, near Saffragang, in the Rio Americanas and Rio Piantic in Brazil, at Marchenberg and Petersdorf, near Weisenberg, in Moravia; also imbedded in mica slate in the river Tajowaja in the Ural

Mountains, fifty-nine miles from Ekatherinenberg, accompanied by emerald and phœnicite; this variety is emerald-green by reflected light, and red by transmitted light; it is called alexandrite, after the Emperor of Russia, and its colour is supposed to be caused by the presence of oxide of chrome. Chrysoberyls have also been found at Haddam, Connecticut, at Greenfield, near Saratoga, New York, and in the granite of Orange Summit, Vermont.

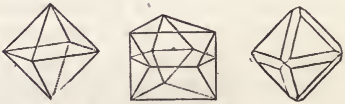
The semi-transparent stones are known by the name of cymophane, and are the "cat's-eyes" of commerce, having frequently the ray across the stone remarkably distinct; they are sometimes of a dark colour, bordering on the black, and occasionally greenish-grey or brown.

The transparent yellow chrysoberyl is the variety used in jewellery. They are cut in brilliant-form, and are extremely lively and lustrous, almost resembling yellow diamonds. They are, however, not fashionable, and are now rarely mounted as ornaments. Although the stones are frequently called chrysolites, and are mistaken for them, nothing can be easier than to detect the difference, the hardness and specific gravity being so dissimilar. They also differ from the yellow topaz in another important particular, that of not becoming electric by heat. The chrysoberyl is cut on a copper wheel with emery, and polished with tripoli.

The name chrysoberyl is derived from the two Greek words, *χρυσὸς*, signifying golden, and *βήρυλλος*, beryl; and that of cymophane from the words *κύμα*, wave, and *φαίνω*, appear, in allusion to the variable colour.

The chrysoberyl of the ancients appears to have been a gem of a different description, perhaps the chrysoprase. They also confounded this gem with the chrysolite.

The value of the transparent chrysoberyl is quite nominal, and for purposes of personal ornament there is no demand for it. The cymophane, or chrysoberyl cat's-eye, however, is worth from £100 to £200, or £300, depending on the distinctness and brilliancy of the ray of light. These stones are considered in the East, and even in Europe, as being lucky, and are becoming much more valuable than formerly. They appear to the best advantage when surrounded by brilliants or rubies. There have been instances known of cat's-eyes of extraordinary size and beauty bringing most extravagant sums of money; as much as £1000 was lately paid by an English nobleman for one, but of course such a value is purely an illusion.



Crystals of Spinel.

THE SPINEL AND BALAS RUBY.

Under this head must be classed the gems called in the trade spinel ruby, rubicelle, balas or balais ruby, and almandine ruby, being all varieties of the same gem. Besides these, there exists a black opaque variety called pleonast, or by some ceylonite, containing oxide of zinc; the chloro-spinel, of a green colour, as its name implies; the sapphirine, blue; the dyshnite, the hercenite, etc. The spinel ruby is of a fine lively red colour, but has a cinnamon tint mixed with it, which renders it far less brilliant than the true ruby or red sapphire; in fact, the colour of the spinel is very similar to that of the garnet, although not so deep in tone. The spinel is found imbedded in granular limestone, and with calcareous spar.

In Ceylon, Ava, Mysore, Beloochistan, and other Eastern countries, it is found in rolled pebbles in alluvial deposits, and the beds of rivers. Hence come the stones of the finest quality, which are used and sold by jewellers.

A pale blue spinel (sapphirine) is found at Aker in Sweden, imbedded in limestone; also in Forland and Straskau in Moravia. Small black crystals of extraordinary lustre are found in company with mica and garnet, in old lava, on Mount Somma. The chloro-spinel, or green spinel, is found in the slate at Slatonht in the Ural Mountains; it owes its green colour to the presence of peroxide of iron. The black spinel, or pleonast, is found in Ceylon, in Bohemia, in the river Iser, in the Tyrol, at Andernach on the Rhine, and in numerous localities in the United States, where also the brown spinels are plentiful.

The automalite, or zinc spinel, is found in Sweden. A white variety occurs at La Riccia, near Rome.

The spinel belongs to the monometric or cubic system of crystallization, and is almost always found in octahedral crystals: its lustre is vitreous; it is transparent in various degrees, in some cases nearly opaque. The spinel is of great hardness, being numbered eight in the scale, scratching quartz readily, but being scratched by sapphire. This stone does not acquire electricity, either by friction or heat; it is possessed of simple refraction, and is infusible before the blowpipe.

The chemical composition of the red spinel from Ceylon is—

Alumina	69·01
Magnesia	26·21
Protoxide of Iron	0·71
Oxide of Crome	1·10
Silica	2·02

The other varieties differ in composition in the proportions of their constituents, and some possess an admixture of other substances. The spinel and balas ruby are of similar composition. The red spinel on being heated becomes brown, but more opaque on cooling. As the heat declines it changes to green, then passes to an almost colourless state, and finally resumes its pristine colour. With borax or salt of phosphorus it melts into a glass, more or less coloured by chrome or iron. It is soluble in powder when heated in sulphuric acid.

The rubicelle is the variety having an orange colour, approaching that of the jacinth.

The violet spinel also bears the name of the almandine ruby.

The *rubis balais*, or balas ruby, is a spinel of that rose-pink colour which often occurs in large crystals.

The original of the term "balas ruby" is the ancient name of Beloochistan, Badakschan, or Balaschan. The Persian name is Badakschiani. An ancient author, Sebaldus Ravius, observes:—"Nomen ejus balachsch diciturque a Teifaschio adduci ex Balachschane, quam regionem Barbari Badachschan vocant, estque secundum eum pars terræ Turcarum, quæ ad Tartarium vergit." (*Specimen Arabicum*, p. 101.)

Marco Polo in his travels speaks of these stones as being principally found in the mountains called Shekinim.

The Persians have to this day preserved a tradition that the mines of these gems were not discovered until after an earthquake, which rent the mountain in twain; and that they were at first mistaken for the true rubies, but their inferior hardness made known the error. One of the finest gems of this kind was formerly in the possession of the king of Oude; it was called Lal-i-jaladi on account of the name Julal-u-din, with which it was engraved; it was of the size of a pigeon's egg, and of great lustre.

The ancient Greek version of the origin of the name is that of Balassus or Palassus, which was supposed to be the dwelling or palace in which the true ruby resided. Andreas Baccius ascribes the origin of the name "balas ruby" to the word *palatius* (palace), as he supposes it to be the matrix or palace wherein the true ruby is found.

The natives of India call the spinel Lal Rumani, or the pomegranate ruby, and ascribe to it valuable medicinal properties. The spinels and balas rubies, which are identically the same gems—the term spinel being applied to those of deeper hue—are frequently sold in error or by fraud for the true ruby; on the other hand, instances have occurred where a true ruby of pale colour has been sold for a spinel or balas ruby.

To any one acquainted with the characteristics of these jewels, the mistake is impossible; the hardness of the ruby is far greater, and its specific gravity considerably more, and nothing can be easier than to verify these facts. An unset stone can be tested by taking its specific gravity; or if set, by attempting to scratch a sapphire with it; or by observing the refraction, which also differs, as a glance at Table A will at once show.

The spinel is also occasionally mistaken for the garnet, on account of the similarity of colour in some of the specimens; still more frequently for the jacinth, from a like reason. Both these gems, however, are of inferior hardness; besides which, the jacinth possesses a strong double refractive power, whilst that of the spinel is single. The brown topaz, which is somewhat similar, may readily be distinguished by its property of acquiring electricity when heated.

During the Middle Ages, the same supernatural powers were attributed to this stone as to the true ruby. Elianus, an ancient author who wrote a natural history of animals, relates that a stork once presented a woman, named Heraclis, with one of these stones, in gratitude for her kindness to it in curing a fractured leg.

The spinel is cut on an iron wheel, with emery or diamond powder, and polished on a copper one; the form is generally the "mixed cut." The colour of this gem frequently becomes more deep and intensified by being carefully heated.

The value of the spinel, or balas rubies, is extremely uncertain and variable. At times they are much sought after for the Eastern markets, and then command a considerable price; on other occasions they are worth comparatively little. As an instance, a stone weighing 40 carats, of good quality and clear, was sold in 1856 for £400; in 1862, it realized by public auction £80, and was lately sold for £240. The present value of spinels varies from 10*s*. to £8 per carat; but it is impossible to say what the intrinsic worth of this gem may be, or what one would fetch, as the value is fictitious, dependent entirely on caprice and fashion.

THE TOPAZ.

This gem is not in vogue at the present day for the purposes of the jeweller, although fifty years ago it was exceedingly fashionable. The true topaz seldom occurs of a very large size without defects, and many of the large stones commonly sold as such are merely rock-crystal or quartz of a yellow colour, such as cairngorm and others, between which and the true topaz, however, there are many important differences, as a reference to the chapter on quartz will show.

The topaz belongs to the trimetric system of crystallization. Its cleavage is basal; that is, it breaks with a flat surface, at right angles, with or across the prism. Its specific gravity is 3·5 to 3·6; it is numbered eight in the scale of hardness, scratches quartz easily, and possesses double refraction in a slight degree.

Its chemical composition is—

The Brazilian Topaz.

Silica	34·01
Alumina	58·38
Fluorine	15·06

The Saxon Topaz.

Silica	34·24
Alumina	57·45
Fluorine	14·99

Monsieur St. Clair Deville has detected vanadium in the variety from the first locality, and he states that topazes may be formed artificially by the wet process. The crystals are usually hemihedral, which is a term used in mineralogy to signify (what its name infers) half-form; that is, its angles are removed from the original form; for instance, the hemihedral form of the cube is the tetrahedron.

The cleavage is basal and very perfect, having a highly polished surface on the cleavage planes; the lustre is vitreous. This stone is found of many colours: the fine pink so often observed in topazes in many articles of jewellery is never natural, but is produced by exposing a brownish-yellow topaz to a low red-heat in a sand-bath. The experiment can also be tried by wrapping the stone up in German tinder, bound with thin iron wire, and then setting fire to it, or with the blowpipe. Those only of the peculiar brown colour described can acquire this pink hue; the pale yellow stones become perfectly white under the treatment. The colour thus acquired is permanent. The topaz becomes strongly electric by heat, friction, and pressure, retaining and continuing in that state for several hours. This characteristic is so marked as to afford an easy method of ascertaining its identity; the application of this test alone would at once prevent the stone being mistaken for a chrysoberyl or a yellow sapphire. Before the blowpipe, it is infusible on charcoal, but in a very strong heat blisters form on the surface, which break as soon as they rise. It fuses with borax into a clear glass, and becomes blue with cobalt solution.

If sulphuric acid be applied to this stone it yields hydrofluoric, but muriatic does not affect it.

The topaz is found in almost every part of the world, generally in the granite and gneiss rocks which contain fluor spar, but it varies in colour and aspect in almost every district. Those from Villa Rica in Brazil have a deep brownish-yellow hue, and are found in a soft loose sandy clay, which renders the search for them an easy task. The crystals are usually not large, seldom exceeding two or three inches in length; the terminal pyramids are often beautifully modified, and the crystals are mostly well defined. They are more or less striated longitudinally down the prism. Associated with the topaz in this locality is sometimes found a very rare mineral called euclase, which is of a pale blue or green colour, somewhat similar to aquamarine.

Another locality in the Brazils whence they come, is the district of Minas Geraes; these topazes, found in rounded pebbles, are perfectly pure and colourless, and are called "pingas d'agoa" or "gouttes d'eau;" they are also termed Nova Minas; the Portuguese call them "slave diamonds." These stones bear a much higher degree of polish than rock-crystal.

A precisely similar topaz has been found in Tasmania, where some blue and green ones have been discovered, but more water-worn than those of other localities. Topazes of a fine pale blue colour are found in Siberia, at Alabascka, near Murinsk, also at Odentochelong and Miask, associated with quartz and beryl. They are found in tolerable plenty at Altenburg, in Saxony, generally of a pure yellow colour; also in Ceylon, Connecticut, U. S., Peru, Asia Minor, in England, Scotland, Ireland, and the Hebrides.

Topazes are cut on a leaden wheel with emery, and polished with tripoli. The best form of cutting is the "full brilliant," leaving the table smaller and the bezil rather deeper than in a diamond. Great care is required on the part of the lapidary to obtain a good polish on this stone. The cleavage surface, called by lapidaries the grain, is extremely difficult, in fact almost impossible to polish; and it is necessary, instead of cutting them flat, to take a small angle from the cleavage-plane, to obtain that high degree of brilliancy of which it is susceptible. In the present day it is very rare to see a topaz well cut, and displaying that intense whiteness and brilliancy which it ought to have, as few lapidaries bestow the care and attention necessary.

This stone is called by the following names, according to the colour:—

Nova Mina is colourless.

Brazilian Sapphire is light blue.

Aquamarine is greenish.

Brazilian Chrysolite is greenish yellow.

Brazilian Ruby is the artificially obtained pink or rose-colour.

The Table C, in which stones are classed according to their colours, will show in how many instances entirely different stones are liable to be mistaken one for the other, when colour alone is relied upon; but the different specific gravity and hardness will at any time determine to which category a stone belongs. The yellow quartz is so commonly sold for the topaz, although of less brilliancy, specific gravity, and inferior hardness, that it would be well for the amateur to put in practice the simple tests recommended before purchasing, as few persons even in the trade are aware of the difference.

A large mass of white topaz in one of the cases of the British Museum was many years ago used as a door-weight by a marine store-dealer in London; he afterwards sold the same for three shillings. It weighs about 12lb. avoirdupois.

It is supposed that the word topaz is derived from the island Topazion, in the Red Sea, whence the Greeks obtained a yellow stone; it is, however, doubtful whether the topazion signified what we call topaz; but there is no doubt that this stone was known in very early times. Formed of this there are still in existence several intaglios of very early Greek workmanship. It is also one of the stones mentioned in the Bible; in the Middle Ages it was considered typical of St. James the Less, the Apostle. The large so-called diamond in the Portuguese treasury is supposed to be a white topaz; it is rather larger than a hen's egg, and weighs 1680 carats.

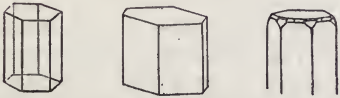
The following properties were ascribed to the topaz by the ancients:—It discovered poison by becoming obscured when in contact with it; it quenched the heat of boiling water, and its powers increased and decreased with the increase and decrease of the moon; it calmed the passions, and prevented bad dreams.

The Emperor Hadrian is reputed to have possessed a topaz seal ring engraved with these lines:—

"Natura deficit,
Fortuna mutatur,
Deus omnia cernit."

Pliny describes it as being found in the mines of alabaster, near the Egyptian city of Thebes.

It is impossible to give any rules by which to fix the value of this stone, as it is now only used in the cheapest jewellery, the jewelling of common Swiss clocks, and for optical purposes. The commercial value of the topaz, as a jewel, is entirely fictitious; a very fine stone can at the present moment be bought for a few shillings, which, when in fashion, would have brought much more; for optical purposes, the rough stones fetch about 5*s*. to 10*s*. per pound avoirdupois. The pink topazes bring considerably more; from 40*s*. to £20 per ounce, the price depending on the depth of the pink colour.



Crystals of Emeralds.

THE EMERALD.

This stone and the beryl are of the same chemical composition, differing only in colour. The beautiful green colour of the emerald is unsurpassed by any other gem; whilst the beryl, or aquamarine, is of a light blue or sea-green as its latter name implies. These stones are found crystallized in regular hexagonal prisms, and belong to that system of crystallization. The top of the crystal is flat at right angles to the prism, and sometimes the angles and edges are beautifully truncated or modified. The crystals of beryl are usually found striated longitudinally often throughout the stone as well as on the surface, which is not the case with the emerald; both these gems in the natural state form most beautiful specimens for the mineralogical student. The rich green colour of the emerald contrasts with the limestone matrix in which it is found imbedded. The beryl is found in crystals, occasionally of immense size, of many shades of green passing into yellow, and sometimes perfectly transparent.

The physical characteristics of these stones are as follows:—

The cleavage is imperfectly basal. The hardness varies from 7·5 to 8 of Mohs's scale. They are scratched by spinel, but scratch quartz with difficulty (although specimens vary considerably in this particular). The specific gravity is 2·67 to 2·75, so that the bulk is very large in proportion to the weight; an emerald being nearly double the size of a sapphire of equal weight. The lustre is vitreous, rarely resinous. The usual colour has been stated above, although the beryl occurs of every shade of greenish-blue to brown, and sometimes verging on pink.

These stones are extremely brittle,—indeed, the emerald, when first withdrawn from the mine, is so soft as to crumble by friction, but hardens by exposure to the air.

The chemical composition is as follows:—

The Emerald.

Silica	68·50
Alumina	15·75
Glucina	12·50
Peroxide of Iron	1·00
Lime	0·25
Oxide of Chrome	0·30
Magnesia and Lime	Traces.
Soda	Traces.

The chemical composition of the beryl is as follows:—

Silica	67·00
Alumina	16.50
Glucina	14.50
Peroxide of Iron	1·00
Lime	0·50

It will be observed that the emerald has more glucina than the beryl; and chemists find that the greater the quantity of glucina there is in a specimen, the greener is the crystal.

Before the blowpipe, the emerald remains unchanged—sometimes, however, becoming a little cloudy; with borax it fuses into a pale green substance not very unlike glass. It is not affected by acids, but is slowly soluble with microsmic salt (or salt of phosphorus).

Formerly it was supposed that the colouring matter of the emerald was the oxide of chrome, but the quantity of chromic acid obtained by Mr. Lewy on analysis was so small as to be inappreciable; he gives it as his opinion that the beautiful tint of the emerald is produced by some organic substance, which he imagines is a carburet of hydrogen, similar to that termed chlorophylle, which constitutes the colouring matter in the leaves of plants. The emeralds of the darkest tint contain the largest amount of organic matter; and it is remarkable as a test that the emerald at a low heat loses the colour and becomes white and opaque, whilst the minerals of which the colouring matter is chrome (as the chrome garnet, "uwarowite") remain unaffected by intense heat. It is possible that the organic colouring-matter of the emerald may be derived from the decomposition of the animals whose remains are now fossilized in the rock which forms the matrix of the gem. This rock, as stated before, is a limestone slightly bituminous, often black with white veins, containing ammonites and other shells.

Mr. Lewy has also arrived at the conclusion that the emerald has been formed in the wet way; that is to say, it has been deposited from a chemical solution. The finest emeralds are found at Muzo, in New Granada, near Santa Fé de Bogotá, 5° 28′ N., in a limestone rock, not unfrequently black and containing shells; some of the crystals of carbonate of lime are vitrified and highly transparent, and the emeralds found imbedded in the rock are often in crystals of a large size. In the matrix minute disseminated crystals of iron pyrites are occasionally found.

These mines are let for a term of years by public tender; they produce to the government about £8000 per annum, but it appears that this price could not have repaid the speculators, as they declined to continue their contract at the same rental, and the mines are now, or were lately, to let. Associated with the emerald in this locality is found that rare mineral "parisite;" it is a brown hexagonal crystal, quite opaque.

The emerald has also been met with at Henbachthal, in Salzburg, imbedded in mica slate, at an altitude of 8700 feet above the sea, on a steep precipice, said to be only accessible by means of ropes. At Odontchelong in Siberia, and in the Burman Empire, near Ava, it is found accompanied by spinel, generally of a fine grass-green colour, rather lighter than the Peruvian emerald.

Monsieur Caillaud, a French traveller, discovered in the mountain of Zabareh, when on a scientific excursion for the Pasha of Egypt, an ancient emerald mine, with large galleries bearing the marks of the miners' tools, with various ancient appliances, as levers, etc. Pliny appears to have been well acquainted with the emerald, speaking of it with admiration, although he confounds it both with the chrysoprase and jasper. He relates, that in the island of Cyprus, on the tomb of Hermias was a sculptured lion, with eyes of emerald, which shone so brightly that they frightened away the fish, but the fishermen had these gems replaced by others, when the fish returned to their accustomed haunts.

Nero, it is well known, observed the feats of the gladiators though an eye-glass of emerald; hence the name it sometimes bore, Neronianus. Isidorus (Bishop of Seville, who has previously been referred to) says of the emerald, that it not only surpasses any green herb or plant in colour, but that it gives a green colour to the surrounding air; and that the lapidaries who cut emeralds have good eyesight, in consequence of the agreeable reflection they have constantly before them. This stone was also used in the Middle Ages in church cups and chalices, and one of the principal ornaments of the crown of Charlemagne was a lustrous emerald.

After the conquest of Peru, the emerald became much more common. The Spaniards possessed themselves of the hoards which had accumulated for centuries in the hands of the priests of the goddess Esmeralda, who was supposed to reside in an enormous emerald, of the shape and size of an ostrich egg. They persuaded the people that the goddess esteemed no offering so much as one of her own daughters; and on the holy days, immense numbers were brought as devotional offerings by the worshippers. It is said that the conquerors of Peru came into the possession of many hundredweights of this gem; but a priest who accompanied the Spanish army persuaded the soldiers that the test of their being genuine was to smite them with a hammer on an anvil, which test of course destroyed a vast number of fine stones. In spite of this, Cortez presented one hundredweight to the King of Spain; and on the occasion of his (Cortez's) marriage, he gave his bride several emeralds carved into various forms—amongst them, an enormous stone shaped like a rose, a gift which aroused the envy of the Queen, and caused him to lose his favour at the Court.

There can be no doubt but that this stone was known in the most remote ages. Necklaces of emeralds have been found in Etruscan tombs, and at Herculaneum. It is the fourth of the gems mentioned in the Bible as worn in the breastplate of the High-Priest; and in Ezekiel, chap. xxvii., the emerald is mentioned in the following manner:—"Syria was thy merchant by reason of the multitude of wares of thy making: they occupied thy fairs with emerald, purple, and broidered work, fine linen, agate, and coral." To this day the Orientals have an immense veneration for the emerald, believing that it imparts courage to the wearer and averts the plague. Many fine stones are irretrievably spoilt by having verses from the Koran engraved upon them, or by being carved by the Hindoos into figures of idols; also by having holes drilled through them to permit their use as nose ornaments.

The following properties were ascribed to the emerald by the ancients, who had dedicated the stone to Mercury:—It was supposed to be good for the eyes, on which account it was worn as a seal ring; it was supposed to colour any water green in which it was placed; to preserve women in childbirth, and to be an infallible preservative of chastity. When ground down, it was taken in doses of six grains, as a remedy for various diseases.

Its name appears to be very similar in most languages, whether Oriental or European; in Arabic it is called *Zamarut;* in Chaldean, *Ismaragdon;* in Greek, *Smaragdos;* in Latin, *Smaragdus;* in Spanish, *Esmeralda;* in French, *Emeraude;* in Italian, *Smeraldo.* The Persians call it *Pachee;* the Greeks sometimes called it *Prasinus,* on account of its colour resembling the greenness of leeks. The origin of the name is said to be a Sanskrit word signifying green.

The emerald is so rarely found perfect, that the saying, "an emerald without a flaw," has passed into a proverb. It is the stone which ranks next in value to the ruby, and on account of the pleasing effect it has, both by day and candle-light, is a very favourite gem. Latterly it has increased enormously in value. The emeralds which now come into the market seem to be far inferior to those found in former times. The value, when of a deep rich grass-green, clear, and free from flaws, is from £20 to £40 the carat; those of lighter shade are worth much less, the price ranging from 5*s.* to £15 the carat; but experience is the only guide which can enable any one to form a correct estimate of the actual worth of any but the very finest quality. The emerald is cut on a copper wheel with emery, and polished on a tin one with rottenstone; it is most commonly trap cut, and, when cut like a brilliant, with rounded tables, it is generally to disguise flaws, which would otherwise be apparent. In India, advantage is taken of the facility with which the emerald can be cloven at right angles to its axis; so that in Indian ornaments, we often see very flat emeralds of large size. The one in the possession of Dhuleep Singh is about three inches long, two inches wide, and half an inch thick, of a fine colour, with few imperfections. It is to be remarked, that the size of the emerald does not increase its value in a cubic ratio; that is to say, it does not progress in price like the diamond or ruby.

The treasuries of Europe and Asia are rich in this gem; the comparatively low price which it formerly brought, and its pleasing colour, having caused it to be collected and worn in every country. The Russian, Saxon, and Papal crowns, contain emeralds of wonderful beauty, and of large size. In the Austrian treasury there is said to be a crystal of emerald weighing 2000 carats, and the Duke of Devonshire possesses one weighing nearly 9 ounces. The mines now seem to produce crystals very inferior to those formerly coming thence, and at present it is rare to meet with fine stones. Few, if any, emeralds possess an historic interest; a description, therefore, of the large emeralds known would be useless.

The beryl, or aquamarine, is much more generally diffused over the surface of the globe. Some magnificent specimens are found in Siberia: this stone is also met with at Invercauld and Kinloch Rannoch, Scotland; in the Mourne Mountains, county Down; at Dalkey, and the Three Rock Mountain, county Dublin, and in Glen Macnap, county Wicklow; at Limoges, in

France; Bodenmais and Rabenstein, Bavaria; Finbo and Brodbo, Sweden; in Saxony; Bohemia; in the isle of Elba; in Norway, Finland; in the Rio San Matheo, Brazil; in the State of Massachusetts, N. A.; and in Hindostan. An enormous beryl has been found in America weighing five tons, but this has not been removed from the spot where it was discovered.

A very large crystal of beryl from America was shown in 1851; it weighed seventy-eight pounds, but was unfit for jewellery purposes.

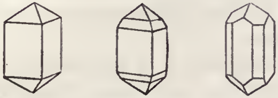
The name, like that of the smaragdus, or emerald, appears to be the same in most Oriental languages; in Hebrew, Persian, Chaldee, and Arabic, it is *Belur*, which signifies crystal. This will however be seen by referring to the Comparative Names of Stones mentioned in the Bible, page 36.

The commercial value of the beryl, or aquamarine, is trifling; it is used principally in Birmingham, for imitation jewellery, and as ornaments for metal work. The yellow variety is called sometimes chrysolite, although it differs greatly in every other character but colour from the true chrysolite. The colourless variety is frequently mistaken and sold for white quartz or rock crystal, although the specific gravity, lustre, and hardness differ materially.

The beryl was well known to the Romans. Pliny mentions it as the gem green as the sea, "qui viriditate puri maris imitantur," and hence its name "aquamarine." Beads of aquamarine have been found in Egyptian mummy-pits, and the Greeks employed the stone for intaglios more than two thousand years ago.

THE ZIRCON, HYACINTH, OR JACINTH.

This gem belongs to the dimetric system of crystallization, and is very imperfectly cleavable. Its specific gravity is 4·07 to 4·75; in lustre it is nearly adamantine.



Crystals of Zircon.

although in the opaque varieties it is vitreous. It varies in colour from red to yellow, brown, green, grey, and white. Its fracture is conchoidal and brilliant. When heated it becomes phosphorescent, and loses its colour, and at the same time increases in specific gravity. If allowed to cool, however, when reheated the phosphorescence does not reappear. This gem is unaffected by any acids except sulphuric after long maceration. Before the blowpipe it is infusible alone, but melts with borax into a transparent glass. Its chemical composition is—

Zirconia	66·8
Silica	33·2
Peroxide of iron	0·1

The zircon or hyacinth is found in imbedded and attached crystals in granite, syenite, and gneiss, and also in beds of rivers associated with garnets in Ceylon, the East Indies, and New Granada; also in the river Espailly in France, in the Iser in Bohemia, and in many places in North America. Specimens of the hyacinth have been found in the lava of Vesuvius.

This gem is seldom used for the purposes of jewellery, although a solitary specimen, when free from defects, and of a fine colour, may realize a high price. It is sometimes confounded with the eponite or cinnamon-stone, but is totally different in the most important characteristics.

When the hyacinth is of a greyish or smoky-white colour it is called a jargoon, and is frequently sold for diamond, which gem it approaches more nearly than any other in lustre. In the last century the jargoon was supposed to be an inferior diamond, and was much used in mourning ornaments. It is found in great abundance at Matura, in the island of Ceylon, whence the natives give it the name of Maturan diamond. It is rarely found of large size, generally not exceeding ten to twelve carats in weight.

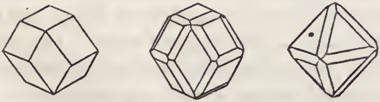
This gem possesses the characteristic of double refraction to a very high degree, and does not acquire electricity by heat. The jargoon occurs of several colours, and is rarely perfectly transparent.

The hyacinth or zircon, and jargoon, are identically the same stone, differing only in colour. The red varieties are sometimes sold for inferior rubies, although they almost always have a more yellow tinge than the ruby.

The word "zircon" is supposed to be derived from the Arabic *zerk* (a gem); the hyacinth, from the Arabic *yakut* (ruby).

Although this gem was well known to the ancients, it is doubtful whether the stone they called by this name was the same as the true zircon; by some it is supposed to be the lyncurion of Theophrastus. In Hebrew it is called *techyleth*, תכלת, or blue, whilst the hyacinth described by Pliny would appear to be the amethyst or sapphire. The magical properties attributed to it in the Middle Ages were as follows:—it procured sleep, riches, honour, and wisdom, and it drove away the plague and evil spirits.

The present value of this gem is purely arbitrary, as it is but rarely employed in jewellery; formerly it commanded a very high price. The jargoon is frequently cut in the form of a rose-diamond; that is to say, flat at the bottom, and pointed at the top. The jacinth or hyacinth is cut like a brilliant, with a rounded table.



Crystals of Garnet.

THE GARNET.

This gem, on account of brilliant colour and hardness, is much used in jewellery, and although an abundant supply renders it of little value, the gem nevertheless possesses every quality necessary for ornamental purposes. There are many varieties of this stone, which are distinguishable by their colour, and also by the difference of their chemical composition. The garnet belongs to the monometric or cubic system of crystallization, and is mostly found in rhombic dodecahedral crystals; when in a matrix its cleavage is dodecahedral; it is also found massive and in small pebbles in rivers and alluvial deposits, occasionally (as in the pyrope) in lamellar cleavable masses. Its hardness varies from 6·5 to 7·5; it scratches quartz slightly, and is scratched readily by ruby or sapphire. Its specific gravity varies from 3·5 to 4·3; its lustre is vitreous, in some varieties resinous, as in colophonite—a name applied to a garnet found in Norway and America. This gem occurs in many colours,—red, brown, yellow, white, green, black; the streak is white; the diaphaneity varies from transparent to subtranslucent, or nearly opaque, and it has a subconchoidal or uneven fracture. The garnet is susceptible of positive electricity by friction, and has a sensible effect on the magnetic needle. The varieties used in jewellery are called carbuncle, cinnamon-stone (or essonite), almandine, and pyrope or Bohemian garnet; besides these, there are the leucite, the melanite, the colophonite, the grossularite, the uwarowite varieties, which are only interesting to the mineralogist.

The chemical composition of the several varieties differs according to the colours and peculiarities. The common garnet is essentially a silicate of alumina iron. The others have various bases, such as lime, magnesia, oxide of manganese, etc.

Mineralogists have divided them under the following heads :—

Alumina lime garnet.
Alumina magnesia garnet.
Alumina iron garnet.
Alumina manganese garnet.
Iron lime garnet.
Lime chrome garnet.

It will suffice here to give the analyses of the most important varieties.

The composition of the almandine is—

Silica	36·30
Alumina	20·50
Protoxide of iron	43·20

Of the essonite, or cinnamon stone—

Silica	38·80
Alumina	21·20
Lime	27·20

Of the pyrope, or Bohemian garnet—

Silica	40·00
Alumina	28·50
Peroxide of iron	16·50
Peroxide of manganese	0·25
Oxide of chrome	2·00
Magnesia	10·00
Lime	3·50

Before the blowpipe the almandine and common garnet fuse somewhat easily, forming a glass of various colours. The pyrope, on the other hand, fuses with difficulty before the blowpipe to a black glass. Both varieties are imperfectly soluble in hydrochloric acid.

The first and most important variety is the common iron-garnet, which is precisely the same stone as the almandine, except that the common garnet is of a blood-red colour slightly tinged with brown, whilst the almandine has a blue tinge mingled with the red. The term carbuncle is applied indiscriminately when they are cut *en cabochon*—or, to use the old English expression, tallow-topped—which means cut, not in facets, but with a flat or hollow base, and a smooth convex top.

The Syrian or Oriental garnet is found in alluvial soil, in India, Pegu, Ceylon, Brazil, etc. The common garnet occurs embedded in mica, slate, granite, gneiss, etc., sometimes in limestone, chlorite-slate, serpentine, and lava; generally in dodecahedral crystal, sometimes six or seven inches in diameter, in the Tyrol, at Fahlun in Sweden, Arendal, Norway. These, however, are only a few of the localities, as the garnet is found distributed in greater or less plenty all over the world; in America alone, more than a hundred places might be mentioned where it is found, so that it is unnecessary to specify other places.

The Syrian garnets are so called, not because they come from Syria, but after Syrian, the capital of Pegu. The colour ranges from the deepest crimson to a violet-purple, resembling the Oriental amethyst. These stones are found from a quarter of an inch to two and even three inches in diameter; they are cut with emery or garnet-powder on a copper wheel, and polished on lead with tripoli when faceted. It is the rule to keep them rather thin, on account of the depth of their colour: they are not infrequently cut into beads and strung as necklaces. The term almandine is mentioned by Pliny as derived from Alabanda, where these gems were cut and polished. Frequently they are set with backs and foiled to imitate rubies, and indeed, are sometimes sold as such even to persons in the trade, although to those acquainted with the physical peculiarities of the gem, and who do not rely solely on the eye, the difference is obvious.

Both the garnet and the almandine are frequently cut in facets and polished, but although at one period extremely fashionable they have now become obsolete and possess but little commercial value. When cut *en cabochon*, however, they bear the name of carbuncle, and if of large size, pure and free from black spots, they are worth as much as twenty pounds each.

The next variety is the pyrope, or Bohemian garnet, found in Bohemia, Saxony, and other parts of Germany; it has among its constituents a portion of lime and chrome, and is one of the hardest of the garnet family. In colour it is a deep-red. This stone is found in alluvial soil, in a peculiar argillaceous and calcareous conglomerate (in Bohemia), often in company with granite, micaceous slate, and serpentine. It is obtained by digging, and cleansed from the adherent earth by repeated washings, and sorted according to size and quality. These stones are greatly esteemed in Austria, Transylvania, and Turkey, (but not in other European countries,) and are sold at very high prices: for a necklace of beads about the size of peas 600 gulden, or £60, was asked in Vienna.

The next variety is the essonite, better known in commerce by the name of cinnamon-stone, which comes under the head of lime garnet; it melts more easily than the other kinds and is much softer, the average hardness being only 6·5 to 7. As its name implies, it is of a reddish-yellow tint, resembling the colour of cinnamon. These stones come principally from Ceylon, and are frequently sold for hyacinths or jacinths, from which, however, they differ in many important peculiarities.

The other varieties are not used for purposes of jewellery; they are interesting only to mineralogists, and may be briefly described as follows:—

The grossularite, which belongs to the alumina-lime garnet variety, is of a greenish colour, sometimes black. Found in Siberia.

The succinite, a yellow garnet of the same composition. Found in Piedmont.

The colophonite and melanite, which are iron-lime garnets, one brown, the other black.

The leucite, a silicate of alumina and potash, is white: it is found in the lava of Vesuvius and in Siberia.

The brown garnet or Spessartine, a manganese-alumina garnet, found at Spessart in Germany; it is also met with in Sweden and Finland.

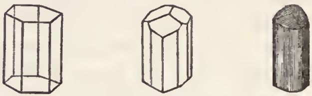
And, lastly, the uwarowite, a lime-chrome garnet of a bright green, found in Siberia. It is named after Uwarow, President of the Imperial Academy of St. Petersburg.

The garnet (particularly the pyropean variety) is sometimes used in powder for the same purposes as emery, although of inferior hardness. The ancients were well acquainted with the garnet by the name of carbuncle, which they applied to all stones of a red colour. Pliny describes vessels of the capacity of a pint formed out of carbuncle devoid of all lustre or beauty of colour, but they were most probably fashioned of some of the massive varieties of the garnet.

Theophrastus speaks of a Massilian carbuncle, which, when held against the sun, resembled a glowing coal. The old writers of the middle ages also ascribe great value to this gem. The superstitious and magical properties attributed to it were similar to those ascribed to the ruby.

THE TOURMALINE.

This gem is very little used for jewellery. Of the many varieties, the only one occasionally employed is that of a dark olive-green tint. It is found, however, of various colours—red and pink, when it takes the name of rubelite—blue, when it is called indicolite,—white, brown, and black. The tourmaline belongs to the rhombohedral or hexagonal system of crystallization; the crystals are usually found in triangular or hexagonal prisms, generally with a flat three-faced termination at each end; the cleavage being very difficult to obtain, the fracture is imperfectly conchoidal; the hardness is 7·0 to 7·5; the specific gravity 2·99 to 3·33; the lustre,



Crystals of Tourmaline.

vitreous. It is found of all grades of diaphaneity, from transparent to opaque; unequal in transparency across the prism, and in the line of the axis it is pyro-electric in a high degree, the refraction double, and exhibits dichroism; its powers of polarizing light are so great, that, cut into slices, it is used in the polariscope for analysing the optical properties of other minerals. If two slices of tourmaline, cut parallel with their axes, be laid one on the other in one direction, they are both transparent; if laid in another direction they become opaque; and, if a doubly refracting crystal be brought between two plates of tourmaline, the part covered by the crystal is transparent, whilst the other is opaque. The extremities of the crystals frequently terminate in a different manner, a circumstance of rare occurrence in other crystals.

The red tourmaline is found in Ceylon, Ava, and Siberia, and is known in commerce by the name of Brazilian ruby, for which stone it is sometimes sold in mistake. The yellow, grey, and brown varieties are principally found in Ceylon; and the green and blue in the Brazils. These latter are sometimes called the Brazilian emerald and sapphire. The black tourmaline occurs in granite formations in Bavaria, the United States, Greenland, and in this country in Devonshire and Cornwall. The white variety, which is very rare, is found in the island of Elba, on Mount St. Gothard, and in Siberia.

The chemical composition of the different varieties is as follows:—

	Black variety from Greenland. Analysis by Rammelsberg.	Green variety from Brazil.	Red variety from Siberia. Analysis by Rammelsberg.
Silica	37·70	39·16	38·38
Boracic acid	7·36	4·59	7·41
Alumina	34·53	40·00	43·97
Peroxide of iron	4·63		
Protoxide of iron	0·25	5·96	
Magnesia	9·51		1·60
Lime	1·25		0·62
Soda	2·00		1·97
Potash	0·43	3·59	0·21
Phosphorus	0·11		0·27
Fluorine	2·23		2·47
Peroxide of manganese		2·14	2·60
Loss by ignition		1·58	
Lithia			0·48

The tourmaline is also found in a massive state, sometimes fibrous or radiating. Under the blowpipe it swells up, and fuses into a sort of slag. The crystals are occasionally found parti-coloured—for instance, red internally and green externally, others blue and green, and frequently in those found in Elba, red at one end, yellow in the middle, and black or brown at the other extremity. When heated or rubbed, the tourmaline acquires a different degree of electricity at each extremity. If broken whilst in that state, the fragments, like artificial magnets, present opposite poles.

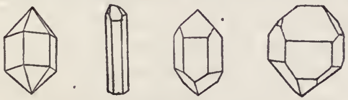
The tourmaline is cut upon a leaden or zinc wheel with emery, and polished with tripoli. The transparent varieties are generally trap cut; the opaque are faceted both above and below the girdle.

The lapidary is obliged to bear in mind that this stone is only transparent in one direction, and that, unless the table be parallel with the axis of the crystal, an otherwise transparent stone will appear opaque on looking through it. This stone was first brought to Europe by the Dutch from Ceylon, and they gave it the name of aschentrekker, from its sometimes attracting and sometimes repelling hot ashes when laid near it for any length of time. The tourmaline was considered a chrysolite when yellow, a sapphire when blue, etc.; and even now it is of no uncommon occurrence to find it sold under other names, although the quality it possesses of acquiring magnetic properties by means of heat affords a ready means of distinguishing it from any other gem. The tourmaline has very little commercial value except for optical purposes. Its name is undoubtedly of Cingalese origin.

QUARTZ.

Amethyst, Cairngorm, Chrysoprase, Onyx, Sardonyx, Cornelian, Chalcedony, Mocha-stone, Agate, Cat's eye, Jasper, Blood-stone, Aventurine, Rock Crystal.

Under this denomination a large number of gems are comprised, generally of small value, although a solitary specimen of fine quality may bring a large price. The gems named above, notwithstanding they are all of the same composition, change their appellation as they differ



Crystals of Quartz.

in colour; and, as the chief characteristics of each are similar, the physical peculiarities of the whole will be first described, after which all the varieties can be mentioned separately.

Quartz belongs to the rhombohedral system of crystallization; many varieties, however, are found massive and compact. It occurs in hexagonal prisms, often having pyramids at each end. Some appear to have each alternate plane of the prism absorbed in the others, giving the appearance of three-sided prisms or pyramids; some are found with only the two pyramids, having no prism; and others with modifications of the angles and edges; often in twin or double crystals. As a rule, all crystals of quartz are more or less striated across the planes of the prism; sometimes very distinct, sometimes hardly perceptible; but never striated longitudinally down the prism, as with the topaz or beryl. The specific gravity of all the members of this family varies from 2·5 to 2·8 in hardness; it is numbered ·7 in the scale, and scratches glass readily. The lustre is vitreous when transparent, inclining to resinous when opaque. The fracture is conchoidal, and the cleavage very indistinct; the refraction is double, and it becomes positively electric by friction. The family of quartz may be classed under three heads:—

The vitreous—or transparent;

The resinous—or opaque; and

The jaspery—or the varieties having the dull colour and opacity of the jasper.

All the varieties are found of various colours and shades; the chemical composition is pure silica, or

Silicon	48·04
Oxygen	51·96

It is insoluble by all acids except hydrofluoric; it does not melt before the blowpipe, but when exposed to the flame of the oxyhydrogen jet it melts, so that it can be drawn into fine threads, and at last becomes volatilized. When two pieces of quartz are rubbed together they become phosphorescent, and emit an empyreumatic odour.

Rock Crystal.

The first variety of vitreous quartz is the colourless one called Rock Crystal, which is found in beautifully-formed crystals—either detached or in groups, and in rounded water-worn pebbles—in various localities in almost every part of the globe:—in the Isle of Wight, at Bristol, on Snowdon, in Derbyshire, Cornwall, Cumberland, and on Cairngorm, in Scotland; in the mountains in Wicklow and Donegal, Ireland; in Savoy and Dauphiné; in the Carrara Mountains, in Hungary, and on the Alps, etc. It is also met with in the East Indies, Ceylon, Brazil, Quito, Canada, and Australia.

Crystal sometimes contains admixture of mica, rutile, tourmaline, topaz, asbestos, bitumen, and other foreign matters, and is often found with a greenish mineral called chlorite; occasionally possessing a cavity containing water, with an air-bubble in it, which moves as the crystal is turned about; sometimes containing gases and liquids. Crystals of a very large size are occasionally met with, but they are rarely perfect. One specimen, in the Jardin des Plantes at Paris, measures three feet in diameter, and weighs eight hundred pounds. Geodes, or hollow globular masses of quartz, are found in many trap rocks; some of them occur of as large a size as two feet in diameter: small specimens are found at Clifton, near Bristol, where they are known as potato stones. This stone, under the name of pebble, is used by opticians for making the lenses of spectacles, on account of its superior hardness and durability to glass, and its coldness,—as it, in common with all precious stones, feels cool to the touch. The lenses, however, must be cut at right angles to the axis of the crystal, in order to avoid the effect of the double refraction of the mineral, which is not only unpleasant, but prejudicial to the eyesight; colourless quartz is also used in the polariscope, in sections cut across the prism. Lately it has been much used in jewellery, stones and enamel being incrusted in it. In India the natives hollow it out into cups, goblets, and vases of a surprising thinness, and frequently cover them with the most elaborate ornamentation. The Chinese also use this substance largely, and attach great value to it, although the forms into which they cut it are less graceful, and the ornamentation far inferior to that of the Indian workmen. In Japan it is cut into large round balls, which are said to be used for the purpose of cooling the hands. The Eastern nations frequently make it into beads for necklaces. The natives of India believe the crystal to be the mother, or external husk, of the diamond, and call the diamond the ripe, and the crystal the unripe, diamond. The ancient Egyptians used the crystal for making cylinders, scarabæi, etc., some specimens being elaborately engraved. The Greeks supposed it to be water congealed by intense cold, as the name (*κρύσταλλος*, ice) signifies; and it was thought to be procurable only in the frozen regions. In the Middle Ages it was believed to be incapable of containing poisons, and that it would betray their presence by becoming obscured, or by breaking; consequently, cups and goblets of it were highly esteemed, being frequently covered with the most beautiful ornamentation.

The Emperor Nero is related to have possessed two magnificent crystal cups, engraved with subjects from the Iliad, which cost an enormous sum. When his downfall took place he destroyed them, that no one else might drink from them. Numerous specimens of the Cinque Cento period are still extant, both of German and Italian workmanship, in various museums and in private hands. The large round balls, under proper manipulation, were supposed to possess magical powers, and to disclose events which were to happen, and show persons who were distant. The famous crystal globe of Dr. Dee is an illustration of this belief. Crystal was used medicinally in powder, mixed with wine, and given in cases of dysentery; pieces, also, were held against the tongue in fevers to assuage thirst.

The value of the ordinary crystal in the rough, for such sizes as will cut into lenses, varies from 2*s*. to 15*s*. per pound avoirdupois, depending on the quality; but pieces of large size bring very high prices, particularly when cut, as the operation of cutting so hard a substance from the solid mass into a hollow vase, cup or dish, is, of course, attended with danger, and requires a great expenditure of time and labour. The stone is cut on a copper wheel by means of emery, and polished with tripoli. If required to be drilled, splinter of diamond is used; for engraving, diamond-powder is necessary, and sometimes a pattern or device is etched on it with fluoric acid. Strass, or paste, is very often sold for crystal when quite pure and free from air-bubbles, but it is easily detected by its inferior hardness and greater weight.

The green, pink, and other coloured beads which are sold in Switzerland and Germany are made of crystal, coloured by artificial means. They are heated to redness, and then thrown into various chemical solutions, according to the colour desired to be produced. The sudden change of temperature causes the crystal to fissure or crack all over, and the liquid permeates the pores of the mineral. These cracks are very minute and imperceptible to the naked eye, and give the crystal the effect of being coloured through the mass.

At the time of the French revolution of 1791 the Crown treasures were valued, and amongst them were a great number of pieces of crystal, in goblets, vases, urns, etc.; some merely polished, and some beautifully carved and engraved. The whole collection was, even then, estimated at more than 1,000,000 francs.

The Amethyst.

The next variety of the vitreous portion of the quartz family is called amethyst, which is of a fine violet colour, passing from white to a deep purple, sometimes in the same specimen. The deep purple-coloured specimens are frequently called oriental, even by jewellers and lapidaries, although the oriental amethyst is an entirely different stone, which has already been described under the head of sapphire. The colour of this gem is by some supposed to be derived from a trace of the oxide of manganese. Later analyses, however, have discovered also silica, iron, and soda. Heintz obtained, from a very deep purple Brazilian amethyst,—

Oxide of iron	0·0187
Lime	0·6236
Magnesia	0·0133
Soda	0·0418

The amethyst is found in India, Ceylon, the Brazils, Persia, Siberia, Hungary, Saxony, Spain, etc. A fine vein is said to exist near Kerry, in Ireland. In Oberstein it is found in a trap rock, in geodes of agate. These geodes are sometimes as much as two feet in diameter, hollow, and filled with crystalized amethyst of a fine colour. Similar geodes are also said to exist in India.

This variety of quartz, in common with some other of the vitreous members of the family, possesses a peculiarly minute, wrinkled, or wavy fracture on the freshbroken surface, resembling the impression of the skin of the thumb on a waxy substance. Sir David Brewster classes all kinds of quartz having this peculiarity as amethysts, without regard to their colour.

This gem is found in pieces of considerable size, and, from its beautiful colour and play, is much used in jewellery. Many years ago, amethysts were of considerable value, ranking next to the sapphire, and when fine selling at 30*s.* per carat; but immense quantities having been sent from the Brazils, they became common, gradually went out of fashion, and became nearly valueless. Latterly, however, the taste for them has revived, and at the present time they are gaining ground in public estimation. A fine clear deep-coloured amethyst, of the size of a two-shilling piece, is worth from £10 to £15; smaller sizes and inferior qualities are sold at from 2*s.* to 100*s.*

The amethyst is cut in various ways; but the mode which best shows the beauty of the stone is the brilliant-cut with a rounding table,—that is to say, cut like a diamond, but with the table, or flat part of the stone, slightly domed. Very few amethysts are cut in this country, as the price of labour is too high: great quantities are sent to Germany, where it is far cheaper. This stone appears to the greatest advantage when set with diamonds or pearls. By candlelight it loses a part of its beauty, being apt to appear of a blackish hue. The amethyst is cut on a copper wheel with emery, and polished on tin with tripoli. This stone takes a very fine polish.

The name amethyst is from the Greek *ἀμέθυστος*, derived from *α μεθύω*, "not to inebriate,"—in allusion to the superstition that this stone had the power of dissipating drunkenness. Pliny says that the gem was so called from the fact of its approaching near to the colour of wine, but not quite reaching it. In the Middle Ages, it was believed to dispel sleep, sharpen the intellect, and to be an antidote against poison. In 1652 an amethyst was worth as much as a diamond of equal weight.

Cairngorm, Cinnamon Stone, False Topaz, etc.

As a variety of quartz, the cairngorm possesses precisely those physical characteristics mentioned at p. 152, in treating of the subject generally. This stone takes its name from the fact of its being found in the Cairngorm mountains, in Scotland. It is commonly supposed that only the smoky varieties have a right to the name of "cairngorm"; but it really is very difficult to decide, as the name appears to run through all shades of colour from black to yellow. Jewellers and lapidaries call these stones Brazilian topaz, Mexican topaz, Spanish topaz, smoke-stone, etc., just as their fancy dictates, and always appear to have a separate name ready for every tint of colour. This, however, would not be of so much consequence if they confined this loose nomenclature to the varieties of quartz; but utterly regardless of chemical composition, they call all pale green stones aquamarine, all pale yellow stones topazes, etc. etc.

The lapidaries of Edinburgh cut the cairngorm in a way which displays the colour of this stone in a most remarkable manner, causing great brilliancy. They cover the underside of the stone entirely with oblong facets arranged in regular rows; while the table is surrounded with triangular facets, keeping the stone as thick as possible, which produces the deep orange-colour observed in them. Some lapidaries have a mode of changing the colour of these gems by heat; in thin stones, used by spectacle-makers for optical purposes, there is a method employed of taking the colour entirely away.

The cairngorm is found in every part of the world —in Brazil, Switzerland, Germany, Siberia, the United States, and in Ireland and Scotland—usually in crystals, sometimes in water-worn pebbles. In Siberia, crystals of smoky quartz are occasionally found penetrated by crystals of beryl, in the same manner as crystals of white quartz are found with crystals of topaz running through them.

False topaz is only another name for cairngorm.

Cinnamon is the name applied to those deep-coloured crystals, mostly found in the Brazils, and which differ in no other respect from the cairngorm. The French term this stone *pierre de cannelle.*

This stone is very little used for articles of jewellery, except in Scotland, where it adorns the handles of snuff mulls, dirks, powder-horns, and other articles of Highland costume. It is also much used in Birmingham for mounting in brass and gilt work.

Avanturine, or Aventurine.

This is another vitreous variety of quartz, of a pearly grey, brown, or reddish-brown colour, and contains minute spangles of mica, which give it a glistening appearance. Its lustre is vitreous, inclining to resinous. The stone is found on the shores of the White Sea, in Bohemia, Silesia, and in India; but the finest quality comes from the Cape de Gata, in Spain, and from Ekatherinenberg, in Siberia. The green variety is apparently coloured by copper, but it has not the peculiar nickel green of the chrysoprase. There is a kind of mica schist, of a reddish colour, which is frequently sold for aventurine. It occurs in many localities, but both are used for snuff-boxes and cane-handles, although very rarely for purposes of jewellery.

The artificial aventurine is far more beautiful than the real. It is made by heating together, for a considerable time, eight parts of ground glass, one part protoxide of copper, and two parts of oxide of iron, the mixture being allowed to cool very slowly. It is said that the name of aventurine arose from a workman in the glass factory at Venice letting fall by accident (*per aventura*) some brass filings into a pot of melted glass, and the product thence received the name of "aventurine."

The Emperor of Russia had two large vases cut out of this material, which he presented to Sir Roderick Murchison.

Chrysoprase.

This stone belongs to the chalcedonic variety of quartz, and is found massive in thick layers, which are never crystallized. It has an even or fine splintery, or a flat conchoidal fracture. Its hardness is slightly less than the other descriptions of quartz. An analysis by Klaproth obtained the following :—

Silica	96·16
Oxide of nickel	1·00
Lime	0·83

It is found at Kosemutz, in Silesia, imbedded in serpentine, and associated with a metal called pimelite, also with opal and chalcedony. The kings of Prussia used only to allow the mines in which this stone was found to be opened once in three years, and kept the finest specimens for themselves. It is reported to have been likewise discovered at the Belmont lead-mine, St. Laurence, U.S.

The chrysoprase, although formerly valuable in this country, is now nearly worthless, not being used for jewellery. On the Continent it is made into snuff-boxes, stick-tops, and even brooches and pins. It is cut *en cabochon*, at the bottom, and with small facets round the edge of the upper side. In the course of time the chrysoprase loses its fine colour, but much more rapidly when kept in a dry warm place : this loss is also occasioned by the action of light. It is said that the colour can be restored by a solution of nitrate of nickel.

The name chrysoprase is derived from two Greek words, *χρυσὸς* and *πράσον*, signifying "golden leek," on account of its colour. It was much used amongst the ancient Greeks and Romans for rings, and fine intaglios and cameos are still in existence of the early Greek period.

Onyx and Sardonyx.

These, the most important members of all the chalcedonic family of quartz, are distinguished from the agate by the position of the stripes or layers. The onyx is generally of a blackish or brownish colour, striped with white; occasionally, also, with a greenish layer. The sardonyx is of a deep rich brown, inclining to orange, and, when held against the light, exhibits a deep-red hue. Onyx is found at Yemen in Arabia, at Guzerat, at Oberstein in Saxony, in the southern part of Russia, in Perthshire, the Isle of Skye, and at various spots in Ireland.

The onyx derives its name from the Greek ὄνυξ, signifying "nail," it being supposed to have a resemblance to the human nail. The finest onyxes are brought from India, in pieces of a circular or oval form, rounded on the top, with the white stripe running round the brown or black centre near the margin, like the eye of a lynx, which the natives think it resembles. These stones are also termed by jewellers "eye-stones." The more concentric rings or layers a stone possesses, the more valuable does it become. Onyxes frequently reach this country in the form of beads; in that case the white stripe runs through them diagonally. Sometimes these beads are elaborately carved, but this destroys their value, instead of enhancing it. The

Indian or Oriental onyxes realize a much larger price than the German ones; and many lapidaries in this country have the erroneous idea that all the translucent ones are Oriental, that they are very much harder, and that it is impossible to stain them artificially, which is quite fallacious, as Indian or Oriental onyxes are of precisely the same nature as the German ones, and are equally susceptible of being coloured.

The trade in German onyxes is extremely large. At Oberstein and Idar are regular works, established on a large scale, for cutting, slitting, drilling, and staining onyxes and agates; the mills are driven by the water-power of the river Aar, which runs into the Rhine opposite Bingen. The grinding and cutting wheels are of very large size, some six or seven feet in diameter; and labour being exceedingly cheap, these operations are performed at an incredibly low cost. The labourers lie on their faces, on a bench constructed for the purpose, and hold the stones against the wheels, their feet resting against two supports firmly fixed to the bench, in order to get greater purchase, and to be enabled to work more rapidly.

Onyxes, agates, etc., are without difficulty stained to any colour by artificial means; for black, the stone is first boiled in honey, oil, or sugared water, and then in sulphuric acid, which carbonizes the oil or sugar the stone has absorbed; for red, protosulphate of iron is added, thereby leaving the iron in the form of an oxide; for the deep blue colour sometimes seen on onxyes, yellow prussiate of potash is added to the proto-sulphate of iron. It must be remarked that it is only the more porous parts of the stone which absorb the sugar, and the carbonization heightens greatly the contrast between the white and black layers.

The stones styled nicolo or onicolo are a variety of onyx, having a deep brown ground, overlaid by a layer of bluish-white; the white layer being excessively thin, the dark colour shows through. These stones are principally found in Bohemia and the Tyrol. Amongst the ancients they were much valued for engraving cameos and intaglios. The name nicolo is derived from the Greek Νιχόλαος.

The sardonyx is of a reddish-brown colour, consisting of alternate layers of chalcedony and carnelion. The name is derived from the union of the sard and the onyx, which were formerly considered to be different stones. The sard is supposed to have derived its name from the ancient Sardis, or from the Greek word σάρξ, flesh, on account of its colour, which somewhat resembles raw flesh. Both onyx and sardonyx are much used in jewellery, especially for signet rings; the different layers of the stone affording good contrasts for the display of the engraving; they are also cut into cups, vases, knife and sword handles, and are much used in beads for necklaces.

The onyx was the eleventh stone on the breastplate of the high priest, according to the Authorized Version of the Scriptures, although the almost complete uniformity of the other translations, given on page 36, would lead to a supposition that the *eleventh* stone was the beryl, and not the onyx. The precious ring thrown into the sea by the tyrant of Samos, Polycrates, was a sardonyx. The chaplets or rosaries worn by the fakirs of India, from the time of Pliny down to the present day, were and are usually made of onyx beads.

With regard to the value of these stones, although an onyx when known to be Oriental is of infinitely higher commercial value than a German onyx, yet, as they are identically the same stone, and as there is great reason to believe that those coming from India are frequently coloured by the process described on page 165, one is at a loss to understand why there should be any difference when the quality and translucency are identical, more particularly as no lapidary or jeweller can tell one from the other. If a fine stone be shown to a number of competent judges, it will most likely be pronounced German by one half, and Oriental by the other. The writer has seen onyxes sell for as high a price as £200 each, when of large size, beautiful colour, and with many layers.

The German beads fetch from *6d.* to *6s.* each, according to size and quality, and for those of Indian origin the most widely divergent prices are asked and obtained.

The onyx and sardonyx have been used for cameos from a very early period; the darker shades are usually left to form the ground, and the lighter shades cut into figures. In the library of the Vatican at Rome is the renowned cameo said to have belonged to the Emperor Augustus; in the Imperial Library in Paris are the well-known onyx cameos of Marcus Aurelius and Faustina, Agrippina and her two children, Venus rising from the sea surrounded with cupids, and many others.

A marvellously fine antique sardonyx cameo of five strata, representing the bust of Faustina, was sold at the sale of the effects of the Marquis de Dree for 7000 francs.

The art of cutting cameos, which has long been neglected, seems now about to be revived, as some creditable productions have recently appeared both at Paris and at Rome; and though still far behind the work of ancient and mediæval artists, are great improvements on the wretched productions which were sent forth a few years ago.

This stone was supposed in ancient times to cause strife and melancholy, and to be a cure for epileptic fits. Mithridates, king of Pontus, is reported to have had two thousand cups made of this material.

The Sard and Carnelion.

These are two varieties of chalcedony, of bright red and yellow tints; the liver-coloured or brownish-red specimens being called sard, and the bright red, white, and yellow ones carnelions. The best stones of this kind are found at Cambay and Surat, in India, and in Arabia; they are also found in Saxony, Scotland, Ireland, and New Zealand. They take a most beautiful polish, and are particularly adapted for seals, as they "deliver" easily from the heated wax, without destroying the impression. This quality was remarked by Pliny, who extolled the stone beyond the sapphire. The name carnelion is derived from the Latin *carnis,* flesh, on account of its colour. The carnelions are very little used in this country, although popular in Germany and Poland. The specimens found in Europe are generally of a muddy or cloudy tint, far inferior to those coming from India. It is a fact that exposure to the sun for a considerable period makes the colour of the stone brighter and deeper; artificial heat fails to produce the same effect, which would lead to the supposition that light as well as heat exercises an influence in effecting the change in colour, which must arise from the oxidation of the iron contained in the stone.

Chalcedony, Mocha-stones, Plasma, and Agate.

Chalcedony is a variety of quartz; according to Fuchs, pure quartz, with opal disseminated through it. This stone is usually of a greyish colour, but sometimes occurs milky-white, pinkish, or of a smalt-blue: in the latter case it is called sapphirine. It is never found crystallized. Some Indian varieties are yellowish, which is owing to the presence of oxide of iron. It is often found lining agate geodes, in trap rocks, and sometimes stratified, various tints alternating; it is semi-transparent, translucent (to nearly opaque) and as hard as quartz, but much less fragile, being very tough, and breaking with an even fracture, exhibiting little or no lustre. Before the blowpipe it becomes an opaque white. It is found in flints in most chalk-pits and in Europe is met with in Cornwall, Transylvania, and Iceland. From its hardness and toughness, this stone is well adapted for engraving, and has been used for this purpose from the most ancient period. White chalcedony, with minute blood-red spots, is called St. Stephen's-stone.

The chalcedonyx is a variety of chalcedony, having alternate stripes of white and grey. Plasma is a faintly-translucent variety which was much used in ancient times for engraving. Many fine gems are extant in this material; it is of a grass- or olive-green colour, sprinkled with minute yellow and white specks, and possesses a resinous sort of lustre; it is found among the ruins of Rome, in the Schwarzwald, in India and China. The name is derived from the Greek *πλάσμα*, "image."

The mocha- or moko-stone is a variety containing infiltrated dendritic oxides of manganese and iron, which give it the appearance of containing vegetable remains. It is found in Arabia, and is said to derive its name from Mocha; others suppose the name mocha-stone to be a corruption of moschas, or moss-stone.

Agate.

The agate (another variety of chalcedony) is of different colours, arranged in bands of various thicknesses, often variegated in small masses in a matrix of chalcedony. When the lines are thin and zigzag, it is called fortification agate, from its fancied resemblance to the outlines of a fortification; when in nearly straight lines, it is called ribbon agate; when containing apparent marks of vegetation, moss agate.

This stone is manufactured into articles of utility as well as ornament; it is much used for making burnishers, mortars for chemical purposes, balances of scales (where great nicety is desired), cups, vases, seal-handles, etc. It may be coloured artificially, in the same manner as the onyx.

The principal manufactories are at Oberstein, where, however, the supply has fallen off. The rough stones are now brought from the Brazils, India, Australia, etc., coming to Hamburg and other ports in ships with light cargoes as ballast. The numerous specimens termed Brighton, Isle of Wight, Aberystwith, and Irish pebbles as well as those sold at Chamounix, Niagara, etc., are in reality these Brazilian or Indian agates, and are distinguishable from the Oberstein agate by being waterworn; whilst the Oberstein agates are generally covered with a greenish mineral called delessite, a silicate of iron, and frequently have some of the trap rock adhering to them. The beach pebbles, found on the south coast of England, are exported in great quantities to Germany; they always have the same mixture of colours, clouded with a fine brown, with black and grey. In some specimens fine sections of choanites may be observed, thus proving them to have been formed in the cretaceous age, and to be totally different from real agate.

The Scotch pebbles, sold in Edinburgh as Scotch jewellery, are frequently cut and mounted in Oberstein, although many are really made from agate quarried near Perth, and manufactured and mounted in Scotland.

The name agate, according to Theophrastus, is derived from the river Achates, in Sicily, now called Drillo, whence they were first brought. The agate was much esteemed by the Greeks and Romans, more especially those specimens wherein a fanciful resemblance to natural objects occurred. Pliny relates that Pyrrhus possessed a natural agate, in which was depicted Apollo playing on the lyre, and the Nine Muses with their attributes.

CAT'S-EYE.

This is another chalcedonic variety of quartz, found of a yellowish-green, yellowish-brown, blackish, and hyacinth-red colour. It derives its name from possessing a peculiar opalescent lustre, between resinous and vitreous, which shows most strongly when cut *en cabochon.* When held towards the light, it resembles the contracted pupil of the eye of a cat; this singular effect being caused by fibres of amianthoid asbestos running parallel across the stone. It is usually translucent, sometimes quite transparent, very easily broken, and the fracture imperfectly conchoidal. Before the blowpipe it loses its lustre and transparency, and in powder is fusible, although with difficulty. It occurs in a massive form in Bavaria, the Hartz Mountains, and in Bohemia; but the good quality only comes from Ceylon and the Malabar coast, where it is found in small rounded pebbles. The cutting is usually performed in Ceylon, and when exhibiting the cat's-eye peculiarity in perfection, is much esteemed.

This gem is frequently confounded by jewellers and lapidaries with the true or chrysoberyl cat's-eye, which they also persist in calling "chrysolite cat's-eye." The chrysoberyl (termed "cymophane" when opalescent) is a much more beautiful gem, and may easily be distinguished by its superior hardness and greater specific gravity.

The cat's-eye is much used in jewellery for rings and pins, and its value has tripled in the last ten years. It is impossible to fix any value which would guide a purchaser, the price being a fancy one, dependent on the size and beauty of the gem.

The cat's-eye is usually set with a black or gold foil, to heighten its play and brilliancy. This stone was dedicated to their god Belus by the ancient Assyrians, and was called by classic authors *oculus Beli,* and λευκο οφθαλμος (wolf's-eye).

Jasper.

This stone—another of the many varieties of quartz—is very compact, and is found of various colours—dark green, red, brown, yellow, greyish, and sometimes bluish and black. It is very hard, and takes a fine polish. Occasionally it is found banded, or in stripes of different colours, when it is termed ribbon-jasper; the stripes are usually red and green alternating. Jasper alone is infusible before the blowpipe, but it will melt with the addition of carbonate of soda. It is sometimes found imbedded in trap rock, but more frequently in pebbles in the beds of rivers.

The yellow jasper is found near the Bay of Smyrna, in Greece and other places; the red in the plains of Argos; the variety known as ribbon-jasper comes from Siberia and Saxony; and another kind, termed Egyptian jasper, is found on the banks of the Nile. This latter is of a fine brown on the exterior, and clouded with brown of various shades, frequently spotted with black; the markings in this variety occasionally resembling natural objects. A specimen in the British Museum is thought to exhibit a likeness of the poet Chaucer. The yellow variety is used in the Florentine mosaic-work called *pietra dura.*

The ancients were well acquainted with this stone, and prized it most highly. Onomakritos, 500 years before the Christian era, speaks of the "grass-green jasper, which rejoices the eye of man, and is looked on with pleasure by the immortals." The emeralds spoken of by Roman and Greek authors were most probably green jasper, as we hear of pillars of temples cut out of one piece. Pliny, who describes no less than ten kinds of jasper, relates that it was worn by the natives of the East as an amulet or charm. This stone was much used for cameos; many specimens are extant, having several layers, and the objects represented are cut deep or shallow, so as to bring the colours into contrast: for instance, in some specimens may be seen the head of a warrior in red jasper, the helmet green and the breastplate yellow. In the collection of the Vatican are two marvellous vases of this substance; one of red jasper with white stripes, the other of black jasper with yellow stripes.

This stone is cut on copper wheels with fine sand and emery, and polished on wooden or metal wheels with pumice and tripoli.

Jasper is highly prized in China, the seal of the Emperor being made of it. In Europe its commercial value in the rough is from 1*s.* to 50*s.* per lb., depending on the quality, evenness, and colour.

The jasper, according to the Authorized Version of the Scriptures, was the twelfth stone in the breast-plate of the High Priest; and as the Hebrew name is "yashpeh," which is strikingly similar to jasper, and almost all the translations agree, there can be little doubt as to its identity.

Galen, among other sage advice, relates that if a jasper be hung about the neck, it will strengthen the stomach.

The Bloodstone or Heliotrope.

Bloodstone is another jasper-variety of quartz, of a dark-green colour, and having those minute blood-red specks disseminated throughout, which give its name.

The word heliotrope, from ἥλιος, the sun, and τροπή, a turning, is derived from the notion that, when immersed in water, it changed the image of the sun into blood-red. Pliny relates that the sun could be viewed in it as in a mirror, and that it made visible its eclipses. Marbodus, in his poem on precious stones, thus speaks of it under the name of heliotrope:—

> "Ex re nomen habens est heliotropia gemma,
> Quæ solis radiis in aqua subjecto basillo,
> Sanguine reddit mutato lumine solem
> Eclipsemque novam terris effundere cogit."

This stone is found in large quantities in India, Bokhara, Siberia, and Tartary, and also in the Isle of Rum in the Hebrides, occurring generally in masses of considerable size. It is translucent, and susceptible of a beautiful polish; its commercial value, as in the case of other stones, varies with the quality of the specimen.

The bloodstone is used for the same purposes as agate and onyx.

There is a tradition that at the Crucifixion the blood which followed the spear-thrust fell upon a dark-green jasper lying at the foot of the cross, and from this circumstance sprang the variety. In the Middle Ages the red specks alluded to were supposed to represent the blood of Christ; and this stone was thought to possess the same medicinal and magical virtues as the jasper.

Crystal of Peridot.

THE CHRYSOLITE, PERIDOT, OR OLIVINE.

This gem is the true chrysolite, although not acknowledged as such by jewellers and lapidaries, who invariably confine that name to the chrysoberyl. It belongs to the monetric system of crystallization, and is the softest of all the gems (numbering from 6 to 7 in the scale) and is easily scratched by quartz. Its lustre is vitreous, and the fracture conchoidal. The specific gravity varies from 3·33 to 3·5, and its chemical composition is as follows:—

Silica	39·73
Magnesia	50·13

Protoxide of iron	9·19
Alumina	0·32
Protoxide of manganese	0·09
Oxide of nickel	0·22

Before the blowpipe it becomes darker, but is infusible, except in the case of the variety called hyalosiderite, which melts into a black magnetic globule. This stone, as its name implies, contains a large quantity of iron. All the varieties give the iron and silica reactions, and are easily and completely dissolved by sulphuric acid into a jelly.

This stone is called peridot when of a deep olive-green, olivine when of a yellowish-green, and chrysolite when of a lighter, or of a greenish-yellow, colour. Mineralogists enumerate many other varieties, but they are of little interest, except to the mineralogical student. Peridots are found in Ceylon, Pegu, Brazil, and also near Constantinople, in angular or worn pieces, very rarely crystallized; they are not, however, very plentiful. The olivine and chrysolite occur in Egypt, Mexico, in Auvergne, the Tyrol, Scotland, etc., usually in substances of volcanic origin. Specimens have been met with in the lava of Vesuvius.

None of the varieties of this gem are much used in jewellery, although some of them possess a very beautiful deep colour: perhaps the fact of its being scratched very easily may be the cause. They are usually cut in steps, or *en cabochon*. On the Continent the chrysolite is often cut like a rose diamond, and set with a gold foil a copper wheel being employed in cutting it, and the polish obtained by the use of tripoli and oil. The peridot very closely resembles the green tourmaline, from which, however, it may be readily distinguished by its non-electrical properties when heated, and by its softness. The name chrysolite is derived from χρυσὸς, gold, and λιθος, a stone. Peridot in many oriental languages signifies a gem. The chrysolite is conjectured to have been the so-called topaz of Pliny, who, however, confounds it with the chrysoberyl as well as the topaz.

The value both of the chrysolite and peridot is very small; fine specimens of good size may be bought at from 1*s.* to 15*s.* the carat. A few years ago they were in tolerable demand for jewellery purposes, when they commanded a much larger price than at present.

THE TURQUOISE.

This stone, in ancient times called the Turkis or Turkey stone, is found in reniform or stalactitic masses, never in crystals; it has a hardness of 6 in the scale (although specimens vary considerably), and a specific gravity of 2·6. It possesses a somewhat waxy lustre, is occasionally translucent, although generally opaque, and has a small conchoidal fracture, with a white streak.

Its composition is as follows:—

	From Silesia. Analysis by Fohn.	From Persia. Analysis by Hermann.
Alumin	44·50	47·45
Phosphoric acid	30·90	27·34
Water	19·00	18·18
Protoxide of copper	3·75	2·02
Protoxide of iron	1·80	—
Peroxide of iron	—	1·10
Peroxide of manganese	—	0·50
Phosphate of lime	—	3·41

Before the blowpipe it decrepitates violently, and yields water; in the reducing flame it becomes brown, and colours the flame green, but is infusible except with borax or salt of phosphorus; it dissolves without effervescence in muriatic acid.

The turquoise of commerce comes from Nichabour in Khorasan in Persia, and is found varying from white to a fine azure blue, occasionally greenish; but it is only the fine blue stones that are of any value. The turquoise is frequently supposed to be found in Russia, but this is an error, and arises from the fact that great numbers are sold to Russians at the fair of Nishni Novgorod by Persian, Kirghiz, and Tartar merchants; they are stuck upon wax-sticks and sold in bundles like quills. An inferior variety is found in Thibet, China, Silesia, and at Oelnitz in Saxony. Lately there has been discovered, by Major Macdonald, in Arabia Petræa, near Mount Sinai, another variety, found in a stratum of red sandstone. The colour of this turquoise is darker and of a finer blue than the best Persian stones, but it has the unfortunate peculiarity of changing its hue in the most rapid and mysterious manner; a fine blue stone will turn on the lapidary's wheel to a sickly green or whitish tint; other specimens retain their colour for some weeks, breaking out afterwards in an eruption of white specks, which gradually overspread the whole surface, whilst others again begin to whiten or to become green first round the edge; some specimens regain their colour by being soaked in water or weak uric acid, but lose it again as the stone becomes dry. In certain rare instances, however, the colour has remained unchanged for many years; but, as a rule, it would be well never to give a large price for any turquoise from this mine. They may be readily distinguished from the real turquoise *de vieille roche* by the stratum (in most cases apparent at the back) being of a pale yellowish-red colour, instead of dark brown.

The Persian turquoise is also subject to change of colour, although in nothing like the proportion of the variety mentioned above; if not brought into contact with acids, musk, camphor, or other scents, it retains its hue for many years, turning at last to a green or a white,—although ancient cameos and intaglios are extant which have retained their colour until the present day. Many persons still hold to the belief that this gem by its changes indicates the state of health of the wearer, and perhaps the fact that turquoises do vary their colour in the most unaccountable manner, may have something to do with this old superstition.

This stone is cut *en cabochon* on a leaden wheel, with emery, and is polished on a wooden one, with rotten-stone, and finished with rouge.

The bone or fossil turquoise (or odontolite) found in Languedoc is composed of nothing but bones fossilized and coloured by phosphate of iron; it is sometimes called turquoise Bricard, from the name of the original owner of the mine. This so much resembles the real stone as to deceive many persons; the colour is generally fine, but of an inky blue, which is never seen on the Persian turquoise, and its texture, which is very compact, shows in its fibrous lines, sometimes straight and sometimes across each other, traces of animal structure. This turquoise is sometimes called *turquoise de nouvelle roche*, but its value is very trifling; a fine ring-stone may be purchased for 20*s.*, and smaller stones at proportionately smaller prices.

The Persian turquoise is much used in jewellery, and a great number are sold here and in Paris; small clear stones bring from 6*d.* to 20*s.* each, whilst a fine ring-stone will realize from £10 to £40. Large turquoises of good quality and fine colour are extremely rare, and realize most extravagant prices; a perfect stone of the size of a shilling, and of good depth, was sold not long ago for £400. The turquoise is much used in oriental countries for ornamenting harness, girdles, swords, daggers, and pipes, also for amulets and charms. It is also frequently engraved with the name of Allah, a verse of the Koran, or some device, and then filled in with gold; faulty specimens are generally chosen, as the defects can thus be concealed. The Shah of Persia is supposed to have in his possession all the finest gems, allowing those only of inferior quality to leave the country.

The turquoise, in ancient times called the callaite, was well known to the Greeks and Romans. Pliny notices its changing colour from gradual decomposition, and also shares in the oriental belief that this gem was lucky, and brought health and fortune to the wearer. Several antique cameos and intaglios cut in this material are extant in the Vatican, some of which still retain their colour. Fragments of turquoise, which appear to have been parts of amulets, are frequently met with in the ruins of ancient towns in Egypt.

THE OPAL.

This magnificent gem is composed of silica in an amorphous state, mixed with water, and is in reality the same mineral as quartz, with the addition of 6 or 7 per cent. of water: it never occurs in a crystallized form, it has a vitreous lustre inclining to resinous, is numbered in the table of hardness from 5·5 to 6·5, is scratched by quartz, and has a specific gravity varying from 1·9 to 2·3.

There are many varieties,—the "noble," or precious opal used by jewellers; the "fire," or reddish opal, which has also occasionally a fine play of colours; the so-called common opal; the semi- or half-opal; the hydrophane (known in commerce as the Mexican opal); another variety of hydrophane called cacholong,—of a milk-white colour, nearly opaque, and containing a small percentage of alumina, and about 3·5 per cent. of water; the opal jasper, which contains oxide of iron, and is found in the neighbourhood of the Geysers of Iceland; finally, the wood opal, or opalized wood, of which huge masses are met with in Hungary, Tasmania, and other parts, whole trees occasionally being found converted into the ligneous structure called wood opal. There are other varieties, but of such small importance that they need not be enumerated here. The following are the analyses of the varieties of opal:—

	Fire Opal of Mexico. Analysis by Klaproth.	Fire Opal of Georgia. Analysis by Bruch.	Precious Opal of Hungary. Analysis by Damour.	Semi-Opal of Hanau. Analysis by Stücker.	Fire Opal of Faroe. Analysis by Forchammer.
Silica . .	92·00	91·89	93·90	82·75	88·73
Water . .	7·75	5·84	6·10	10·00	7·97
Peroxide of iron . .	0·25	—	—	3·00	—
Alumina .	—	1·40	—	3·50	0.49
Magnesia .	—	0·92	—	—	1·48
Lime . .	—	—	—	0·25	0·49
Potash and Soda. .	—	—	—	—	0·34

The opal is infusible before the blowpipe, but gives off water, and becomes opaque; those varieties containing iron turn red. It is almost entirely soluble in a cold solution of caustic potash; in other respects its chemical characteristics are the same as quartz.

The precious opal is found in claystone porphyry at Czernowitza; between Kaschau and Eperies, in Hungary; occasionally near Frankfort; and at the mines in the province of Gracias, Honduras, South America: the "fire" opal at Zimapan and San Nicolas, in Mexico, the Faroe Islands, etc.: the common opal in Hungary, Faroe Islands, Iceland, Giant's Causeway, Ireland, Cornwall, and near Smyrna: cacholong occurs in small masses on the river Cach, in Bucharia—whence its name—and also in Iceland.

The precious, or noble opal is one of the most beautiful gems in existence; when held between the eye and the light it appears of a pale milky-reddish blue, but when seen by reflected light it displays all the colours of the rainbow, in flakes, flashes, or specks,—in fact, all the colours of the most beautiful gems are here united in one. When the colours are in small flakes, distributed over the surface, it is termed by jewellers "harlequin" opal, on account of its resemblance to the motley tints of the harlequin's dress. When fine, these are much prized; but most persons prefer stones having the variously-coloured fire in large flashes. This marvellous play of colour is thought to be occasioned by nearly invisible fissures; the Abbé Haüy, however, ascribes it to thin films of air filling cavities in the interior. Opals are always cut *en cabochon* on both sides, and the true beauties of the gem only display themselves when the stone is moved about, as then a fine opal really appears to have an actual life within itself.

They are very brittle, and are always much more brilliant on a warm day. A dealer in precious stones, aware of this peculiarity, invariably holds an opal in his hand before showing it, in order to impart warmth to the gem. Fine stones of large size are rarely found; they seldom exceed an inch in diameter. At the mines in the locality of Gracias á Dios, in Honduras, specimens have been found equally as fine as the Hungarian stones, and certainly not to be distinguished from specimens coming thence.

The hydrophane, or Mexican opal, loses its beauty when exposed to water, and Sir Walter Scott has alluded to this fact in 'Anne of Geierstein,' although in that romance he ascribes it to supernatural agency. Strange to say, after the publication of the brilliant novelist's fiction, the belief that opals were unlucky obtained such currency that they quickly went out of fashion. Of late years they have again come into vogue, and now promise to become, as they have always deserved to be esteemed, universal favourites; the more especially as they are *the only precious stones which defy imitation*. In Eastern nations they have always been highly prized. The Mexican opal can be restored to its original colour by a moderate application of heat.

The common opal is used in Germany for cheap jewellery—cane-tops, snuff-boxes, etc.; the other varieties are not used. The value of the precious opal depends entirely on the brilliancy and play of its colours, and any attempt at pricing it would be an idle task; for large fine gems of extraordinary beauty as much as £1000 has been paid; fine ring or brooch stones bring from £40 to £100, and smaller ones from 5*s.* to £20 per piece; they are very rarely sold per carat.

The opal is cut on a leaden wheel with emery, and polished on a wooden one with tripoli and water. Great care must be taken not to heat the stone too much by friction, and, from its fragility, very delicate handling will be requisite.

The opal was known to the most ancient authors, and was esteemed beyond any other precious stone. Pliny describes it as uniting the colours of the ruby, the amethyst, the topaz, and the emerald, in the most marvellous mixture, and says that its fire is like the flame of burning sulphur. He relates that a Roman senator, Nonnius, was outlawed and sent into exile by Marcus Antonius, because he refused to give up an opal. The stone—valued at 20,000 sesterces, about £170,000—was of the size of a filbert, and set in a ring, but rather than part with it Nonnius submitted to exile, carrying his stone with him.

Amongst the French crown jewels are two wonderful opals; one is set in the clasp of the imperial cloak. The finest known is in the museum at Vienna; itwas found at Czernowitza,—where mines have been worked since A.D. 1400,—and is of immense size and extraordinary beauty. It is said that £50,000 has been refused for it.

THE PEARL.

THIS beautiful gem, formed by nature in the shells of oysters and of mussels, is found in the beds of rivers and in the sea, in various places in Europe, Asia, and America.

Its chemical composition is entirely carbonate of lime and organic matter. It possesses a lustre peculiar to itself, which is called pearly: it is easily affected by acids and fetid gases, and calcines on exposure to heat. The specific gravity is 2·5 to 2·7; those found on the coast of South America, termed Panama pearls, are somewhat heavier than the oriental ones.

Naturalists account for the formation of these gems in the endeavours of the animal to rid itself of some foreign body which has intruded into its shell, by covering it with a deposit similar to the interior of the oyster shell,—commonly known by the name of mother-of-pearl; others ascribe it to a disease of the oyster. In some instances, on bisecting a pearl it is found to be composed of a series of layers or skins round a speck of some darker substance; in others the middle of the pearl is hollow and of a globular or spherical form; and in others again the pearl appears perfectly solid, and of the same texture, colour, and formation throughout. The Chinese, from a very remote period, have been in the habit of inserting small beads, images, etc., in the shells of oysters and mussels, and these have certainly become coated with a pearly substance, but they are generally of a blackish tint, with very little lustre, and far inferior in appearance to the pearls formed in the laboratory of nature.

The wonderful polish and consequent lustre of a fine pearl,—which in a great measure constitutes its value, and has never yet been even passably imitated—would appear to be caused by the friction of the soft body of the oyster for a considerable length of time; and this polish in most cases exists only on the outer skin, as on removing the exterior surface the next layers are usually dull in colour and dead in lustre,—resembling a fish's eye. In some cases, however, a pearl of very bad exterior contains a fine and "lively" kernel.

Pearls are found of almost every imaginable colour, and of the most fantastic shapes; in some instances of considerable size, but those of both fine quality and large dimensions are very rare. Sometimes a shell will be opened containing several pearls detached, sometimes with one or more adhering closely to the shell, and occasionally with pearls conglomerated together in a shapeless mass. The oriental pearls are seldom found of any colour but yellow and white, and are usually of a round or button form; whilst the American or Panama are generally blackish or brownish, and mostly long and drop-shaped.

The number of fine and large pearls is, however, as may be supposed, very small.

The sea pearl-oyster, *Meleagrina margaritifera,* is a large oyster of seven or eight inches in diameter, with very thick shells, rather flat, and of a greenish-black exterior; whilst the interior is of a silver-white hue reflecting various colours, being, in fact, the ordinary mother-of-pearl of commerce, too well known to require further description here. Some idea of the quantity of this material produced may be gathered from the fact that there are imported into Europe annually some 15,000 tons; and, calculating the average weight of a pearl shell, we have the astonishing number of from five to six million oysters which have been fished from the ocean.

The principal pearl-fisheries are in the East,—on the west coast of Ceylon, in the Bay of Manaar, in the Persian Gulf, and in the Sooloo Islands (which lie between Borneo and Mindanao). Pearl-fishing is also carried on in the Aroo Islands; near the island of Papua, or New Guinea; in the Red Sea; in America, on both the

Pacific and Atlantic coasts (in California, and latterly on the coast of New Jersey); and in several other localities.

A short account of the pearl-fishery in Ceylon, which is the property of and is conducted by the Colonial Government, may interest the reader. When the season for the pearl-fishery arrives, a fleet of boats, sometimes as many as 150, put out, but not before they have gone through numberless ceremonies, which the natives will on no account forego. Under the command of the adanapar, or head pilot, each boat is manned with twenty men and a steersman, ten being rowers and ten divers, besides a 'pillal karras,' or shark charmer. The government keep these men in regular pay, as no diver would descend without their presence. Other conjurors remain on the seashore, mumbling incantations until the boats return. At each side of the boat is a stage, from which the divers descend. The men go down into the sea five at a time; when the first five come up, the other five go down; and by this method of alternately diving, they give each other time to recruit themselves for a fresh plunge.

In order to accelerate the descent of the divers, large stones are employed: five of these are taken in each boat for the purpose; they are of a reddish granite common in this country, and of a pyramidal shape, round at top and bottom, with a hole in the smaller end sufficient to admit a rope. Some of the divers use a stone shaped like a half-moon, which they fasten around their middle when they wish to descend, and thus keep their feet free. The stones generally weigh from twenty to twenty-five pounds each.

The diver, when he is about to plunge, seizes the rope to which one of the stones previously described is attached with the toes of his right foot, while he takes hold of a bag of network with those of his left—it being customary among all the Indians to use their toes in working or holding as well as their fingers; and such is the power of habit, that they pick up even the smallest thing from the ground with their toes almost as nimbly as a European could with his fingers. The diver, thus prepared, seizes another rope with his right hand, and holding his nostrils shut with the left, plunges into the water, and by the assistance of the stone speedily reaches the bottom. He then with much dexterity and all possible dispatch collects as many oysters as he can while he is able to remain under water, which is usually about two minutes. This done he resumes his former position, makes a signal to those above by pulling the rope in his right hand, and is immediately drawn up into the boat.

The serious effects of this continual submersion are shown in the discharge of water, and occasionally blood, which takes place from the diver's mouth, ears, and nostrils. But this does not hinder the men from going down again in their turn. They will often make from forty to fifty descents in one day, and at each plunge bring up about a hundred oysters.

Some rub their bodies over with oil, and stuff cotton into their ears and noses to prevent the water from entering, while others use no precautions whatever. Although from one to two minutes is the time generally passed under water, yet instances are known of four, five, and even six minutes' stay beneath the surface.

The great dread of the divers is the ground-shark, a common inhabitant of the seas in those latitudes. During the time of the fishery conjurors stand on the shore till the boats return in the afternoon, muttering prayers, twisting their bodies into strange attitudes, and performing ceremonies. All this time they ought to abstain from food or drink; but they occasionally regale themselves with toddy, till they are no longer able to stand at their devotions. If an alarm be given by one diver, none of the others will descend that day.

Latterly, the diving bell has been adopted, which, when it is brought into general use, will of course much diminish the danger. On the return of the boats, they are unloaded and the oysters left to putrify in pits or closed vessels. When these are opened the pearls are washed from the decayed oysters, in troughs, with sea-water. On other occasions the shells are opened immediately, and the pearls extracted. The oysters, however, are generally sold unopened, and as their contents are alike unknown to both buyer and seller, the transaction takes more the form of a lottery than a commercial exchange,—in fact, the trade has in it much of the spirit of gambling. Many oysters contain no pearl; whilst others may produce a pearl worth £200 or £300.

The government derive a large income from this fishery, and protect it by the strictest regulations. Those places to be fished are buoyed out carefully before the boats leave the land, and are examined from time to time by experienced divers. Latterly, the supply has fallen off so greatly that a recent regulation has directed the fishery to be discontinued for some years, —a precaution which is very necessary, as the beds are becoming exhausted.

The fisheries in the Persian Gulf are carried on in exactly the same manner as those of Ceylon. In ancient times they were known to the Macedonians, and Seleucus, king of the Syrians, gave the revenues derived therefrom to one of his satraps. Here, besides the sharks, the divers have to contend with the sword-fishes, which are even more dangerous. Formerly the Portuguese had possession of the Persian Gulf fisheries, but they are now in the hands of the native rulers; and it is said that as many as 30,000 persons are employed on them. The Persian Gulf pearls are inferior in colour to those found at Ceylon; in commerce they are termed "Bombay pearls," as they are mostly sold there.

The produce of the fisheries on the coast of the Sulu Islands principally goes to China. The Red Sea fisheries, which in the time of the Ptolemies were immensely productive, now produce very few pearls.

Great quantities of pearls come from Panama and California, and there is good reason to believe that the fisheries in these parts were well known to the ancient

Mexicans, for we learn from the old Spanish histories that the Aztec kings had in their possession immense numbers of fine pearls, and appeared to be well acquainted with the sources from whence they were derived.* Pearls are also found in mussel-shells in the rivers of Scotland, Germany, France, Sweden, and Russia. These are generally of a dull and leaden hue, without lustre even when white, and are known in commerce by the name of Scotch pearls.

Many experiments have been made with the view of ascertaining the length of time required to produce large pearls, and the results would lead to the belief that many years are necessary to develope them.

From the most remote ages the pearl has been considered one of the richest gifts of nature. It is spoken of in the Book of Job, ch. xxviii., and in the Proverbs of Solomon, ch. iii. Hindu mythology ascribes to the god Vishnu the discovery or creation of pearls, and the numerous idols or gods and goddesses connected with this ancient faith were formerly adorned with them. The ancient Persians, Egyptians, Babylonians, and other oriental nations, held the pearl in great esteem. From these the Romans became acquainted with them, and the mania for their possession grew so great that they were sold for the most fabulous prices: when Pompey conquered Mithridates, he found in his treasury, besides

* The Spaniards, by the conquest of Peru and Mexico, came into possession of immense quantities. and the palace of Montezuma is reported to have been studded with emeralds and pearls.

several crowns of this material, a portrait of that king, consisting of pearls in mosaic. Seneca exclaims against the shameful extravagance of Roman ladies in this particular. They termed a drop pearl "unio," and wore a pair in the ear just as ladies do at the present day. The story of Cleopatra's pearls is too well known to require repetition here. The two halves of the second gem, by order of the Emperor Severus, went to adorn the statue of Venus in the Pantheon. Pliny places the pearl next to the diamond in value, and supposes the former to proceed from drops of dew swallowed by the oyster.

In China, pearls are used as medicine; a belief existing among orientals that they possess great virtues in syncopes, fluxes of blood, etc. The pearl in Hindostanee is called "moti." In Bengal, at one time, virgins wore them on their arms as a preservative of virtue.

One of the finest pearls at present in existence is called *La Peregrina.* It was sold to Philip IV. of Spain, in 1625, and is said now to be in the possession of a Russian princess. The Shah of Persia has a pearl valued at £60,000, and the Imaum of Muscat one for which he refused £30,000. The pearl necklace of the Empress of the French is one of the finest known,—a remark equally applicable to that presented to Her Majesty by the East India Company. A very large necklace was presented to the Princess of Prussia on her marriage, but the pearls are misshapen, and of inferior quality. The Marquis of Abercorn, it may be stated, possesses a matchless drop-pearl of great size.

On the Value and Discrimination of Pearls

The beauty and value of pearls depend on their form, colour, texture (technically called "skin"), transparency (or water), and lustre. A pearl, to be perfect, must possess the following qualifications :—

1. It must be perfectly round or drop-shaped, seeming as if fashioned, or turned, into shape.

2. It must have a perfectly pure white colour.

3. It must be slightly transparent.

4. It must be free from specks, spots, or blemish.

5. It must possess the peculiar lustre characteristic of the gem.

These rules, however, only hold good in Europe, as in India and China the bright yellow colour is preferred. When a single round or drop-shaped pearl is examined, it is easy, by means of comparison, for even an inexperienced buyer to judge for himself. Not so when, however, as is frequently the case, they are strung in a row or as a necklace; in this case the pearl-stringer arranges the pearls in such a gradation of colour that the tints imperceptibly blending they appear of one hue, when perhaps, if isolated, they would show several tints.

The American pearls, called in commerce "Panama pearls," although appearing at first sight very white, have almost invariably a sort of blackness under the skin, which renders their colour far inferior to the pure white hue of the oriental pearl. In fact, the Panama pearls have often a sort of quicksilvery appearance.

In the annexed Tables it has been endeavoured to give an approximate value of the different sizes; but it must be remembered that the pearl, more than any other gem, is liable to fluctuation in price. For the last sixteen years the tendency has been towards a rise; and, in consequence of the Ceylon fishery being for a time interdicted, the price of pearls seems likely still further to increase.

It would be almost useless to give any value for drop pearls, as when of large size and fine quality they are of so rare occurrence as to command fancy prices; still, as a slight guide, it may be mentioned that perfect white drop pearls, of 80 to 100 grains, may be estimated at from £7 to £11 per grain; those of 50 to 80 grains, at from £4 to £7 per grain; and those of 30 to 50 grains, at from £3 to £5 per grain; smaller sizes bring from 20*s*. to 60*s*. per grain. Misshapen pieces are called "barrok pearl" (*perles baroques*), and are sold at per ounce; the price varying from £10 to £200 per ounce, depending on quality, colour, and size. Pearls of the commonest description are exported in great numbers to China, where they are used medicinally; the next quality are sold in Poland, the south of Germany, Russia, and the Danubian Principalities, where they are worn by the peasantry. It may be mentioned that pearls are much more generally worn on the Continent than in this country.

The pink pearls, which are found principally in North America and the West India Islands, bring from

3*s*. to 40*s*. per grain. They seldom occur of regular shape, or even form, and when bad are not very unlike decayed teeth. Although termed "pink," they are of all colours, from red to pale yellow, and not unfrequently of a dead white, like a polished fish's eye.

Black and lead-coloured pearls bring a large price when fine in shape, and of even colour; some persons prefer the leaden or plumbago tint, others, the shining greenish-black; they bring from 3*s*. to 60*s*. per grain.

Grey pearls are worth very little, being nearly useless for mounting in jewellery.

Pearls deteriorate by age, contact with acids, gas, and noxious vapours of all sorts. Various means for restoring them to their pristine beauty have been suggested and tried, but experience shows these to be useless, and only more likely still further to injure than to restore. The best way to preserve pearls is to wipe them with a clean linen cloth after being worn, depositing them carefully wrapped in linen in a closed box.

Unbored pearls are termed "virgin," and those which have suffered from wear receive the name of "widows." The operation of boring requires great care, and is far better done in India than here; the holes there being drilled much smaller and more straight. In drilling, a bow and string is used with a very fine drill, the pearl being held between two pieces of wood. This operation must be performed slowly and with great caution, so as not to run the risk of breaking the pearl in halves.

Occasionally a pearl adheres to the shell; in this case it is cut out, and the shell part polished off; this, however, notwithstanding the care that may have been employed, leaves a certain portion of mother-of-pearl adherent, which reduces its value immensely. Occasionally the pearl is a sort of wart, hollow inside; in this case it is called *coq de perle*, and is of very little value.

The curious articles of jewellery by Dinglinger, in the Green Vaults of Dresden, mounted in gold and enamel, to carry out the fanciful resemblance of the pearl to some object, are made of this substance. A pearl of this description, of the form of a strawberry, was shown at the Exhibition of 1862, and was subsequently sold to an English merchant for a ridiculously exorbitant price, its intrinsic value being very trifling.

When round pearls are used for setting in articles of jewellery, they are split in halves. Those flat on one side, and convex on the other, are much used; they are called button pearls (*perles boutons*), and are worth about 25 per cent. less than round pearls of the same size and quality.

Jeffries adopted the same mode of valuation for pearls as for diamonds, namely, multiplying the square of the weight by 8*s*., at which he values a 4-grain pearl. His method of estimation may have been a correct one at that time; but as it would not be so now, I have simply given the market price of the day, which, it must be noted, may rise or fall according to circumstances.

Annexed is a list of the valuation of the pearls taken possession of by the Directory of France in 1791, made, at their order, by the most celebrated jewellers of the time, which may prove interesting.

Valuation of Pearls in the Crown Treasury of France, 1791.

A perfect white round virgin pearl of		388	grains	£ 8000
2 pear-shaped pearls	each	214	,,	12,000
4 ,, ,,	together	399	,,	2560
6 round pearls	,,	772½	,,	2400
3 ,,	,,	232	,,	880
5 ,,	,,	$408\frac{1}{16}$	,,	1200
7 ,,	,,	$464\frac{5}{16}$	,,	1320
8 ,,	,,	628½	,,	960
6 ,,	,,	392½	,,	728
11 ,,	,,	712⅛	,,	448

At the present day, these pearls,—which doubtless were of the purest and finest description,—would be worth a far larger sum than the amounts named.

The prices given in the following Table are approximate ones for perfectly white pure round pearls, of a smooth and lustrous skin, perfectly free from specks or discoloration of any sort.

A pearl of	1	grain is worth from	2*s.*	to 2*s.* 6*d.*
,,	2	,,	6*s.* 6*d.*	,, 7*s.* 6*d.*
,,	3	,,	12*s.*	,, 16*s.*
,,	4	,,	22*s.*	,, 28*s.*
,,	5	,,	35*s.*	,, 45*s.*
,,	6	,,	55*s.*	,, 65*s.*
,,	8	,,	90*s.*	,, 110*s.*

A pearl of 10 grains is worth from		. . . . . .	£8 to £9
,,	12 ,,	. . . . . .	12 ,, 15
,,	14 ,,	. . . . . .	15 ,, 18
,,	16 ,,	. . . . . .	20 ,, 30
,,	18 ,,	. . . . . .	30 ,, 40
,,	20 ,,	. . . . . .	40 ,, 50
,,	24 ,,	. . . . . .	60 ,, 72
,,	30 ,,	. . . . . .	80 ,, 100

THE SLIGHTEST TINGE OF COLOUR, SPECKS, INEQUALITY OF SHAPE OR OF LUSTRE, REDUCE THESE VALUES CONSIDERABLY.

Round pearls above this weight are of such rare occurrence, and command such exceptional prices, that it would be useless to attempt any scale of valuation.

The above Table of Value refers to the year 1865. A new Table, showing the present value of pearls, is given in the additional matter at the commencement of the work.

SUBSTANCES USED IN JEWELLERY NOT PROPERLY PRECIOUS STONES.

ALTHOUGH such substances as jet, coral, moon-stone, lapis lazuli, malachite, etc., do not properly belong to the family of gems; yet, as they are used for personal adornment, and possess some value, a short description of them may not be out of place in this treatise.

MOON-STONE.

Formerly the moon-stone was in fashion in this country, although it is now seldom seen. This variety of felspar or orthoclase has a *chatoyant* reflection, resembling that of the cat's-eye, and is of a pearly-white colour. A description called "adularia," from the name of one of the peaks of the St. Gothard, where it is found, is of inferior colour to the best moon-stones, which come principally from Ceylon.

In hardness it is 6 in Mohs's scale; the specific gravity, 2·4 to 2·6; the lustre vitreous, inclining to pearly. Crystals of large size are seldom found.

The chemical composition is:—

Silica	64·00
Alumina	19·43
Lime	0·42
Potash	14·81
Magnesia	0·20
Water	1·14

The stones are cut *en cabochon*, and at present are of very trifling value. An opaque and green variety of the orthoclase, deriving its tint from an admixture of copper, comes from Siberia, where it is called "amazon-stone;" but it is very little known in England. The moon-stone is also known by the name of water or Ceylon opal. At one period considerable value was attached to this stone, the ancients employing it frequently in their works of art.

LAPIS LAZULI.

This beautifully-coloured stone has been employed from the earliest times for various ornamental purposes. It is rarely found in crystals, and when it does so occur the specimens are small, and of the rhombic dodecahedron form. It has an imperfect dodecahedral cleavage, and is found in masses; it has a hardness of 5·5, a specific gravity of 2·38 to 2·45, a subvitreous lustre of a rich blue colour, and is opaque.

The composition of the Persian variety is, according to Klaproth :—

Silica	46·0
Sulphuric acid	4·0
Alumina	14·5
Peroxide of iron	3·0
Lime	17·5
Water	2·0
Carbonic acid	10·0

It fuses to a white glass, and, if calcined and reduced to powder, loses its colour, and gelatinizes in muriatic acid; with borax it effervesces, and forms a colourless glass.

Lapis lazuli is usually found in granite or calcareous limestone, with iron pyrites, often disseminated through the mass, which, when polished, gives it the gold-spotted appearance it often exhibits: the finest quality comes from Persia and Beloochistan; it is also found in China, Bucharia, and in Siberia. Latterly large quantities of very inferior quality and colour have been brought from Chili. The deep-coloured pieces are the most esteemed, being extensively used for studs, brooches, and other articles of jewellery, as well as for vases, ornamental furniture, mosaic work, etc.; when ground to powder, they form the valuable pigment called ultramarine. Latterly, however, chemists have discovered an artificial substitute, possessing exactly the same constituents and almost the same colour, which can be sold for a three-hundredth part of the price of the genuine ultramarine. This stone was well known in ancient times, and was, doubtless, the sapphire of the Greeks and Romans.

Pliny says:—'In sapphiris aurum punctis collucet cœrulis; similis est cœlo sereno, propter aurea puncta stellis ornato:'—which may be translated 'In the blue sapphire shine golden specks; it is like a serene sky adorned with stars, on account of the golden points.' In China and India this stone is carved into cups, vases, dagger-handles, etc. Many fine specimens still exist in the old Italian and Spanish churches, in slabs, pillars, and various adornments to the altars and shrines; also as panels, on which the pictures of saints, etc., have been painted. In the Russian palace of Zarskoe-Selo there is a room, made by order of Catherine II., the walls of which are entirely covered with slabs of lapis and amber. At the present day it is much used in decorative furniture and mosaic work.

In ancient times lapis was used in medicine as a purge. The Arabic name is *Azul*, meaning blue, whence probably is derived the name lazuli.

The value of the finest lapis—of a deep blue, not too dark, without any admixture of white or golden specks—varies from 10*s*. to 50*s*. per ounce, according to the size of the piece. Formerly, when used for the manufacture of ultramarine, it was worth much more.

MALACHITE.

This beautiful copper ore, in such great demand for ornamental purposes, is a hydrous carbonate of copper, and, apart from its value as a stone, yields so large an amount of metal that it is extensively used for smelting. According to Klaproth, its analysis is—

Carbonic acid	18·0
Protoxide of copper	70·5
Water	11·5

In a glass tube before the blowpipe it blackens, and yields a globule of copper; in acids and ammonia it dissolves with effervescence. Its hardness is 3·5; specific gravity 3·7; lustre vitreous, sometimes nearly adamantine, occasionally silky, and often dull; colour green, spotted and banded with other shades of the same colour; it takes a very high polish. Out of the thousands of tons annually found, a very small proportion is adapted for ornamental purposes, the compact variety susceptible of a high polish being very rare. The finest quality comes from the mines of Prince Demidoff, in Siberia. The doors and vases of malachite exhibited by the Prince in the Exhibition of 1851 created a great sensation, and first drew public attention to the substance. It is also found in the Burra-Burra mines in Australia, in Africa, Cornwall, Hungary, and the Tyrol; but all these varieties are far inferior in solidity and beauty of marking to Siberian malachite. This stone is sometimes used in jewellery and in cabinet work, but is not of any great value.

LABRADORITE, OR LABRADOR FELSPAR.

Although not commonly used in jewellery, this stone is well known; and possesses in some degree the brilliant multicoloured light-flashes of the opal. It belongs to the triclinic system of crystallization, and is found massive. Its hardness is 6; specific gravity, 2·67; lustre vitreous (in one direction pearly); easily cleavable, and is usually greyish in colour, sometimes nearly white. The chemical composition of the variety from Labrador is, according to Klaproth—

Silica	55·75
Alumina	26·50
Peroxide of iron	1·25
Lime	11·00
Soda	4·00
Water	0·50

Before the blowpipe on charcoal it acts like felspar, but fuses rather more easily to a colourless glass. When pulverized, it is easily dissolved by heated muriatic acid —which does not attack felspar. It is found variously transparent, from translucent to semi-opaque.

This stone is met with on the coast of Labrador, also in Canada, Norway, and Sweden; occasionally in the lava of Etna and Vesuvius. It is susceptible of a fine polish, and some specimens, owing to their *chatoyant* reflection, are very beautiful.

JET.

This substance is a variety of coal much used in England for mourning jewellery : it is much blacker, tougher, and harder than the ordinary Cannel coal, and has a considerable lustre when polished. Its hardness is 1·5, and specific gravity 1·3, and it has a conchoidal fracture. Jet is found in detached pieces in clay on the coast of Yorkshire, near Whitby, on the Baltic coast (where it is called black amber), in the forest of Ardennes, and in the Pyrenees. Great quantities of the manufactured jet are sold in Spain and Turkey. This substance is the *gagates* known to Pliny, Theophrastus, and other ancient authors, and took its name from the river Gagus, in Syria, where in ancient times it was found. Boetius says of this stone, that it secures men from nocturnal fears, spectres, and ghosts; and Cardanus relates that the saints wore bracelets and rosaries of this substance to number their prayers. In manufacturing this material it requires to be frequently moistened with water, for if it be allowed to get hot by the friction of the cutting or polishing-wheel, it flies into pieces. It is polished with tripoli and oil; the final polish being given by the hand, with dry tripoli powder.

JADE, OR NEPHRITE.

Although seldom used for purposes of jewellery in this country, throughout the whole of Asia this stone is an extremely favourite one. It is a hard, compact, translucent, and very tough stone, breaking with a splintery fracture and glistening surface. The colour varies from a creamy white to a dark green; the hardness is 6·0 to 7·0; specific gravity, 2·9 to 3·1; it is slightly unctuous to the touch, and fuses with difficulty before the blowpipe at the thinnest edges.

Its composition is variable; as it is not a distinct mineral, two analyses are given here:—

	Analysis by Kattner.	Analysis by Schafhäutl.
Silica	50·50	58·91
Magnesia	31·00	22·42
Lime	—	12·28
Alumina	10·00	1·32
Peroxide of iron	5·50	2·70
Oxide of chrome	0·05	—
Water	2·75	0·25
Peroxide of manganese	—	0·91
Potash	—	0·80

Jade is found in Egypt, New Zealand, Corsica, in North America, and in China. The name nephrite is derived from the Greek νεφρὸς, a kidney, from the power it was reputed to possess of curing diseases of that organ. In India, China, and Turkey it is carved into dagger- and sword-handles, cups, ornamental vases, etc., and frequently inlaid with precious stones. The most favourite colour is the pale greenish-grey, good specimens realizing a large price. Some fine examples of jade are exhibited in the South Kensington Museum, and large quantities of ornamental objects in this substance have lately come to Europe from Japan. In New Zealand it is carved into axe- and spear-heads, which are ground to a very fine edge. The variety called soft jade, which is frequently sold for the real, is a kind of stearite, or soapstone; its inferior hardness will, however, show the difference to the most inexperienced observer.

AMBER.

This fossilized gum or resin is found in irregular masses without cleavage, having a very low degree of hardness—2· to 2·5, and a specific gravity of only 1·081; its lustre is resinous or waxy, and varies from transparent to opaque. Its composition is—

Carbon	80·99
Hydrogen	7·31
Oxygen	6·73
Calcium	1·54
Alumina	1·10
Silica	0·63

It burns readily with a bright yellow flame and gives an agreeable odour, leaving a black carbonaceous residue. At 287° it fuses and is decomposed, yielding water, an empyreumatic oil, and succinic acid. It acquires negative electricity by friction, and is soluble in alcohol.

Amber is found in abundance on the Prussian coast of the Baltic, from Dantzig to Memel; also on the coast of Denmark, in Sweden, Norway, Moravia, Poland, Switzerland, and in France; it also occurs embedded in clay, on the coast of Essex, Suffolk, and Norfolk; in various parts of Asia, and many other places. In the United States it has also been found in the Greensand, both imbedded in the soil and in lignite. The colour varies from white and pale yellow to a deep brownish-orange. It is very brittle, and yields to the knife.

The experiments made by Sir David Brewster, Goepert, and others, have established the fact of its vegetable origin, which was surmised by Pliny. Goepert calls the trees which produced it *Pinites succinifer*, and he supposes amber to have been derived from at least eight other kinds of plants, and enumerates not less than 163 species of insects, most of which are unknown to us, except by what we can learn from their remains encased in amber.

Yellow amber beads used formerly to be in fashion in this country, and in Turkey and other Asiatic countries the material is still prized, saddles, bridles, and arms being adorned with it. In Oriental countries it may frequently be seen inlaid with gold and precious stones. It is also much used for the mouthpieces of pipes, it being the custom in the East to have the pipe lighted by a servant, the amber being thought incapable of transmitting infection. The most valuable variety is nearly opaque, and resembling fresh butter in colour.

Amber is also employed in chemistry; the oil of amber and succinic acid being obtained from it by distillation, the residue serving for the manufacture of black varnish. The name amber is probably derived from the Arabic word 'anabaron,' which designates this substance.

Amber was well known to the ancients; its name in Greek was *ἤλεκτρον,* from its power of attracting small substances when rubbed; in Latin *succinum,* from a supposition that it was the gum of a tree; also *lyncurion,* because some supposed that it was a deposit of the urine of the lynx—that of the males giving a deep, and that of the females a pale tint. Pliny records its medicinal use, and relates that necklaces used to be hung about the necks of young children, to preserve them against the powers of witchcraft and sorcery. The Greeks had a tradition concerning the origin of amber, that it arose from the tears of the sisters of Phaeton, who, lamenting his death, were turned into poplar-trees, and poured forth perpetual tears into the river Eridanus or Padus, which were congealed into the *succinum* or amber. Hence the lines in Ovid's fable of the Heliades. as given in the second book of his Metamorphoses:

> 'Inde fluunt lachrymæ; stillataque sole rigescunt
> De ramis electra novis, quæ lucidus amnis
> Excipit et nuribus mittit gestanda Latinis.'

Amber is sometimes found in large masses: a piece weighing fourteen pounds is, with other fine specimens, in the Royal Museum at Berlin: the Prussian government reserves the sole right of searching for amber within its dominions, guarding the monopoly with very stringent regulations. It produces, however, not more than 10,000 dollars, about £1500, yearlv.

CORAL.

Coral is the production of gelatinous mollusks belonging to the family of 'polypi.' They form submarine forests of leafless branches in many parts of the globe, and in the Southern hemisphere increase occasionally to such an extent as to form islands, and to seriously obstruct navigation. Coral is found of several colours—all shades of red and pink, green, brown, and yellow, as well as white and black. Its peculiar plant-like form formerly caused the belief that it was of vegetable origin,—a belief which is even now current amongst some, although the researches of distinguished naturalists have identified the form of the insects which produce this wonderful phenomenon of nature. These 'polypi' resemble an eight-pointed star, notched on each point, with the mouth in the centre, and appear to have a marvellous organization common to all the others on the same branch; if one of them be disturbed, the others instantly draw back along with the one touched, so that the separate mollusks on the branch seem to form one body. In certain respects these insects vary in different localities. The coral islands and enormous reefs, which are growing every day with wonderful rapidity, are the work of these minute objects. Although, as said above coral is found in the seas of many parts of the globe, yet the coral adapted for purposes of ornament comes almost entirely from the Mediterranean, and is found principally on the African coasts. The beds lie at a considerable depth, sometimes 700 or 800 feet beneath the surface of the sea, which depth causes the operation of fishing for it to be a difficult and tedious operation; it is obtained by means of nets and iron drags. Although at present the coral fishing is carried on principally by the Italians and Maltese, the industry is of French origin. As early as the year 1450 there existed at Calle a French establishment for the fishery of coral, and this company had a monopoly, on the condition of only employing Provençal sailors. In 1791 the trade was thrown open; in 1794, however, the French ships were protected by a duty laid on those of all other nations. At the present time, more than 150 barques from various ports are employed every season in this fishery. The amount of business carried on in this substance is surprising. Immense quantities are yearly exported to China, India, and Persia, where coral is ranked as one of the most precious productions of nature. In some parts of India worm-eaten coral is in great demand, and thousands of pounds worth of this commodity, which in European estimation would be worthless, is yearly sent there. One house in Naples alone exports £8000 worth to Calcutta, and the total value yearly imported by India is said to amount to £200,000.

Coral is principally cut into beads, and *boutons* or pieces cut *en cabochon;* drops for earrings; also in leaves, flowers, and various other shapes, for making the carved ornaments seen in Naples and Genoa; into charms, worn in bunches, which are supposed to avert the influence of the evil eye, occasionally into cameos, although not so frequently as was the case fifty years ago; and into stick and whip mounts and handles. The cutting and working of coral occupies a considerable number of persons; the three most important factories being at Genoa, Leghorn, and Marseilles. The branches of coral are cut in the most advantageous manner, according to their shape and freedom from fissures and defects, and afterwards ground into beads, etc., and polished with oil.

The red coral, once the most valuable, is now worth far less than the colour which formerly was nearly worthless—the pale delicate pink, similar to that of the inside of a pale rose-leaf. Coral of this tint is very valuable; a large bead or drop will realize £30 to £40, and smaller pieces are worth from £120 to £150 the ounce.

This stone or substance is not nearly so much sought after in Europe as formerly; and, as mentioned before, the great bulk goes to the East, where coral is much worn in turbans, and on the handles of daggers and swords. The beads are used by the Brahmins and Fakirs for rosaries, and the dead are frequently adorned with coral ornaments, to prevent evil spirits from taking possession of the corpse. The deep red colour, which harmonizes well with the olive skin of the Indian, is preferred; and few of the richer sort of Indian girls are without one or two coral ornaments. Coral is also worn in Spain, and in the West India Islands by the negroes. The white, yellow, and black varieties are of very little value.

Coral is affected by heat and acids, and is frequently imitated by bone, horn, and ivory, stained with cinnabar, —also by a composition of gypsum, gum, and cinnabar.

One of the Greek names of coral was *γόργεια*, from the tradition that the blood dropping from the head of Medusa, which Perseus had deposited on some branches near the sea-shore, becoming hard, was taken by the sea-nymphs and planted in the sea. Pliny calls it 'dendrites' and 'corallum,' and it was dedicated by the Romans to Jupiter and Apollo. In the Middle Ages it was used in medicine as an astringent, and given to newly-born infants; it was also thought to deepen in colour when worn by a man, and to become paler when worn by a woman. Both Boetius and Dioscorides sagely report it as efficacious against the delusions of the devil when worn in the form of an amulet.

ON THE MEANS OF ASCERTAINING THE IDENTITY OF GEMS.

The details given under the head of each stone afford ready and simple means for determining, unaided, the identity of any particular stone; and a comparison of the results of the experiment, with the different headings in Table A, will show at a glance in which division the crystal or cut-stone experimented on should be classed.

The pink topaz is frequently confounded with the balas ruby, the tourmaline with the emerald, the jacinth with the cinnamon stone, and the jargoon and white sapphire with the diamond; not only by amateurs, but even by persons supposed to be acquainted with precious stones. A very little attention to the facts noted under each head, both in the Table A and in the description of each stone, will prevent the errors into which many persons fall, and the possibility of the frauds to which they are occasionally liable.

In the first place, it may be taken as a general rule that stones, either rough or cut, which are affected by the file, are not precious stones; and to persons who are accustomed to its use, the difference of the resistance, and of the grating sound occasioned, affords a fair criterion of hardness. In the use of this tool, however, care must be taken not to file the delicate edges; as even the diamond, the hardest of bodies, might chip, if subjected to the tool on the girdle, which, as has before been said, is as thin as the edge of a knife.

For example, supposing it were wished to ascertain what gem a white stone was:—if it were scratched by a sapphire, it would at once be seen, on reference to the Table A, that it could not be a diamond; if its specific gravity were less than 3·9, it could not be a ruby or sapphire; if it did not acquire electricity by heat, it could be neither a topaz nor a jargoon; and if it scratched glass, it would be seen that it must be either a beryl, or quartz, or rock-crystal. For the purpose of ascertaining these facts, a crystal of sapphire (which may be obtained easily and without expense), a piece of quartz or rock crystal, a piece of hard flint-glass, and a pair of scales for the purpose of taking the specific gravity, are all that is necessary. Those persons who are in possession of an electrometer or a polarizing apparatus, have valuable adjuncts to the simple tests here indicated.

A very common mode of fraud, practised on inexperienced persons in cut stones, is the "doublet," or "semi-stone." In this case the top of the stone is genuine and the under-part glass, joined together artistically with cement; sometimes, for instance, the top is sapphire, and the under-part a gem of less value, such as garnet. When set, these stones are very difficult to detect, and frequently deceive the most experienced. When the under-part is of glass, however, the application of the file to the under as well as upper surface will, of course, at once show the imposition. Set stones which are set with a back are generally of pale colour or small lustre, often set with coloured foil, to enhance their beauty. Sometimes, however, stones which are set open, or, to use the technical term, 'azur,' have the interior of the setting enamelled or painted, to throw a tint of colour into the gem; or, in the case of the diamond, have the inside of the setting of polished silver, to correct a yellowish tinge. In all these cases, to be forewarned is to be forearmed, and a careful examination will prevent any one being deceived by these means.

"Doublets" are frequently sold by the Cingalese at Colombo to Europeans, and to the passengers by the Peninsular and Oriental steamers; sometimes blue glass, cut into facets, and sent there from Birmingham and Paris, are palmed off for the real stones.

Persons residing in countries producing precious stones may find these hints of service, and, if attended to, prevent their incurring expense in sending home worthless pebbles, with the mistaken idea that they are valuable gems. In one instance, a man actually left his business, and, at a very considerable expense, came to this country to sell a quantity of stones, which he was assured were diamonds; but which, on examination, proved to be 'nova minas,' or nodules of rock-crystal.

In the case of pearls, which are frequently imitated with marvellous skill, it will be seen that false pearls are much lighter than real ones; that generally the former are brittle (although some are made solid, of fish-scales, and do not break so easily); and the holes, which in the real pearl are drilled very small, and have a sharp edge, in the false are larger, and have a blunt edge.

In concluding these hints on the identity of gems, the author would remark that to no honest and respectable jewel merchant can the publication of such facts prove prejudicial; on the contrary, he is convinced that the more the public are enabled to test by their senses, or such simple means as may be readily available, the truth of statements made to them, the more will their appreciation of jewels increase.

TABLE OF THE DISTINGUISHING

Name and Colour.	Lustre.	Specific Gravity.	Hardness.	No. in Scale of Hardness.	Composition.	System of Crystallization.
DIAMOND. White, pink, yellow, red, blue, green, black, orange, brown, opalescent. BOART. CARBONATE (compact massive variety).	Adamantine; reflects prismatic colours. None.	3·4 to 3·6	Scratches all other precious stones.	10	Pure Carbon.	Monometric or cubical.
SAPPHIRE. Sometimes Asteroid. { White, blue, violet. RUBY, pink, red, violet-red. TOPAZ, *Oriental*, yellow. AMETHYST, *Oriental*, purple, violet. EMERALD, *Oriental*, green, generally pale.	Vitreous: very lively.	3·9 to 4·2	Scratched by diamond; scratches all others.	9	Alumina . 98·5 Oxide of Iron . 1·0 Lime . . . 0·5	Hexagonal or rhombohedral.
CHRYSOBERYL, or ORIENTAL CHRYSOLITE. Bright pale-green, greenish-yellow, reddish-brown. ALEXANDRITE, when exhibiting a reddish, transmittent light. CYMOPHANE, or CHRYSOBERYL CAT'S EYE, when showing an opalescence like a cat's eye	Vitreous; sometimes pearly.	3· to 3·8	Scratched by sapphire, etc.; scratches quartz readily.	8·5	Alumina . 80·2 Glucina . . 19·8 (Trace of Peroxide of Iron, of Oxide of Lead and Copper, depending on colour and locality.)	Trimetric or rhombic, prismatic.
SPINEL. Dark-red, white, blue, green. PLEONASTE or CEYLANITE, black. RUBICELLE, orange. BALAS RUBY, rose-red.	Vitreous.	3·8	Scratched by sapphire; scratches quartz readily.	8	Alumina . 69·01 Magnesia . 26·21 Protoxide of Iron . 0·71 Silica . 2·02 Oxide of Chrome . 1·10	Monometric or cubical.
TOPAZ. White, greenish, yellow, orange, cinnamon, bluish, pink.	Vitreous.	3·5 to 3·6	Scratched by sapphire; scratches quartz easily.	8	Silica . . 34·01 Alumina . 58·38 Fluorine . 15·06 Traces of metallic oxides.	Trimetric or rhombic.

A.

CHARACTERISTICS OF GEMS.

Form of Crystal.	Refraction.	Refractive Index.	Dispersive Power.	Electric Properties.	Fusibility.	Diaphaneity.
Cube, Octahedron, Rhombic dodecahedron, Tetrahedron, Hexa-octahedron.	Single.	White 2·455 Brown 2·487	0·38	Acquires positive electricity by friction; non-conductor of electricity.	Infusible; volatilized by long-continued heat.	Transparent, and translucent; Carbonate opaque.
Hexagonal prism; often pointed at each end.	Double, in a small degree.	1·765	0·026	Acquires electricity by friction and retains it several hours.	...	Transparent.
In flat hexagonal crystals; generally in rolled pebbles.	Double.	1·760	0·033	Acquires electricity by friction, and retains it several hours.	Infusible, alone.	Transparent and semi-transparent.
Octahedron, Rhombic dodecahedral octahedron, Tri-octahedron.	Single.	1·755 to 1·810	0·040	...	Infusible, alone.	Transparent, translucent.
Right-rhombic prism, Octahedral rhombic prism.	Double, in a slight degree.	1·635	0·025	Acquires electricity by friction and heat.	Infusible.	Transparent, translucent.

TABLE OF THE DISTINGUISHING

Name and Colour.	Lustre.	Specific Gravity.	Hardness.	No. in Scale of Hardness.	Composition.	System of Crystallization.
EMERALD. Fine green. BERYL or AQUAMARINE, pale sea-green, blue, white, yellow, rarely pink.	Vitreous.	2·67 to 2·75	Scratched by spinel; scratching quartz (specimens vary).	7·5 to 8·	Silica . . 68·50 Alumina . 15·75 Glucina . 12·50 Oxide of Iron . . 1·00 Lime . . 0·25	Hexagonal or rhombohedral.
HYACINTH or JACINTH, brownish-yellow, brownish-red, cinnamon. JARGOON, various shades of green, yellow, white, brown.	Vitreous (almost adamantine).	4·07 to 4·70	Scratches quartz slightly.	7·5	Silica . . 33·0 Zirconia . 66·8 Peroxide of Iron . . 0·10	Dimetric or square prismatic; pyramidal.
GARNET. Rarely Asteroid. ALMANDINE, violet-red. CARBUNCLE, red, brownish. CINNAMON-STONE, white, yellow, orange. PYROPE, vermilion or Bohemian garnet.	Vitreous, inclining to resinous.	3·5 to 4·3	Scratches quartz slightly.	6·5 to 7·5	Silica . . 38·25 Alumina . 19·35 Red Oxide of Iron . 7·33 Lime . . 31·75 Magnesia . 2·40 Protoxide of Manganese . 0·50	Monometric or cubical.
TOURMALINE. Green, red, brown, yellow, blue, black, sometimes white.	Vitreous.	2·99 to 3·3	Scratches quartz slightly	7· to 7·5	Fluorine . 2·28 Silica . . 38·85 BoracicAcid 8·25 Alumina . 31·32 Red Oxide of Iron . 1·27 Magnesia . 13·89 Lime . 1·60 Soda. . . 1·28 Potash . . 0·26	Hexagonal or rhombohedral.
QUARTZ or ROCK CRYSTAL. White. AMETHYST. violet. CAIRNGORM, yellow, brown. CHRYSOPRASE, fine apple-green. CAT'S-EYE, having *chatoyant* reflection. PLASMA, deep olive-green. JASPER, yellow, red, green, black, brown.	Vitreous.	2·65	Scratches glass.	7	Silica . . 99·37 Alumina . Amethyst . Silica . . 97·50 Alumina . 0·25 Red Oxide of Iron . 0·50 Oxide of Manganese 0·25	Hexagonal or rhombohedral.

CHARACTERISTICS OF GEMS—*Continued.*

Form of Crystal.	Refraction.	Refractive Index.	Dispersive Power.	Electric Properties.	Fusibility.	Diaphaneity.
Hexagonal prism.	Double (very feeble).	1·585	0·026	Acquires positive electricity by friction.	Slightly fusible before the blowpipe.	Transparent.
Long square prism, Short square prism, Long square octahedron, The prisms often doubly terminated with square pyramids.	Double, in a very high degree, especially in the Jargoon of Ceylon.	1·990	0·044	Do. do.	Infusible before the blowpipe.	Transparent to opaque.
Rhombic dodecahedron, Rhombic dodecahedral cube, Trapezohedron, Hexa-octahedron.	Simple.	1·759	0·053	Do. do.	Fusible before the blowpipe.	Transparent, Opaque.
Obtuse rhombohedron, Hexagonal prisms.	Double.	1·625	0·028	Acquires positive and negative electricity by friction and heat.	Fusible.	From transparent to opaque.
Hexagonal prism, Bipyramidal, dodecahedral.	Double.	1 549	0·026	Acquires positive electricity by friction.	Infusible.	Transparent and translucent. (Many varieties nearly opaque.)

TABLE OF THE DISTINGUISHING

Name and Colour.	Lustre.	Specific Gravity.	Hardness.	No. in Scale of Hardness.	Composition.	System of Crystallization.
BLOODSTONE, dark-green, with red spots. CARNELION, red, white, yellow. AGATE, various colours. ONYX, having black, brown, and white layers. SARDONYX, having red or brownish and white layers. MOCHA-STONE, having infiltrated Oxides of Iron or Manganese, producing dendritic appearances.						
CHRYSOLITE. PERIDOT, olive-green. OLIVINE.	Vitreous.	3·3 to 3·44	Scratched by quartz.	6· to 7·	Silica . 39·73 Magnesia . 50·13 Protoxide of Iron . 9·19 Oxide of Nickel . 0·32 Oxide of Manganese 0·09 Alumina . 0·22	Trimetric or rhombic.
TURQUOISE. Blue, green, white.	Vitreous.	2·62 to 3·	Scratches glass feebly.	6	Phos. Acid 27·34 Alumina . 47·45 Oxide of Copper . 2·05 Oxide of Iron . . 1·10 Oxide of Manganese . 0·50 Phosphate of Lime . 3 41 Water . . 18·18	None.
OPAL. Colourless, red, white, green, grey, black, yellow. (Iridescent.)	Vitreous, inclining to resinous.	2·0 to 2·3	Scratches glass slightly.	5·5 to 6·5	Silica . . 91·32 Water . . 8·68 Traces of mineral colouring-matter.	None.
PEARL. White, yellow, pink, black, violet, brown, grey.	Pearly.	2·5 to 2·7	Various.	2·5 to 3·5	Carbonate of Lime, organic matter.	None.

CHARACTERISTICS OF GEMS—*Continued.*

Form of Crystal.	Refraction.	Refractive Index.	Dispersive Power.	Electric Properties.	Fusibility.	Diaphaneity.
Generally in rolled grains and pebbles.	Double.	1·660	0·033	Acquires electricity by friction.	Infusible.	Transparent and translucent.
None.	...	...	...	None.	Infusible.	Opaque. Translucent at edges.
None.	...	..	...	...	Infusible.	Semi-transparent.
None.	None.	None.	None.	None.	Calcines by moderate heat.	Opaque; sometimes semi-transparent.

TABLE B.

NAMES OF STONES IN DIFFERENT LANGUAGES.

English.	*French.*	*German.*	*Italian.*
Agate.	Agathe.	Achat.	Quarzo Agato.
Almandine Garnet.	Grenat, Almandine.	Almandin.	Amandina.
Almandine Ruby.	Rubis violet.	Violet Rubin.	Rubino violetto.
Amber.	Succin, Ambre.	Bernstein.	Ambra giallo.
Amethyst.	Amethyste.	Amethyst.	Ametista.
Aquamarine.	Acque-marine.	Aquamarin.	Acquamarina.
Asteria.	Astérie.	Sternstein.	Asteria.
Aventurine.	Aventurine.	Aventurin.	Aventurina.
Balas Ruby.	Rubis Balais.	Balas Rubin.	Rubino Balasso.
Beryl.	Béryl.	Beryll.	Berillo.
Bloodstone.	Jaspe sanguin.	Jaspis.	Elitropia.
Boart.	Boart.	Diamant Boart.	Boart.
Cairngorm.	Topaze Écossaise.	Rauchstein.	Topazio fumoso.
Carbonate of Diamond.	Carbonat.	Diamant carbonat.	Carbonato di Diamante.
Carbuncle.	Escarboucle, Grenat cabuchon.	Karfunkel.	Carbuncolo.
Carnelion.	Sardoine.	Karneol.	Corniola.
Cat's-eye.	Œil de Chat, Quarz chatoyant.	Katzenauge.	Occhio di Gatto.
Chrysoberyl.	Chrysobéryl, ou Chrysolite orientale.	Chrysoberyll.	Crisoberillo.

English.	*French.*	*German.*	*Italian.*
Chalcedony.	Calcédoine.	Chalcedon.	Calcedonio.
Chrysolite.	Chrysolithe.	Chrysolith.	Crisolito.
Chrysoprase.	Chrysoprase.	Chrysopras.	Crisoprasio.
Cinnamon stone.	Topaze fumée, vermeille.	Kaneelstein.	Pietra cinnamomo.
Coral.	Corail.	Koralle.	Corallo.
Corundum.	Corindon.	Korund.	Korund.
Crystal.	Cristal de Roche.	Bergkrystall.	Cristallo di Rocca.
Diamond.	Diamant.	Diamant.	Diamante.
Emerald.	Émeraude.	Smaragd.	Smeraldo.
Essonite.	Vermeille.	Essonit.	Essonite.
Felspar.	Feldspath.	Feldspath.	Feldspato.
Fire Opal.	Opale-Feu.	Feuer Opal.	Opalo.
Garnet.	Grenat.	Granat.	Granato.
Hyacinth.	Hyacinthe.	Hyacinth.	Giacinto.
Indigo Sapphire.	Saphir de Brésil.	Männlich Sapphir.	Zaffiro.
Jacinth or Hyacinth	Hyacinthe.	Hyacinth.	Giacente.
Jade.	Jade.	Amazonstein.	Pietra nefritica.
Jargoon.	Jargon.	Zirkon.	Giacinto.
Jasper.	Jaspe.	Jaspis.	Diaspro.
Jet.	Jaïet.	Gagat.	Gagato.
Labrador.	Feldspathopalin.	Labrador.	Feldspato opalino.
Lapis Lazuli.	Lapis Lazuli.	Lazurstein.	Lapis Lazuli.

English.	*French.*	*German.*	*Italian.*
Malachite.	Malachite.	Malachit.	Malacito.
Marcasite.	Marcassite.	Markasit.	Marcassita.
Moon-stone.	Pierre de Lune.	Mondstein.	Pietra lunare.
Moss Agate.	Agate.	Moss Achat.	Agata.
Olivine.	Olivine.	Olivin.	Olivina.
Onyx.	Onyx.	Onyx.	Onice.
Opal.	Opale.	Opal.	Opalo, Girasole, Scambaia.
Pearl.	Perle.	Perle.	Margarita, Perla.
Peridot.	Péridot.	Peridot.	Peridoto.
Plasma.	Plasme.	Plasma.	Plasma.
Pyrope.	Grenat.	Pyrop.	Granato.
Quartz.	Quartz.	Quarz.	Quarzo.
Ruby.	Rubis.	Rubin.	Rubino.
Sapphire.	Saphir.	Sapphir.	Zaffiro.
Sardonyx.	Sardoine	Sardonyx.	Corniola.
Smokestone.	Topaze enfumée.	Rauch Topaz.	Pietra di Fuma.
Spinel.	Spinelle, ou Rubis.	Spinel.	Spinello.
Star Sapphire, Ruby, etc.	Saphir chatoyant.	Stern Sapphir, oder Rubin.	Zaffiro-pianeta.
Topaz.	Topaze.	Topas.	Topazio.
Tourmaline.	Tourmaline.	Turmalin.	Tormalina.
Turquoise.	Turquoise.	Turkis.	Turchina.
Ditto, Fossil or Bone.	„ de la nouvelle Roche.	„ von neuem Felsen, oder Zahn Turkis.	Do. di Rocca nuova.

TABLE C.

PRECIOUS STONES ARRANGED ACCORDING TO THEIR COLOURS.

White.

Diamond.
Beryl.
Sapphire.
Rock-crystal.
Spinel.
Tourmaline.
Jargoon.
Topaz.
Quartz.

Blue.

Diamond.
Sapphire.
Spinel.
Topaz.
Tourmaline.
Beryl.

Red.

Diamond.
Ruby.
Spinel.
Jacinth.
Garnet.
Tourmaline.

Yellow.

Diamond.
Topaz.
Chrysolite or Olivine.
Spinel.
Beryl.
Garnet.
Jacinth.
Tourmaline.

Yellow (continued).

Sapphire.
Chrysoberyl.
Quartz.

Green.

Diamond.
Emerald.
Peridot or Olivine.
Sapphire.
Chrysoberyl.
Spinel.
Aquamarine.
Tourmaline.
Chrysolite (called also Olivine).
Topaz.
Garnet.
Jargoon.

Pink.

Diamond.
Spinel.
Ruby.
Chrysoberyl.
Beryl.
Topaz.

Brown.

Diamond.
Chrysoberyl.
Garnet.
Jacinth.
Tourmaline.
Quartz.

Black.

Diamond.
Sapphire.
Spinel.
Garnet.
Tourmaline.
Quartz.

Violet.

Amethyst.
Sapphire.
Ruby.
Garnet.
Spinel.

Opalescent.

Diamond.
Sapphire.
Opal.
Cat's-eye.
Quartz.
Ruby.
Moonstone.

Orange or Reddish-yellow

Diamond.
Chrysoberyl.
Garnet or Cinnamon-stone.
Topaz.
Jacinth.
Ruby.
Tourmaline.
Rubicelle (or Spinel).

APPENDIX.

THE BIBLIOGRAPHY OF PRECIOUS STONES;

OR, A LIST OF THE PRINCIPAL WORKS THAT HAVE APPEARED RELATING TO DIAMONDS AND OTHER GEMS.

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