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THEOPHRASTUS

DE CAUSIS PLANTARUM

II

LCL 474

# THEOPHRASTUS

DE CAUSIS PLANTARUM

BOOKS III-IV

EDITED AND TRANSLATED BY

BENEDICT EINARSON

AND

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## SIGLA

(see volume I, pages lix–lxi)

- U Vatican City, Urbinas graecus 61 (11th century)  
U<sup>d</sup> the diorthotes of U  
u correctors (more probably an Italian corrector)  
of the 15th century  
N Florence, Laurentian Library, desk 85, 22 (15th  
century)  
v Venice, Library of St Mark 274 (dated 3 Jan.  
1443)  
Gaza Theodorus Gaza's Latin translation (completed  
1451)  
M Florence, Laurentian Library, desk 85, 3 (15th  
century)  
C Oxford, Corpus Christi College 113 (15th cen-  
tury)  
H Harvard College Library 17 (15th century)  
a Aldine Aristotle, fourth volume  
P Paris, National Library 2069 (15th century)  
B Vatican City, Vaticanus graecus 1305 (15th cen-  
tury)
- U<sup>c</sup> a correction by the first hand  
U<sup>cc</sup> such a correcton made in the course of writing  
U<sup>ac</sup> the reading before correction by the first hand  
U<sup>r</sup> a reading due to erasure  
U<sup>ar</sup> the reading before erasure  
U<sup>m</sup> a reading or note in the margin by the first hand  
U<sup>t</sup> a reading in the text  
U<sup>ss</sup> a superscription  
U<sup>1</sup> a reading by the first hand

## ΠΕΡΙ ΦΥΤΩΝ ΑΙΤΙΩΝ

Γ—Δ

1.1 ἡ περὶ τῶν φυτῶν θεωρία διττὰς ἔχει τὰς σκέψεις καὶ ἐν δυσὶν · μίαν μὲν, τὴν ἐν τοῖς αὐτομάτοις γινομένην, ἥπερ ἀρχὴ τῆς φύσεως, ἑτέραν δέ, τὴν<sup>2</sup> ἐκ τῆς ἐπινοίας καὶ παρασκευῆς, ἣν δὴ φαμεν συνεργεῖν τῇ φύσει πρὸς τὸ τέλος.

ἐπεὶ δὲ περὶ τῆς πρότερον εἰρηται, λεκτέον ὁμοίως καὶ περὶ ταύτης, ὑπὲρ αὐτοῦ τούτου πρῶτον<sup>3</sup> εἰπόντας ὅτι καὶ τῶν δένδρων ἔνια καὶ τῶν ἐλαττόνων ὑλημάτων οὐ δέχεται γεωργίαν · τοῦτο γὰρ ἂν εἴη τῶν μὲν οἶον πέρας, τῶν δὲ ἀρχή, μεταβαίνουσιν ἐκ τῶν αὐτοφυῶν εἰς τὰ διὰ τέχνης.

<sup>1</sup> τὸ γ̄ U<sup>m</sup>.

<sup>2</sup> U : τῶν Schneider.

<sup>3</sup> Gaza, Schneider : πρώτου U.

<sup>1</sup> Both the nature of the plants (as in Book I) and the environment which is akin to it (as in Book II).

## THE EFFECTS OF ART

The study of plants pursues two different investigations in two different fields. The first investigation deals with plants that grow of their own accord, and here the starting-point belongs to their nature<sup>1</sup>; whereas the other starting-point is that which proceeds from human ingenuity and contrivance, which we assert helps their nature to achieve its goal.<sup>2</sup> 1.1

*A Problem: Plants that Refuse Cultivation*

Now that we have discussed the first starting-point,<sup>3</sup> we must similarly speak of the second, first mentioning this very circumstance, that a few trees and smaller woody plants reject cultivation,<sup>4</sup> since this would be the conclusion (so to say) of the one subject and the opening of the next, as we pass from spontaneous occurrences to the results of art.

<sup>2</sup> Cf. CP 21. 1.

<sup>3</sup> In the whole of Book II.

<sup>4</sup> Cf. HP 1 3. 6 (the trees are silver fir, fir, holly; caper and lupine are mentioned among the smaller plants).

1.2 ἄτοπον δ' ἂν<sup>1</sup> ἴσως δόξειεν τὸ νῦν λεχθέν· εἰ τὸ προσλαμβάνον θεραπείαν, ὥσπερ χώραν οἰκείαν, μὴ μᾶλλον εἴθνεϊ<sup>2</sup> καὶ καλλικαρπεῖ,<sup>3</sup> συνεργούσης τῇ φύσει τῆς τέχνης. ἀλλ' οὐκ ἔστιν ἄτοπον οὐδ' ἀλλότριον, ἀρχὴν δὲ αὐτοῦ ληπτέον τήνδε· τὴν φύσιν ἐκάστου<sup>4</sup> μὴ ἐκ τῶν αὐτῶν εἶναι, μηδὲ ἐκ μιᾶς τιος ὕλης, μηδ' αὖ πᾶσι ταῦτὸ τέλος τῆς πέψεως καὶ δυνάμεως τῶν καρπῶν, ἀλλ' ἐκάστου πρὸς ὃ πέφυκεν καὶ χυλοῖς καὶ ὀσμάϊς καὶ τοῖς ἄλλοις. μάλιστα δὲ πως ἐν δυοῖν τούτων ὀρίζομεν τὴν πέψιν· ὀσμάϊς καὶ χυλοῖς, ἀναφέροντες καὶ ταῦτα πρὸς τὴν ἡμετέραν χρείαν (ὥσπερ διωρίσθη καὶ πρότερον).

1.3 ἐπεὶ δ' ἐξ ὧν συνέστηκεν ἕκαστον, καὶ τρέφεται, καὶ τὸ πρόσφορον οὐ κατὰ τὸ ποιδὸν μόνον ἐστίν, ἀλλὰ καὶ κατὰ τὸ ποσόν, ἐν ἀμφοτέροις ἂν

§ 2 line 6 [Aristotle], *Problems*, xx. 12 (924 a 5–7) [why does caper avoid cultivated land?]: . . . περὶ δὴ τούτου καὶ ὅσα ἄλλα τοιαῦτα, δεῖ λαβεῖν ὅτι οὐχ ἅπαντα ἐκ τῆς αὐτῆς ὕλης γίνεται οὐδ' αὖξεται . . .

<sup>1</sup> U<sup>css</sup>: U<sup>ac</sup> omits.

<sup>2</sup> M<sup>r</sup>: -εἰν U NM<sup>ar</sup> P (εἰσθενεῖν H).

<sup>3</sup> M<sup>r</sup>: -εἰν U (-εἰν u NM<sup>ar</sup> HP).

<sup>4</sup> τὴν φύσιν εκ- U<sup>c</sup> in an erasure.

<sup>1</sup> The nature of a tree does best and produces the finest fruit when the tree has its appropriate country: cf. CP 1 9. 3 and the other passages adduced at CP 3 1. 6.

The statement just made might appear odd: that a plant that gets tendance besides, just like one that gets its appropriate country,<sup>1</sup> should not do better and bear finer fruit, although art is now cooperating with its nature. But there is nothing odd here or at variance with nature. We would rest our proof on the following considerations: that the nature of each and every plant is not constituted of the same characters,<sup>2</sup> and does not proceed from some matter that is the same for all<sup>3</sup>; and again that all plants do not have the same goal for the concoction and potency<sup>4</sup> of their fruits, but each has instead its own natural goal in point of flavour, odour and the rest.<sup>5</sup> For our part, we<sup>6</sup> somehow determine concoction mainly by these two, odour and flavour, and we moreover refer these to our own uses, according to the distinction drawn earlier.<sup>7</sup>

But since what a plant is formed from it is also fed by, and since suitability of food is not only a matter of quality, but also of quantity,<sup>8</sup> the same

<sup>2</sup> The formal cause.

<sup>3</sup> The material cause.

<sup>4</sup> "Potency" suggests medicinal use.

<sup>5</sup> The final cause. "The rest" are the "potencies."

<sup>6</sup> The efficient cause (for cultivated plants).

<sup>7</sup> CP 1 16. 1.

<sup>8</sup> That is, the food must not only be of the quality that suits the constituents, but the quantities involved must not further some constituents at the expense of others.

εἴη ταῦτόν<sup>1</sup> οἰκεῖον. ἡ δὲ γεωργία πληθὸς τε τροφῆς καὶ ποιότητα κατασκευάζει, κατεργαζομένη γὰρ ἡ γῆ καὶ ἀπόλαυσιν πλείω δίδωσιν καὶ μεταβάλλει τοὺς χυλοὺς, ὥστ' εὐλόγως οὐκ ἂν εἴη πρόσφορος ἐνίοις, οἷον ὅσα ξηρά τε καὶ δριμέα καὶ πικρά, καὶ ἀπλῶς ὅσα φαρμακώδη καὶ ἐν τούτοις παρέχεται τὴν χρείαν ἡμῶν· ἐκθηλύνεται γὰρ ἀφαιρουμένων τῶν δυνάμεων καὶ τὰ μὲν ὅλως οὐκ ἐκφέρει καρπούς, τὰ δ' ὑγροτέρους καὶ χείρους, καὶ αὐτὰ ὑδαρέστερα γίνεται, καθάπερ τὸ ἀμίνθιον καὶ τὸ κενταύριον, καὶ ὅλως δὲ πᾶσα φαρμακώδης δύναμις ἢ κατὰ ῥίζαν<sup>2</sup> ἢ κατὰ καρπὸν ἢ κατὰ κλῶνας.

1.4 ἀνὰ λόγον<sup>3</sup> δὲ τούτοις καὶ ὅσα δριμύτητά τινα ἔχειν<sup>4</sup> δεῖ καὶ κατὰ τὴν γεῦσιν, ὧν καὶ ἡ κάππαρις ἔοικεν εἶναι καὶ τὸ σίλφιον καὶ τὸ λάπαθον καὶ ἡ θύμβρα καὶ τὸ θύμον· τὰ μὲν γὰρ ὅλως οὐδὲ

§ 3 lines 4–7 *ibid.* xx. 12 (924 a 16–18): ἡ δὲ γεωργία πέττει καὶ ἐνεργὸν ποιεῖ τὴν τροφήν· ἐξ ἧς συνίστανται οἱ ἡμεροὶ καρποί.

<sup>1</sup> U: τὸ αὐτοῦ Schneider: τούτοις τὸ Wimmer.

<sup>2</sup> ῥίζαν <ἢ κατὰ κωνίδιον> Wimmer.

<sup>3</sup> Wimmer: ἀνάλογον U.

<sup>4</sup> εχειν U: ἔχει u.

character in the feeding as in the formation would be appropriate in both quality and quantity. But husbandry brings about both a new quantity of food and a new quality, since tilling the soil not only increases the consumption of a plant but also changes its flavour. Hence it is reasonable that husbandry should fail to suit some plants, namely such as are dry and pungent and bitter, in short all that are medicinal and serve our needs by this or that medicinal character, since the plants are emasculated by the loss of their potencies and some yield no fruit at all, others a more watery and inferior fruit, and the plants themselves become more watery, like wormwood, centaury and in general all drugs and medicines, whether the potency is in root or fruit or twigs.<sup>1</sup>

The results are analogous in plants where a certain pungency is wanted in the taste as well<sup>2</sup>; among these appear to belong caper, silphium, dock, savory and thyme.<sup>3</sup> For on cultivated land some do

1.4

<sup>1</sup> Cf. *HP* 9 8. 1: (we must try to speak) "... in general of everything medicinal, such as fruit, flavour-juices, leaves, roots and grass (for the druggists term some of their drugs 'grasses')"; cf. also *CP* 6 4. 3.

<sup>2</sup> These are kitchen plants (though a medical use is not expressly denied). Medicinal potencies as such were valued for their physical effects, not for their taste.

<sup>3</sup> Cf. *HP* 1 12. 2 (the fluid in savory and thyme has a certain pungency); *HP* 7 6. 1 (the wild varieties of dock and savory have greater pungency and dryness).

φύεται τούτων ἐν τοῖς ἡμέροις ἢ κακῶς, τὰ δὲ χείρω πολλῶ, καθάπερ τὸ λάπαθον καὶ ἡ θύμβρα καὶ ἡ κάππαρις, ἕνια δὲ καὶ τὰς γλυκύτητας αὐτῶν λαμβάνει, καθυγραινώμενα καὶ πληθύνεμενα ταῖς τροφαῖς, ὥσπερ τὸ κράνον (καὶ γὰρ τοῦτο χείρων ἡμερούμενον γίνεται, καὶ ἀπλῶς δὲ αὐτὸ τὸ δένδρον ὑδαρές τε καὶ μανὸν καὶ ἀσθενές). τῆς δ' οἴης γλυκύτερος μὲν ὁ καρπός, ἦττον δ' εὐώδης, 1.5 ἀφαιρεῖται γὰρ ἡ εὐτροφία<sup>1</sup> καὶ τὸ εὖοσμον. ὁ δ' αὐτὸς λόγος καὶ περὶ σιλφίου καὶ θέρμου<sup>2</sup> καὶ εἴ τι τοιοῦτον ἕτερον. τὸ μὲν γὰρ οὐχ ὁμοίως ἔχει τὴν δριμύτητα διὰ τὸ πλείω καὶ ὑδαρεστέραν εἶναι τὴν τροφήν· ὁ δὲ θέρμος<sup>3</sup> ἄκαρπος γίνεται, καθάπερ ὑλομανῶν καὶ ἐξυβρίζων, ποιεῖ γὰρ καὶ τάντην τὴν ἐναντίωσιν κατεργασία (καθάπερ εἴρηται), πλήθος παρέχουσα τροφῆς· ἐκ δὲ τῆς ἀρχῆς ταμικεύεται τὸ σύμμετρον ἕκαστον ἑαυτῷ καὶ λαμβάνει τὴν οἰκείαν χώραν· ἡ γὰρ αὐτοφυῆς γένεσις 1.6 ἐν ταύταις. ἀπλῶς γὰρ τὸ μέγιστον (ὥσπερ πολ-

<sup>1</sup> Schneider (<διὰ> τὴν εὐτροφίαν Dalecampius): τὴν εὐτροφίαν U. <sup>2</sup> u HP: θερμοῦ UN. <sup>3</sup> u HP: θερμὸς UN.

<sup>1</sup> Cf. HP 3 2. 1 (wild trees concoct their fruit less than the cultivated): "All do this with rare exceptions, such as the cornel and the sorb, since they say that here the wild cornel berry and sorb apple are riper and more choice than

not grow at all (or grow poorly), whereas others grow but are far inferior, like dock, savory and caper; a few even get their sweet taste, getting diluted and too full of food, like the cornel berry,<sup>1</sup> for not only does the berry deteriorate on cultivated land, but the tree itself too as a whole gets watery, open in texture, and weak. In the sorb the fruit gets sweeter but less fragrant,<sup>1</sup> since good feeding does away with fragrance too. The story is the same with silphium, lupine and the like.<sup>2</sup> Thus silphium does not have the same pungency under cultivation, since its food is then too abundant and watery. Lupine fails to bear, "running to leaf" (as it were)<sup>3</sup> and getting out of hand. For agriculture works against the nature of the plant in producing this result too (as we said),<sup>4</sup> by filling it with too much food; whereas each plant, left to the government of its own nature, so regulates its food that it gets no more than the right amount, and finds its own appropriate country (since it is in that country that it grows without the aid of man). For in a word the 1.6

the cultivated."

<sup>2</sup> Cf. HP 3 2. 1 (continued): "and there are the other cases where a tree or smaller plant will not accept cultivation, like silphium and caper, and among legumes lupine, these being the plants that one would most of all call wild in their nature."

<sup>3</sup> The word was used of the vine; hence the apology "as it were." <sup>4</sup> CP 3 1. 3: "some yield no fruit at all."



## THEOPHRASTUS

λάκις εἴρηται) τὸ λαβεῖν οἰκείαν ἀέρα καὶ τόπον · ἐκ τούτων γὰρ ἡ εὐθένεια<sup>1</sup> καὶ εὐκαρπία. ταῦτα δὲ ἐναντία φαίνεται τοῖς παρὰ φύσιν ἡμερουμένοις · εἷς τε γὰρ ἀέρα μαλακώτερον μετατίθενται<sup>2</sup> καὶ τροφήν ἀλλοιοτέραν λαμβάνουσιν,<sup>3</sup> ἐξ ἀμφοτέρων <δὲ><sup>4</sup> τούτων ἡ μεταβολὴ καὶ οἷον ἔκστασις τῆς φύσεως. ἐπιμαρτυρεῖ δὲ πως καὶ ἐν αὐτοῖς τοῖς γεωργουμένοις τὸ μὴ φιλεῖν ἔνια τὴν ἀκριβῆ καὶ τὴν πολλὴν ἄγαν ἐξεργασίαν, ὥστε καὶ ταύτην ζητεῖν τινα ὄρον · καὶ τρόπον τινὰ οὐδὲν κωλύει κατὰ τὴν μετάβασιν οὕτως ἔνια μηδὲ ζητεῖν ὅλως.

ὅτι μὲν οὖν οὐ πάντα προσδέχεται τὰς γεωργίας φανερόν ἔστω διὰ τούτων (ἴσως γὰρ τὰ μὲν ὅλως οὐ δεῖται, τῶν δ' οὐκ ἐξευρίσκομεν τὰς αἰτίας).

- 2.1 ἡ δὲ γεωργία, δυοῖν ὄντων ἐξ ὧν αἱ τροφαὶ καὶ εὐθένεια,<sup>5</sup> τῆς γε<sup>6</sup> γῆς<sup>7</sup> παρασκευάζει βοήθειαν,

<sup>1</sup> U: εὐθένεια u.

<sup>2</sup> u (μετατεθέντα Schneider): μετατίθενται U.

<sup>3</sup> U: λαμβάνοντα Schneider. <sup>4</sup> HP.

<sup>5</sup> UN: εὐθένεια u HP. <sup>6</sup> ego: τε U (Heinsius omits).

<sup>7</sup> γῆς <καὶ τοῦ ἀέρος· τῆς γῆς μόνον> Schneider: γῆς <καὶ τοῦ ἀέρος, τὴν ἀπὸ τῆς γῆς> Wimmer.

## DE CAUSIS PLANTARUM III

most important thing (as we have often said)<sup>1</sup> is that a plant should get the air and the locality that are appropriate to its nature, since from these come well-being and good bearing. But air and locality are seen to work against plants that are subjected to cultivation against their nature, for the plants are removed to air that is too gentle for them and get food that is of too different a character, and from both of these circumstances comes the change and departure (as it were) from their nature. This view receives a certain support from the fact that even among plants that are under cultivation some do not like the care to be over-precise or over-lavish, and so care too requires a certain restriction; and in a way there is nothing to prevent that by gradual increase in the restriction there should finally be some plants that want no care at all.

We shall take it, then, as made clear by this discussion why not all plants accept cultivation. For perhaps whereas some plants will have none of it at all, others reject it for reasons that we have not succeeded in discovering.

### *Agriculture: Aims and Procedures*

Of the two sources<sup>2</sup> of food and well-being, agriculture can at least remedy conditions in the

<sup>1</sup> HP 22.8; 25.7; 33.2. CP 19.3; 27.1; 216.7; 219.6. <sup>2</sup> The appropriate air and locality (CP 31.6).

τὸν ἀέρα γὰρ οὐκ ἐπ' αὐτῇ ποιόν τινα ποιεῖν, ἀλλὰ δεῖ πρὸς τὰς μεταβολὰς καὶ τὰς ὥρας τὰς γινομένας αὐτὰ τὰ δένδρα καὶ τὴν χώραν διακεῖσθαι πως, ἵνα τε ἀπολάβῃ<sup>1</sup> τὴν προσαύξησιν καὶ τροφήν<sup>2</sup> καὶ μὴ πάσχη μηδὲν ὑπὸ τῶν ἐναντίων (δεῖ γὰρ καὶ πρὸς ταῦτα φυλακῆς), λέγω δ' οἶον τομὰς τε καὶ διακαθάρσεις καὶ βλαστολογίας καὶ κοπρίσεις καὶ σκαπάνην<sup>3</sup> καὶ ὅσα ἄλλα πραγματεύονται (καὶ περὶ τῆς ἀροσίμου δὲ καὶ σπερματομένης ὁμοίως).

τοῖς μὲν γὰρ οὐ ταυτὰ, τοῖς δ' οὐκ ἴσα, τοῖς δ' οὐ τὸν αὐτὸν τρόπον, οὐδὲ τὴν αὐτὴν ὥραν ἀποδιδόναι δεῖ· τοῖς δὲ ἴσως οὐδὲ ποιεῖν ἓνια τὸ ὅλον. ἃ δὴ καὶ φαίνονται διαιροῦντες οἱ γεωργοί, καθάπερ καὶ ἐν τῇ διακαθάσει τὰ μὲν σιδήροις, τὰ δὲ ταῖς χερσίν, τὰ δ' ἀγκύραις τισὶν κελεύοντες ἀφαιρεῖν, οἶον τῆς τε ἐλάας καὶ τῆς ἀπίου καὶ τῆς μηλέας,

<sup>1</sup> u: ἀπολαύει U (-η NHP).

<sup>2</sup> U: τῆς πρὸς τὴν (Wimmer omits τὴν) αὐξήσιν τροφῆς Schneider, Wimmer.

<sup>3</sup> Heinsius: σκεπάνην U.

<sup>1</sup> As opposed to orchard land and vineyards; trees (including the vine) were propagated by cutting and dig-

ground, since it is not in its power to change the character of the air. Instead the trees themselves and the land must meet the changes of the air and the course taken by the seasons by being put into a certain state, so that the trees may obtain their due of growth and food and escape the effects of adverse circumstances (protection against these being also needed): I mean such measures as pruning, trimming, thinning the fruiting shoots, and manuring, spading and the other operations about which the agriculturists elaborate (so too with ploughed and 2.2 seeded land).<sup>1</sup>

Thus with some plants one must not apply (1) the same kinds of things<sup>2</sup>; with others (2) the measurements involved must not be the same; with others the procedure must not be applied (3) in the same manner or (4) at the same season; and with others perhaps (5) there are some things that must not be done at all.<sup>3</sup> These are the distinctions that the agriculturists are in fact observed to make: for instance (3) in pruning they recommend the removal to be carried out in some cases with iron tools, in others with the bare hands, in others with what they call "anchors,"<sup>4</sup> as with olive, pear and apple,

ging holes. Land was ploughed for cereals (and some grains and vegetables); for many it was merely seeded.

<sup>2</sup> So of manure (CP 3 9. 5).

<sup>3</sup> Cf. Plato, *Phaedrus*, 268 B 6-8, 272 A 6-7.

<sup>4</sup> Apparently a pruning-hook shaped like an anchor.

2.3 ὅπως μὴ ἐλκούμενα πονῆ δια τὴν λεπτότητα καὶ  
ξηρότητα τῶν κλάδων · καὶ γὰρ ἀφαιρεῖν δεῖ τού-  
των ταυτά<sup>1</sup> τε καὶ τὰ τρώξανα μόνον. ὁμοίως δὲ  
καὶ τὰ τῶν ἀμπέλων · διαιρετέον τὰς τε πρωτο-  
τόμους<sup>2</sup> καὶ τὰς ὀψιτόμους, καὶ τὰς βραχυτόμους  
καὶ τὰς μακροτόμους, καὶ τοῖς ἄλλοις ὡσαύτως,  
ἀναφέροντας αἰεὶ πρὸς τὸ τέλος.

ὁ μὲν οὖν σκοπὸς οὗτος, καὶ ἡ καθ' ἕκαστα  
διαίρεσις.

ὑπὲρ ἐκάστου δὲ ἐστὶν ὁ λόγος ὁ τὴν αἰτίαν  
ἔχων, ἣν δεῖ μὴ λαθάνειν · ὁ γὰρ ἄνευ ταύτης  
ποιῶν καὶ τῷ ἔθει καὶ τοῖς συμβαίνουσιν κατακο-  
λουθῶν κατορθοῖ μὲν ἴσως, οὐκ οἶδεν δὲ (καθάπερ  
ἐν ἰατρικῇ) · τὸ δὲ τέλειον ἐξ ἀμφοῖν. ὅσοι δὲ καὶ  
τὸ θεωρεῖν μᾶλλον ἀγαπῶσιν, αὐτὸ τοῦτο ἴδιον τοῦ  
λόγου<sup>3</sup> καὶ τῆς αἰτίας.

<sup>1</sup> U: τὰ ἀνά Schneider.

<sup>2</sup> U: πρωϊτόμους?

<sup>3</sup> U<sup>c</sup>: τῶν λόγων (?) U<sup>ac</sup>.

<sup>1</sup> Cf. Plato, *Phaedrus*, 271 B 1-5.

<sup>2</sup> CP 3 2. 1. <sup>3</sup> CP 3 2. 2-3.

<sup>4</sup> Cf. Plato, *Phaedrus*, 268 A 8-C 4, 270 B 4-7 (for the example of medicine as an art and as mere experience);

to avoid any suffering of the trees from wounds, owing to the thinness and dryness of their twigs (indeed in these trees only the twigs and deadwood should be removed). So too with the procedures for pruning the vine: we must distinguish between (4) vines pruned early and vines pruned late, vines (2) pruned long and vines pruned short, and so with the rest of these matters (1, 5), always relating the distinction of treatment to the end in view.<sup>1</sup>

This<sup>2</sup> then is the aim of agriculture, and these<sup>3</sup> are the distinctions in its various procedures.

#### *Agriculture: Theories and Disputes*

About each procedure there is the account that gives its reason, and the reason must not escape us. For the man who carries out the procedure in ignorance of the reason, guided by habit and by the event, may perhaps succeed, but he does not *know* (just as in medicine), and complete possession of the art comes from both.<sup>4</sup> As for those who have a greater love for understanding,<sup>5</sup> this very thing, understanding, comes only when we have the account and the reason.

269 C 2, D 2, 272 A 2 (for completeness as involving theoretical knowledge); 270 B 4-5, D 1-7, 271 B 1-2, D 4-6 (for dividing the subject dealt with and the procedures used); 271 B 2-4, D 6-7 (for teaching that gives the reasons). <sup>5</sup> Philosophers.

- 2.4 ἀντιλέγεται δὲ<sup>1</sup> περὶ πολλῶν, καὶ τὰ μὲν ἀπλῶς, τὰ δ' εἰς τὸ βέλτιον καὶ χεῖρον, ὥσπερ κατὰ τὰς ἄλλας τέχναις. ἐνταῦθα δὲ καὶ ἰδιώτερόν τι συμβαίνει· πρὸς γὰρ τὴν ἑαυτῶν ἔνιοι χώραν τετραμμένοι τὰ πρόσφορα πολλάκις καθόλου λέγουσιν. ὅτε δὲ καὶ ἀμφοτέρως γινομένων ἀκριτόν ἐστι τὸ βέλτιον· ὅποια γὰρ ἂν ᾖ τὰ ἀπὸ τοῦ ἀέρος<sup>2</sup> συμβαίνοντα, τοιαῦτα ἀποβαίνει καὶ<sup>3</sup>
- 2.5 κατὰ τὰς ἐργασίας. οὐδὲ γὰρ δεῖ<sup>4</sup> μᾶλλον ἀκολουθεῖν<sup>5</sup> τῇ τοῦ ὄλου καταστάσει καὶ περιφορᾷ τῶν δένδρων καὶ φυτῶν καὶ σπερμάτων,<sup>6</sup> ὡς πολλάκις ἁμαρτανόμενα<sup>7</sup> τῇ ἀπὸ τούτων εὐκρασίᾳ<sup>8</sup> καὶ<sup>9</sup> τῇ αὐτῶν<sup>10</sup> δυνάμει τὰ μὲν ὑπομένει, τὰ δὲ τινα ἀναμάχεται, καθάπερ καὶ τῶν ἀνθρώπων φύσις<sup>11</sup> <τὰ><sup>12</sup> ὑπὸ τῆς ἰατρικῆς. ὥστε αἱ μὲν ἀντιλογίαι πρὸς ταῖς κοιναῖς τῶν τεχνῶν καὶ διὰ ταύτας γίνονται τὰς αἰτίας.

<sup>1</sup> U: γὰρ Schneider.

<sup>2</sup> τοῦ ἀέρος Schneider (aeris Gaza: ἀέρος Itali): θερους U.

<sup>3</sup> καὶ <τὰ> H<sup>c</sup> P.

<sup>4</sup> u: δὴ U. <sup>5</sup> u HP: -εἰ UN.

<sup>6</sup> τῶν . . . σπερμάτων U: quam plantarum: ac seminum naturam Gaza: <ἢ τῇ> τῶν . . . σπερμάτων <φύσει> Basle ed. of 1541: <ἢ τῇ φύσει> τῶν . . . σπερμάτων Schneider.

<sup>7</sup> <τὰ> ἁμαρτανόμενα Scaliger.

<sup>8</sup> U: ἀκρ- NHP.

Many matters are in dispute; in some the dispute 2.4 is a simple question of yes or no, in others it is a question of better or worse, just as in the other arts. But in agriculture something rather special also occurs: some experts have their view fixed on their own country and often state as a general rule what is successful there. Sometimes moreover both rules 2.5 work and there is no deciding which is the better, since the outcome of the agricultural measures depends on accidents of weather. For one should not in fact be governed by the celestial conditions and revolution<sup>1</sup> rather than by the trees and slips and seeds, since owing to good tempering contributed by these conditions and to their own power they often either resist mistaken measures or in some cases recuperate, just as a human constitution does with the mistakes of medicine. And so disputes in addition to those common to the other arts arise in agriculture for these reasons.

<sup>1</sup> That is, the farmers' calendars, which reckoned by the position of the sun and the rising or setting of various stars and constellations, foretelling the weather by counting from these in days (the "revolution") and advising what procedures to undertake at what time.

<sup>9</sup> [καὶ] Schneider.

<sup>10</sup> U: αὐτῶν Scaliger.

<sup>11</sup> <ἢ> φύσις HP. <sup>12</sup> Schneider.

## THEOPHRASTUS

οὐ μὴν ἀλλὰ καὶ συνομολογείται πολλάκις<sup>1</sup>  
παρὰ πάντων, ὡσπερ ἐξ αὐτῶν τῶν πραγμάτων  
εἰληφότα πίστιν, τὰ μὲν καθόλου, τὰ δὲ διαιρού-  
μενα γένεσι<sup>2</sup> καὶ χώραις, οἷον εὐθύς τὰ περὶ γενέ-  
σεις καὶ φυτείας, ὑπὲρ ὧν οὐ χαλεπὸν εἰπεῖν τὰς  
αἰτίας.

2.6 αἰὲ γὰρ δεῖ φυτεῦν καὶ σπείρειν εἰς ὀργῶσαν  
τὴν γῆν · οὕτω γὰρ καὶ ἡ βλάστησις καλλίστη,  
καθάπερ τοῖς ζώοις ὅταν εἰς βουλομένην πέση τὸ  
σπέρμα τὴν ὑστέραν. ὀργᾶ δ' ὅταν ἐνικμος ᾖ καὶ  
θερμὴ καὶ τὰ τοῦ ἀέρος ἔχη σύμμετρα · τότε γὰρ  
εὐδιάχυτός τε καὶ εὐβλαστής, καὶ ὅλως εὐτραφής  
ἔστιν. τοῦτο δ' ἐν δυοῖν ὥραιν γίνεται μάλιστα  
τοῖς γε δένδροις, ἔαρι καὶ μετοπώρῳ, καθ' ἃς καὶ  
φυτεύουσι μᾶλλον, καὶ κοινοτέρως ἐν τῷ ἤρῳ · τότε  
γὰρ ἡ τε γῆ δίυγρος καὶ ὁ ἥλιος θερμαίνων ἄγει  
καὶ ὁ ἀήρ μαλακός ἔστιν καὶ ἐρῶδης, ὥστε ἐξ  
ἀπάντων εἶναι τὴν ἐκτροφὴν καὶ τὴν εὐβλαστίαν.

<sup>1</sup> U : *multa* Gaza : πολλά καὶ Schneider.

<sup>2</sup> Schneider : *γενέσει* U.

<sup>1</sup> "Planting" (*phyteúō*) is used of putting a slip (*phytón*)  
in the ground, "sowing" (*speirō*) of sowing seeds, especially

## DE CAUSIS PLANTARUM III

Nevertheless there is often agreement on all  
sides, as if the rules had been accredited by the facts  
themselves, some in a general formulation, and  
some drawing distinctions between the kinds of  
plant and kinds of country, such as to begin with the  
rules about propagation and planting, for which it is  
not hard to give the reasons.

### *Planting: The Seasons*

So one must always plant and sow<sup>1</sup> when the 2.6  
earth is in heat, since then the sprout that comes  
forth is best, just as in animals when the seed enters  
a womb desiring it.<sup>2</sup> The earth is in heat when  
it is moist and warm and the weather temperate,  
since then it is loose and sends the shoot up quickly  
and is in general nutritious. This receptivity occurs  
chiefly, at least for trees, at two seasons, spring and  
autumn, these being in fact the times when more  
planting is done, and for a greater number of dif-  
ferent trees it is done in spring, for the earth is then  
soaked through and the sun by its warmth brings  
about growth and the air is mild and dewy, so that  
all this combines to rear the slips and make them  
sprout well.

of grain (*spérmata*).

<sup>2</sup> Cf. Aristotle, *On the Generation of Animals*, ii. 4 (739 a  
31-35); Plutarch, *Quaestiones Convivales*, v. 7. 3 (681 F).

- 2.7 ἔχει δέ τινα καὶ τὸ μετόπωρον τοιαύτην κρᾶσιν (διὸ καὶ τὰς ἐκβλαστήσεις<sup>1</sup> ἔφαμεν γίνεσθαι τῶν δένδρων). οἱ δὲ ἐπαινοῦντες αὐτὴν μᾶλλον τοῦ ἔαρος<sup>2</sup> τοιαῦτα λέγουσιν· ὅτι τὰ φυτὰ θερμῆς οὐσῆς ἔτι<sup>3</sup> τῆς γῆς ῥιζοῦται κάλλιον, δεῖ<sup>4</sup> δ' αἰεὶ τὴν ἀρχὴν ἰσχυροτέραν ποιεῖν ἀφ' ἧς καὶ ἡ τῶν ἄλλων γένεσις καὶ ὅλως ἡ ζωὴ· διὸ καὶ τὴν βλάστησιν ἅμα τῷ ἥρι καλὴν γίνεσθαι καὶ ἀθρόον, ἐκβεβηκυίας ἤδη καὶ κυούσης ταύτης,<sup>5</sup> τοῦ δὲ ἥρος εἰς ψυχρὰν τιθεμένων τὴν γῆν (ψυχρὰν γὰρ ἔτι διαμένειν ἐκ τοῦ χειμῶνος) ῥιγοῦν<sup>6</sup> καὶ κακοβλαστεῖς γίνεσθαι τὰς ῥίζας. καὶ διὰ τοῦτο πάντα 2.8 κελεύουσι τοῦ μετοπώρου μᾶλλον φυτεύειν, ὅσα δύναται βλαστάνειν (ἔνια γὰρ οὐ δύναται, καθάπερ ἄπιος καὶ μηλέα, καὶ ὅλως τὰ λεπτὰ καὶ ξυλάδη· καὶ γὰρ ξηρὰ<sup>7</sup> φύσει, καὶ διὰ τὴν ἀσθένειαν οὐχ ὑπομένει τοὺς χειμῶνας), τῷ<sup>8</sup> τὸ μὲν μετοπωρινὸν<sup>9</sup> ἔγκυμον εἶναι καὶ ἐπίφορον, τὸ δὲ ἔαρινδον ἄρτι κύσκεσθαι· τὸ δὲ τίκτειν ἀμφοτέροις

<sup>1</sup> U (cf. HP 3 5. 5): ἐπι- Schneider.

<sup>2</sup> u: ἑτέρος U: ἀέρος N HP.

<sup>3</sup> Gaza (adhuc tepido), Scaliger: θερμῆς οὐσῆς ἐπι U.

<sup>4</sup> U: δέων Gaza (oporteat), Schneider.

<sup>5</sup> ταύτης ego (τῆς ῥίζης Schneider): τῆς γῆς U.

<sup>6</sup> With ῥιγοῦν H breaks off; it lacks the rest of the CP.

- Autumn too has a somewhat similar tempering 2.7 (which is why we said<sup>1</sup> that trees have sproutings then). Those who favour autumn over spring reason as follows: "Slips root better when the ground is still warm (and we should always make the beginning<sup>2</sup> stronger, from which the other parts are produced and from which indeed the tree lives). This is why at the coming of spring the upper parts come out fine and all at once, the beginning having by then grown out and being pregnant with them. In spring on the other hand the slips are set in earth that is cold (since it remains cold from winter) and are chilled and the roots come out poorly." For this 2.8 reason they recommend planting in autumn rather than in spring all trees that can grow when so planted (for some are unable to do so, like pear, apple and in general all that are thin and woody, since they are both naturally dry and also are too weak<sup>3</sup> to stand the winter), because the slip planted in autumn is pregnant and near its term, whereas the one planted in spring is just conceiving; but both

<sup>1</sup> CP 1 12. 3; cf. CP 1 6. 3.

<sup>2</sup> That is, the root.

<sup>3</sup> Because they are thin.

<sup>7</sup> u: ξηρὰ U.

<sup>8</sup> τῷ ego (ἔτι Gaza [item], Itali: ἔτι δὲ Basle ed. of 1541): ἔτι U.

<sup>9</sup> Gaza (plantam autumnalem), Itali: μετόπωρον U.

τὴν αὐτὴν ὥραν, ὥστε συμβαίνειν<sup>1</sup> τῷ μὲν ἄρτι  
κυϊσκομένῳ πολλὰ τυφλὰ τίκτειν τῶν βλαστη-  
μάτων, τῷ δὲ πάλαι κύντι καὶ ἐπιφόρῳ τὰ  
πλεῖστα τέλεα καὶ καλά. σχεδὸν γὰρ ταύτας καὶ  
τοιαύτας λέγουσιν τὰς αἰτίας.

- 3.1 οὐ μὴν ἀλλὰ (καθάπερ εἴρηται) κοινοτέρα  
πᾶσιν ἢ τοῖς πλείστοις καὶ τοῖς σπέρμασι<sup>2</sup> καὶ φυ-  
τοῖς ἢ τοῦ ἔαρος<sup>3</sup> ἔστιν· αὐτὰ τε γὰρ τὰ φυτὰ  
προωρημένα, καὶ <δ> ἄηρ<sup>4</sup> μαλακὸς καὶ εὐβλα-  
στής, καὶ ὄλως ἡ ὥρα γονιμωτάτη· καὶ αἱ ἡμέραι  
θερμότεραι καὶ μῆκος ἔχουσαι ταχείας ποιοῦσι τὰς  
βλαστήσεις. ἡ δὲ ῥίζωσις ἰσχυρὰ καὶ οὕτω διὰ τε  
<τὴν><sup>5</sup> τῶν φυτευτηρίων ὀρμὴν (εἰς ἄμφω γὰρ  
ὁμοίως ἔστι) καὶ διὰ τὸ τὴν γῆν<sup>6</sup> ὀργᾶν ἢ<sup>7</sup> καὶ ἔτι  
τὸν ἀέρα συνεκτρέφειν (ὁ γὰρ ἥλιος οὐ μόνον δοκεῖ  
τὰ ὑπὲρ γῆς ἀλλὰ καὶ τὰ ὑπὸ γῆς εὐτραφέστερα  
καὶ καλλίω ποιεῖν· σημεῖον δ', ὅτι τῶν ῥιζῶν ἢ  
βλάστησις ἢ οὐ γίνεται πορρωτέρω τῆς τοῦ ἡλίου  
δυνάμεως ἢ χείρων).

<sup>1</sup> Gaza (*evenire*), Schneider: -ει U.

<sup>2</sup> Schneider (*fructuum* Gaza): ὄποις U.

<sup>3</sup> Gaza, Itali: ἀέρος U.

<sup>4</sup> Schneider (ἄηρ υ): ἀήρ U.

<sup>5</sup> u. <sup>6</sup> U<sup>c</sup>: ὀργῆν U<sup>ac</sup>.

<sup>7</sup> [ῆ] Gaza, Schneider.

bring forth at the same season, with the result that  
the tree which is just conceiving brings forth many  
of its shoots blind,<sup>1</sup> whereas the one that is well  
along in its pregnancy and near its term brings  
forth most of them perfect and fine. These (one may  
say) and the like are the reasons that they cite.

Nevertheless (as we said)<sup>2</sup> planting in spring is 3.1  
the one more common to all or at least most seeds as  
well as slips. For the slips themselves are then well  
on the way to sprouting, the weather is mild and  
good for sprouting and in general the season is  
best at generation; and the increasing warmth and  
length of the days make the sprouting rapid. And  
the rooting is strong at this season too, not only  
because the slips are astir with the impulse to grow  
(for the impulse is equally in both directions, down  
as well as up), but also because the earth is in heat,  
or because, in addition to this, the air helps to rear  
the plant (the sun being considered not only to make  
the parts above ground plumper and finer but also  
the parts below, the proof being that the roots either  
do not grow beyond the reach of the sun's power<sup>3</sup> or  
else grow more poorly).

<sup>1</sup> Cf. Aristotle, *On the Generation of Animals*, ii. 4 (739 a  
31-35); Plutarch, *Quaestiones Convivales*, v. 7. 3 (681 F).

<sup>2</sup> CP 3 2. 6 (where however seeds were not included).

<sup>3</sup> Cf. CP 1 12. 7 and HP 1 7. 1 (of roots): "... none goes  
deeper than the sun reaches, since it is heat that generates  
them."

3.2 ὁ δὲ χειμῶν ἐπιλαμβάνων<sup>1</sup> τὴν φυτείαν ἑνιά γε δοκεῖ φθεῖρειν, οἷον τῆς μὲν ἐλάας ἀφιστάς τὸν φλοῖον, τῆς δὲ συκῆς παχύνων καὶ πηγνύς τὸν ὀπὸν τὸν ἐν τῇ κράδῃ,<sup>2</sup> καὶ τῶν ἄλλων σχεδὸν τῶν πλείστων τοιοῦτόν τι πονούντων.<sup>3</sup> ἀλλὰ γὰρ ταῦτα μὲν ἴσως ἀφορίζοιτ' ἂν ὁ φάσκων τὴν μετοπωρινὴν εἶναι τὴν βελτίω, τοῖς δεχομένοις λέγων.

ὅτι <δὲ><sup>4</sup> πλείω ταῦτα <καὶ><sup>5</sup> τῆς φύσεως αὐτῆς ἐστι σημεῖα τῶν πρὸς τὴν φυτείαν ὥρων τό τε παρορμῶν<sup>6</sup> αὐτὰ τὰ δένδρα τοῦ ἤρος καὶ τὸ κοινοτέραν εἶναι πᾶσι ταύτην, δηλὸν ὡς φυσικώτερον<sup>7</sup> ἂν τις θείη ταύτην. ἐπεὶ καὶ ὅπου περὶ Κῦνα καὶ τοὺς ἐτησίας εὐθενεῖ καὶ ἐπιβλαστάνει τὰ δένδρα, τηνικαῦτα καὶ τὰς φυτείας ποιοῦνται, πολλῶ<sup>8</sup> δέον ἀκολουθεῖν τῇ τοῦ ἀέρος κράσει καὶ τῇ τῶν φυτῶν ὀρμῇ· τάχα δὲ καὶ ἡ ὀρμὴ γίνεται διὰ τὸ περιέχον. ὅπου δ' αὖ θερυνὸς ὄμβρος πολὺς,

<sup>1</sup> u : ὑπο- U (ὑπο- N aP).

<sup>2</sup> Schneider : καρδίᾳ U. <sup>3</sup> Schneider : ποιοούντων U.

<sup>4</sup> ὅτι δὲ ego (Verum quum Gaza : εἰ δὲ Wimmer) : εἰ U (ἔτι u) : ἔστι N : ἔτι δὲ aP. <sup>5</sup> ego.

<sup>6</sup> U : προορμῶν Schneider (cf. προωρημένα CP 3 3. 1).

<sup>7</sup> U : φυσικώτερον Schneider.

<sup>8</sup> πολλῶ u (cf. CP 6 11. 10) : πολῶν U.

<sup>1</sup> Cf. CP 3 2. 8.

<sup>2</sup> Cf. the calendar (Introduction, vol. I, p. xlixf.: July 18:

When winter follows the planting it is held to 3.2 destroy at least some of the slips, separating for example the bark from the olive slip and thickening and congealing the juice in the branch of the fig; and one might say that most of the rest labour from similar ill effects. But the advocate of autumn planting would perhaps exclude these slips and say that it is better for the slips that are receptive to it.<sup>1</sup>

But because there are more slips that suffer, and because the impulse of the trees themselves in the spring and the greater universality of spring planting in all plants are indications that this season for planting belongs to the very nature of the plants, one would evidently account planting in 3.3 spring the more natural procedure. Indeed in regions where even in the dog days and when the Etesians blow<sup>2</sup> trees do well and have a second sprouting growers also do their planting at that very time, so important is it to be guided by the temperate state of the air and the impulse in the slips; in fact the impulse perhaps is due to the surrounding air. Again in regions where there is heavy sum-

Sirius rises in the morning (Eudoxus); the Etesians blow for 55 days . . . August 26: the Etesians cease (Callippus). Cf. Aristotle, *Meteorologica*, ii. 5 (361 b 35–363 a 2): "The Etesians blow after the summer solstice and the rising of Sirius, and neither when the sun is closest nor yet when the sun is far; and they blow by day and stop at night."



THEOPHRASTUS

ὥσπερ ἐν Αἰθιοπία καὶ ἐν Ἰνδοῖς, ἢ περὶ Αἴγυπτον ὁ Νεῖλος, ἐνταῦθα δὴ πρὸ τούτων ἢ μετὰ τούτους εἰκὸς τὴν φυτεῖαν ἀρμόττειν · τηρικαῶτα γὰρ ἢ τοῦ ἀέρος κρᾶσις σύμμετρος.

3.4 εἴη δ' ἂν διελεῖν καὶ τοῖς κατὰ φύσιν τόποις πρὸς τὰς<sup>1</sup> ὥρας, οἷον τοὺς μὲν εὐκράτους τῷ ἀέρι τοῦ ἤρος, τοὺς δὲ ροῶδεις καὶ ἐπόμβρους καὶ ἐλείους θέρους ὑπὸ τὸ ἄστρον (ὥσπερ καὶ ἐν τῇ Λακωνικῇ πολλοὶ<sup>2</sup> φυτεύουσιν), τοὺς δ' ἀρχμῶδεις μετοπώρου · συμβήσεται γὰρ οὕτω, θερμῆς οὕσης ἐν βάθει τῆς γῆς κατὰ χειμῶνα, ψυχροῦ δὲ τοῦ πέριξ, τὴν αὐξησιν κατακλειομένην εἰς τὰς ρίζας ἵεναι · πλείονος δ' ὄντος καὶ ἰσχυροτέρου τοῦ ριζώματος, πλείων<sup>3</sup> ἢ βλάστησις ἔσται καὶ καλλίων.

καὶ περὶ μὲν ὠρῶν τῶν εἰς τὰς φυτείας ἱκανῶς εἰρήσθω.

4.1 ἐπεὶ δὲ ὑπόκειται τὴν γῆν ἔνικμόν τε δεῖν καὶ

<sup>1</sup> καὶ τοῖς . . . τὰς U : κατὰ φύσιν καὶ τοῖς τόποις τὰς πρὸς <τὴν φυτεῖαν> Schneider.

<sup>2</sup> u : πολὸν U : πολλὰ N aP. <sup>3</sup> u : πλείων U.

<sup>1</sup> Cf. Aristotle, *Meteorologica*, i. 12 (349 a 4–7): “Further in Arabia and Ethiopia the rains come in summer and not in winter, and come in downpours, often several times in the same day . . .”

DE CAUSIS PLANTARUM III

mer rain, as in Ethiopia<sup>1</sup> and India<sup>2</sup> (or in Egypt the Nile),<sup>3</sup> it is presumable that a good time for planting is before or after the rains, this being the moment when the air is tempered to the right degree of wetness.

One could also distinguish the seasons for planting 3.4 by the regions naturally appropriate to a season, as follows: one should plant regions with well-tempered air in spring; regions full of flowing water, or rainy, or marshy, in summer during the dog days (this is the practice of many growers in Sparta); and regions with a scarcity of water in autumn, for the result will be that since in winter the ground deep below the surface is warm, whereas the surrounding air is cold, growth will be shut in by the cold and pass to the roots, and greater and stronger rooting will lead to greater and finer sprouting above ground.

Let this suffice for the treatment of the seasons for planting.

*Planting: Preparation of the Ground*

We have laid it down<sup>4</sup> that the earth should be 4.1

<sup>2</sup> The monsoon.

<sup>3</sup> Cf. Aristotle, *Fragments* 246–248 (ed. Rose<sup>3</sup>) [the inundation of the Nile occurs in summer and is due to the summer rains in Ethiopia].

<sup>4</sup> CP 3 2. 6.

εὐδίοδον εἶναι ταῖς ρίζαις, ὅπως εὐμήκεις καὶ παχείαι<sup>1</sup> καὶ ἰσχυραὶ γίνωνται, διὰ ταῦτα δεῖ τοὺς [τε]<sup>2</sup> γύρους προορύττειν ἐκ πολλοῦ,<sup>3</sup> μάλιστα δὲ ἐνιαυτῷ πρότερον, ὅπως ἡ γῆ καὶ ἠλιωθῆ καὶ χεμισθῆ καθ' ἑκατέραν τὴν ὥραν· ἄμφω<sup>4</sup> γὰρ ταῦτα ποιεῖ μανῆν καὶ χαύνην. ἔνιοι δὲ καὶ διορίζουσι τοὺς χρόνους ἀπὸ τροπῶν θερινῶν μέχρι Ἀρκτούρου·<sup>5</sup> τότε γὰρ τὴν τε γῆν διαχειῖσθαι<sup>6</sup> μάλιστα, καὶ τὴν ἕξω καὶ τὴν ἐν τοῖς γύροις,<sup>7</sup> καὶ βλαστάνειν ὄλως οὐδέν. φυτεύουσι δὲ τὴν μετοπωρινὴν φυτείαν μετὰ Πλειάδος δύσω, δεξάμενοι τὸ<sup>8</sup> ἐπὶ τῷ ἄστρω ὕδωρ, ὅπως ἔνικμος ἡ γῆ γενομένη παρέχη τροφήν.

4.2 καὶ τοὺς γύρους οὐκ εὐθὺς συμπληροῦσιν, ὅπως ριζωθῆ τὰ κάτω πρότερον· εἰ δὲ μή, φέρονται πρὸς τὰ<sup>9</sup> ἄνω (τρέφει γὰρ καὶ αὐξεῖ πάνθ' ὁ ἥλιος καὶ ὁ ἀήρ). ὄντων δὲ τῶν μὲν<sup>10</sup> βαθυρρίζων, τῶν δ' ἐπιπολαιορρίζων, διὰ τοῦτο τοὺς γύρους οὐκ

<sup>1</sup> Gaza, Basle edition of 1541: ταχείαι U.

<sup>2</sup> Schneider.

<sup>3</sup> u: πολὺ U: πολλὰ N aP.

<sup>4</sup> N aP: ἄμφω U.

<sup>5</sup> U<sup>c</sup> from ἀκ-.

<sup>6</sup> Gaza, Itali: διακεῖσθαι U.

<sup>7</sup> u: γυροῖς U.

moist and provide an easy passage for the roots, to allow them to become long, thick and strong. The holes must therefore be dug a good time beforehand,<sup>1</sup> preferably a year, to expose the earth to the sun in summer and to the cold in winter. For both exposures make it open in texture and loose. Some experts even specify the time for digging: from the summer solstice to the rising of Arcturus, since the earth (they say) is then loosest both outside and inside the holes, and nothing sprouts at all.<sup>2</sup> Autumn planting is carried out after the setting of the Pleiades, first waiting for the rain that falls at this time,<sup>3</sup> to let the earth become moist and provide food.

The holes moreover are not filled up immediately 4.2 after planting, to let the lower part of the slip strike root first; otherwise the roots move higher (since sun and air nurture everything and make it grow).<sup>4</sup> Trees being distinguished into the deep and shallow-rooted, the holes intended for the shallow-

<sup>1</sup> Cf. HP 2 5. 1 (on planting): "They recommend . . . digging the holes as long as possible beforehand . . ."

<sup>2</sup> The hole is thus easy to dig and needs no weeding.

<sup>3</sup> Cf. CP 3 23. 1, where Cleidemus says that rain falls on the seventh day after the setting of the Pleiades.

<sup>4</sup> The sun provides heat, the air rain.

<sup>8</sup> Schneider: τε U. <sup>9</sup> U: τὸ Wimmer.

<sup>10</sup> τῶν μὲν U<sup>cm</sup> (with index): U<sup>t</sup> omits.

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ἰσοβαθεῖς ὀρύττουσιν τοῖς ἐπιπολαιορρίζοις (οἶον ἐλάα καὶ συκῆ<sup>1</sup>), βουλόμενοι πιέζεσθαι<sup>2</sup> καὶ ὡσπερ ἀντιταπτόμενοι πρὸς τὰς φύσεις.

4.3 ὅπως δὲ καὶ τῶν ὑδάτων τοῦ χειμῶνος ἀπολαύωσιν<sup>3</sup> καὶ τοῦ θέρους καταψύχωνται (δεῖ γὰρ δὴ πρὸς ἀμφοτέρας τὰς ὥρας παρεσκευάσθαι), διὰ τοῦθ' ὑποβάλλουσι κάτω λίθους, ὅπως συρροὴ γίνηται τοῦ ὕδατος, καὶ τοῦ θέρους οἶτοι καταψύχωσι τὰς ρίζας. οἱ δὲ κληματίδας ὑποτιθέασιν, οἱ δὲ κέραμον<sup>4</sup> παρακατορύττουσιν ὕδατος, οἱ δὲ ξύλον κνημοπαχές,<sup>5</sup> εἴτ' ἐξαιροῦσιν, ὅπως ἔχη τροφήν αἰεὶ τὰ φυτά, δικμαζομένης τῆς γῆς καὶ συρρέοντων τῶν ὑδάτων. ἀπλῶς γὰρ τοῦτο δεῖ τηρεῖν· ὅπως καὶ πρὸς τοὺς ὄμβρους τοὺς γινόμενους, καὶ πρὸς τὸν ἀέρα καὶ τὸν ἥλιον, ἔξει συμμετρως· αἱ γὰρ τροφαὶ καὶ αἱ αὐξήσεις διὰ τούτων.

4.4 ἐπεὶ δὲ ἡ γῆ βορείοις μὲν πεπηγυῖα καὶ ξηρά, νοτίοις δὲ κεχυμένη καὶ ἐνικμος, ὡσαύτως δὲ καὶ τὸ φυτὸν ὑγρότερον καὶ αὐτὸ ἑαυτοῦ μᾶλλον, διὰ

<sup>1</sup> a (-ῆ P): συκαὶ U: συκαὶ u N.

<sup>2</sup> Scaliger: πιεσθαι U.

<sup>3</sup> ἀπολαύωσι u: ἀπολαύουσιν U.

<sup>4</sup> U: κεράμιον Schneider.

<sup>5</sup> Wimmer (καὶ κνημοπαχές Schneider): καν κνημοπαχές U.

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rooted kind (as olive and fig) are not dug only as deep as the roots would ordinarily go,<sup>1</sup> since the agriculturists wish the slip to be under pressure to send its roots deeper, and set themselves (as it were) against its nature.

To let the roots profit from the rains in winter and be cooled in summer (since provision should be made for both seasons), stones are placed at the bottom to allow rain water to collect and to keep the roots cool in summer. Others put vine branches at the bottom, others bury a pot of water alongside, and others a stick, which they later remove, as thick as a man's leg, all so that the slips may be ensured a constant supply of food, the earth being well moistened and the rain water collecting. We must take care, in a word, that there shall be adequate provision for dealing with the rains that fall and with the air and the sun, these being the means whereby the young trees feed and grow.

When northerly winds prevail the earth is stiffened and dry, but when southerly ones prevail it is loose and moist, and the slip is similarly more springy and truer to type.<sup>2</sup> It is therefore better to

<sup>1</sup> Cf. *HP* 2 5. 1 (on planting): "They recommend . . . digging the holes always deeper than the roots, even for shallow-rooted trees."

<sup>2</sup> Literally "more its own self"; for the expression compare *CP* 3 7. 10, 4 3. 4.

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ταῦτα βελτίων ἢ τοῖς νοτίοις φυτεία · ταχεῖα γὰρ ἡ ρίζωσις καὶ ἡ βλάστησις ὅταν ὀργῶν εἰς ὀργῶσαν τεθῆ, καὶ τὰ τοῦ ἀέρος ἦ μαλακὰ καὶ εὐμενῆ (δεῖ γὰρ δὴ τὸ μέλλον ἔσεσθαι καλὸν ἅμα κάτωθεν καὶ ἄνωθεν βλαστάνειν). τοῖς δὲ βορείοις ἅπαντα τὰναντία γίνεται, ῥιγοῦν γὰρ καὶ κακοπαθεῖν τὸ φυτόν · ἔτι δέ, τῆς γῆς πεπηγυίας, οὔτε ριζοῦσθαι δύναται ἂν ὁμοίως οὔτε βλαστάνειν.

ἡ μὲν οὖν τοιαύτη παρατήρησις τοῦ ἀέρος ἂν εἴη.

5.1 τὰ δὲ φυτευτήρια δεῖ λαμβάνειν ἀπὸ νέων τε<sup>1</sup> τῶν δένδρων (ἢ ἀκμαζόντων) καὶ ὅλως λειότατα καὶ ἰθύτατα καὶ ὡς πάχιστα ·<sup>2</sup> καὶ γὰρ ἀντιλαμβάνεται καὶ ἰσχύει τὰ τοιαῦτα μάλιστα, καὶ διὰ τὴν ἡλικίαν καὶ τὸ πάχος εὐβλαστότερα τυγχάνει · τό τε<sup>3</sup> γὰρ λείον ὡσπερ ὑγιᾶς καὶ ἀπήρωτον, τὸ δὲ τραχὺ καὶ ὠζωμένον,<sup>4</sup> ἄλλως<sup>5</sup> τε καὶ τυφλοῖς ὄζοις, ὡσπερ πεπηρωμένον, ἐάν τε ζῶσιν,

<sup>1</sup> U : γε Wimmer. <sup>2</sup> ego : κάλιστα U.

<sup>3</sup> τότε U : τὸ μὲν Schneider.

<sup>4</sup> Gaza (*nodatum*), Heinsius : ὄζόμενον U.

<sup>5</sup> N aP (ā - u) : ὄλως U.

<sup>1</sup> Cf. HP 2 5. 1: "They recommend taking the slips as stout (reading *πάχιστα* for *ταχίστα* U) as possible."

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plant during southerly winds, rooting and sprouting being rapid when slip and ground are both in heat and the weather is gentle and propitious (for to make a fine tree the slip must sprout above ground at the same time as it roots below). When northerlies blow, on the other hand, the opposite of all this occurs, the slips getting chilled and suffering hardship; moreover, since the ground is stiff with cold, the consequence is a lessening in their ability both to root and sprout.

Here, then, is a rule to follow in the matter of the air.

*Planting: The Slips*

The slips should be taken from trees that are 5.1 young or in their prime, and should in any case be the smoothest and straightest and as stout as possible,<sup>1</sup> since not only does such a slip take hold best and have most strength, but its youth and stoutness make it also sprout better. For the smooth slip is as it were sound and unmaimed, whereas the slip that is rough and full of nodes,<sup>2</sup> especially if the nodes are blind,<sup>3</sup> is as it were maimed,<sup>4</sup> and if the nodes

<sup>2</sup> The notion includes the buds and twigs coming from the nodes.

<sup>3</sup> That is, if the buds or twigs coming from the nodes bear no fruit.

<sup>4</sup> "Maimed" (*πηρός* and its derivatives) is often used of blindness.

ἐκβεβλαστηκὸς<sup>1</sup> εἰς τούτους ἀσθενέστερον, ὅσων<sup>2</sup> μηδ' ἢ φύσις τοιαύτη, καθάπερ τῶν κλημάτων. διὰ τοῦτο γὰρ καὶ ἐπὶ τῶν δένδρων ἔνιοι μοσχεύουσιν, οἱ δὲ περιαιροῦσιν τὴν θάλλειαν<sup>3</sup> τῶν κλάδων,<sup>4</sup> ὅπως μὴ ἐξαναλώσῃ<sup>5</sup> τὴν δύναμιν εἰς τὴν  
5.2 βλάστησιν. ἔτι δ' εὐθύτης λειότης τε<sup>6</sup> εὖρου καὶ εὐδίοδον ποιεῖ τὴν ῥοήν, ὥστε ταχεῖας εἶναι τὰς αὐξήσεις.

ὀρθῶς δὲ καὶ τὸ μάλλον ἐξ ὁμοίας γῆς, εἰ δὲ μή, [μη]<sup>7</sup> χείρονος λαμβάνειν· ἢ μὲν γὰρ οὐδεμίαν ποιήσει μεταβολήν, ἢ δ' ἐπὶ τὸ βέλτιον εὐτροφούντος·<sup>8</sup> μέγα δὲ αἱ μεταβολαὶ τοῖς ἀσθενέσιν, ἀσθενὲς δὲ τὸ φυτόν. διὰ ταῦτα γὰρ καὶ τὰς θέσεις τῶν φυτευμάτων τὰς αὐτὰς ἀποδιδόασιν κατὰ τὰ πρόσβορρα καὶ νότια, καὶ πρὸς ἔω καὶ δυσμάς, ὡς ἐπὶ τῶν δένδρων εἶχε, βουλόμενοι τηρεῖν ὅτι<sup>9</sup> μάλιστα καὶ μηδὲν τῆς φύσεως καὶ τῶν εὐθότων μετακινεῖν, ὡς οὐκ ἂν ῥαδίως ἐνεγκόν-

<sup>1</sup> u: ἐκβεβλαστικῶς U: <τὸ> ἐκβ. Schneider (*quod* . . . *edit* Gaza). <sup>2</sup> Gaza, Schneider: ὅσον U. <sup>3</sup> ego: θάλλειαν U.

<sup>4</sup> U<sup>r</sup> N aP: κελάδων U<sup>ar</sup>. <sup>5</sup> u: -ει U.

<sup>6</sup> Schneider: λειότητος U. <sup>7</sup> Cagnatus.

<sup>8</sup> ego (εὐτροφος οἶσα Wimmer): συντροφούντος U.

<sup>9</sup> Gaza (*quam*), Itali: ἔτι U.

<sup>1</sup> Cf. HP 2 6. 3, CP 3 11. 5 (a layer has roots stronger than those sent down by a slip).

live, a slip that has let its growth pass into them is weaker (unless its nature is to do so, as with the branches of the vine). For the reason why some experts even layer the slips on the trees,<sup>1</sup> and others strip the olive cutting of its leaves, is to prevent it from exhausting its power on growth above  
5.2 ground. Again, straightness and smoothness make the flow of food plentiful and direct, so that the slips grow fast.

Another good recommendation is to take the slip preferably from similar soil, or failing that, from poorer,<sup>2</sup> since the new soil in the first case will involve no change, in the second, a change for the better, the slip getting plenty of food; and changes are grave matters for whatever is weak, and the slip is weak. For this is why the recommendation is given that the slip should face in the same direction—north, south, east and west—as it did on the tree,<sup>3</sup> the intention being to disturb so far as possible nothing that belongs to its nature or to the circumstances to which it is accustomed, in the belief that the slips would not easily support a

<sup>2</sup> This passage is referred to at CP 3 24. 1. Cf. HP 2 5. 1: "They recommend taking the slips . . . from land similar to the one you are going to plant them in or from worse."

<sup>3</sup> Cf. HP 2 5. 3 (recommendations about slips): "Some recommend that also the lower part of the slips that have roots should be bent under, and be placed in the same position that some of the trees had, those facing north and east and south."

των μεταβολήν.

- 5.3 ἐπεὶ καὶ τοὺς τόπους ὅτι μάλιστα ὁμοίους ζῆ-  
τοῦσι διὰ τὰς αὐτὰς αἰτίας, καὶ προμοσχεύοντες<sup>1</sup>  
φυτεύουσιν· ἰσχυρότερα γὰρ καὶ ὥσπερ ἤδη  
βεβιωκότα. καὶ τὰ φυτὰ μάλιστα μὲν ὑπόρριζα  
λαμβάνουσιν, ἔχει γὰρ εὐθὺς καὶ ἀρχάς· εἰ δὲ μὴ,  
μᾶλλον ἀπὸ τῶν κάτω ἢ τῶν ἄνω, καὶ γὰρ ταῦτα  
ἐμβιωτέρα ἐστίν, πλὴν ἀμπέλου καὶ συκῆς καὶ εἴ-  
τι ἄλλο ὑγρόν (ὥσπερ εἴρηται). τὰ γὰρ ὑγρά κάλ-  
λιον<sup>2</sup> ἀπὸ τῶν ἄνω βλαστάνει, τὰ δ' ἄλλα<sup>3</sup> διὰ  
τὴν ξηρότητα καὶ τὴν λεπτοδερμίαν τὰ μὲν ὄλως  
οὐ βλαστάνει, τὰ δὲ χεῖρον. τὸ δ' ὑπόρριζον,<sup>4</sup> ὡς  
προπεπονημένον<sup>5</sup> τι τῆς φύσεως ἔχει, καθάπερ τὸ  
5.4 μεμοσχευμένον, ᾧ δεῖ χρῆσθαι. καὶ διὰ τοῦτο βέλ-  
τιον λέγουσιν ὀρθὰ κελεύοντες τὰ τοιαῦτα τιθέναι,  
καὶ μὴ ὑποβάλλοντάς<sup>6</sup> τι μέρος (ὥσπερ τοῖς ἀρρί-

<sup>1</sup> u : πρόσμ- U.    <sup>2</sup> U<sup>c</sup> : -ω U<sup>ac</sup>.

<sup>3</sup> δ' ἄλλα U<sup>cc</sup> : δε χεῖρον U<sup>ac</sup> (skipping some 58 letters).

<sup>4</sup> Wimmer (ὑπόρριζα Schneider) : ὑπέρριζων U (-ον u) : ὑπέρ-  
ρίζων N : ὑπέρ ρίζων aP.    <sup>5</sup> u aP : -μένον N : -μένων U.

<sup>6</sup> ego : ὑποβάλλοντές (sic) U.

<sup>1</sup> "First making them grow roots" renders *promoscheú-  
ontes*. *Móschos* is literally a "calf," and as a calf to a cow, so  
a young tree with roots of its own stands to the parent.  
The "moschos" when planted has roots, either produced by

change.

- Indeed for the same reason experts look for 5.3  
regions as similar as possible and plant the slips  
after first making them grow roots,<sup>1</sup> since they are  
stronger then and have as it were already esta-  
blished independent life. And they prefer to take a  
slip with some root attached, since then it starts  
with a beginning.<sup>2</sup> Otherwise they prefer slips from  
the lower part to those from higher up, these too  
being better at taking, except for the vine<sup>3</sup> and fig  
and other fluid trees (as we said),<sup>4</sup> since fluid trees  
sprout better from slips taken from their upper  
parts, whereas the rest are so dry and thin-skinned  
that they either do not sprout at all when so planted  
or sprout worse. The slip with some root attached is  
preferred since it has a part of its nature already  
prepared, like the slip that has been made to grow  
roots, and of this we must take advantage. This is 5.4  
why it is better advice to plant such slips straight,  
and not lay flat a certain portion of them (as is done

layering or after separation from the parent, and is dis-  
tinct from a slip with some root attached. This is taken  
directly from the tree, where it grew as a sucker or as a  
side-shoot from the base of the trunk.

<sup>2</sup> Cf. CP 3 2. 7, note 2.

<sup>3</sup> Cf. HP 2 5. 3: "One must take the slips with some root  
attached if possible; otherwise from the lower rather than  
from the upper parts of the tree, except for the vine . . ."

<sup>4</sup> CP 1 1. 4; 1 3. 1.

ζοις), ὅπως ἡ ρίζα βλαστάνη<sup>1</sup> συμβαίνει<sup>2</sup> γὰρ  
 δοκεῖ πλαγίων τιθεμένων ἀφαινεσθαι τὰς πρό-  
 τερον, ἄτοπον δὲ ζητεῖν ἑτέρας ἀποβάλλοντα τὰς  
 ὑπαρχούσας. ὀρθῶς δὲ καὶ τὸ μὴ πολὺ τῆς γῆς  
 ὑπερέχειν τὸ φυτόν, εἰ δὲ μῆ, γίνεται δυσαυξές,  
 ὅταν ᾗ πλέον τοῦ τρεφομένου τὸ ποιοῦν· ἔνια δὲ  
 καὶ ἀφαινεῖται, καθάπερ ἡ συκῆ καὶ εἴ τι ἄλλο  
 μανόν· ἅμα δὲ καὶ ἀθροωτέρα φέρεται μᾶλλον ἢ  
 τροφή πρὸς τὴν βλάστησιν, ὃ καὶ ἐπὶ τῶν κατα-  
 5.5 κοπτομένων συμβαίνει. τὰ γὰρ παρὰ τὴν γῆν ὅτι  
 μάλιστα κοπέντα θάπτου παραγίνεται τῶν ἐν  
 ὕψει· φανερόν δὲ καὶ ἐπὶ τῶν τῆς ἀμπέλου φυτῶν  
 καὶ εἴ τι ἄλλο τομῆν ζητεῖ κατὰ τὴν φυτεῖαν.  
 τῶν δὲ τῆς ἐλάας καὶ τῶν μυρρίνων, καὶ ὅλων ὅσα  
 φύεται<sup>3</sup> μείζω, πάντων ἀποστέγουσι<sup>4</sup> τὰς τομάς,  
 ὅπως μῆθ' ἥλιος μῆθ' ὕδωρ λάβῃ· κίνδυνος γὰρ  
 νοσήσαι ραγέν· περιλαλείφουσιν δὲ οἱ μὲν πηλὸν  
 μόνον, οἱ δὲ σκίλλαν ὑποτιθέντες, εἴτ' ἄνωθεν τὸν  
 πηλόν, ἐπὶ τούτῳ δὲ τὸ ὄστρακον· δοκεῖ γὰρ ἢ  
 μὲν σκίλλα χλωρὸν παρέχειν, ὃ δὲ πηλὸς ἐκείνην

<sup>1</sup> βλαστάνη u: -ει U.    <sup>2</sup> u: -ει U.

<sup>3</sup> U: φυτεύεται (?) Schneider.

<sup>4</sup> Gaza (contegunt): ἀποστέγουσα U.

<sup>1</sup> Cf. HP 2 5. 3 (recommendations about slips): "One

with the rootless slips) to make the root come out<sup>1</sup>;  
 since the earlier roots are believed to wither away  
 when the lower portion of the slip is planted at an  
 angle, and it is folly to seek for new roots by throw-  
 ing away the ones you have. It is also good advice  
 not to let the slip project far above the ground, since  
 otherwise its growth is slow, the part exposed to  
 hardships being larger than the part that feeds, and  
 some such slips even wither away, as with the fig  
 and other trees of open texture. Then too when the  
 slips do not project far the food passes on with a  
 more concerted movement to bring about sprouting,  
 and the same results when the slips are pruned  
 short. For slips cut back as close as possible to the  
 ground come out faster than those cut back higher,  
 and this is evident not only in slips of the vine but in  
 all others that require to be cut back when planted.  
 In the slips of olive, myrtle and in general all slips of  
 larger growth, the cut is sealed off to keep sun and  
 rain from getting at it, since otherwise there is  
 danger that it will split and get diseased. Some  
 experts merely smear the cut with mud, but others  
 first cover the cut with a squill, then cover the squill  
 with mud and the mud with a shard, since the squill  
 is considered to keep the stump fresh, the mud to

should plant the ones with roots straight, and should lay  
 flat about a handsbreadth or a little more of those that are  
 rootless. Some recommend laying flat the same length of  
 slips with root attached too . . ."

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τηρεῖν, τὸ δ' ὄστρακον τὸν πηλόν.

- 6.1 ἡ δὲ κόπρος, ὅτι μὲν καὶ μανοῖ τὴν γῆν καὶ διαθερμαίνει, δι' ὧν ἀμφοτέρων ἡ εὐβλαστία, φανερόν· ὑπὲρ δὲ τῆς χρήσεως διαμφοισθητοῦσιν, καὶ οὐχ ὡσαύτως χρῶνται πάντες, ἀλλ' οἱ μὲν εὐθὺς ἀναμίξαντες τῇ γῇ πρὸς τὸ φυτὸν προσβάλλουσιν, οἱ δ' ἀνὰ μέσον ποιοῦσι τῆς τε πρώτης γῆς καὶ τῆς ἐπάνω, κάτωθεν γὰρ παραλαμβάνομένην<sup>1</sup> εἰς τὸ ἄνω φέρεσθαι φασιν ὅταν ὕση· βέλτιστον γὰρ εἶναι τὸν χυλόν, ἄνωθεν δ' ἐξικμάζεσθαι ὑπὸ τοῦ ἡλίου, καὶ ὕοντος οὐ δικνεῖσθαι τὸ<sup>2</sup> κάτω. πάντες δὲ τό γε τοσοῦτον συμφωνοῦσιν, ὥστε μὴ δριμεῖαν καὶ ἰσχυράν, ἀλλὰ κούφην, διὸ καὶ μάλιστα χρῶνται τῇ τῶν λοφούρων· ἡ γὰρ δριμεῖα καὶ ἰσχυρὰ διαθερμαίνει μᾶλλον, ἢ δὲ καὶ ξηραίνει.
- 6.2

χρῆ δὲ καὶ πρὸς τὴν χώραν ἐκάστην ποιεῖν τὸ ἀρμόττον· οἶον ἐὰν μὲν τις <ἐν><sup>3</sup> ἐμπύρω

<sup>1</sup> U: παραβαλλομένην Schneider.

<sup>2</sup> U: εἰς τὰ Schneider. <sup>3</sup> Schneider.

<sup>1</sup> Cf. HP 27. 4 (of manure): "... some plants require it to be pungent, some to be less so, and some require it to be quite light. The most pungent is that of man. So Chartodras says that the best is that of man, second of swine, third of goat, fourth of sheep, fifth of ox and sixth of pack-

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guard the squill and the shard the mud.

*Planting: Manure*

It is evident that manure not only gives the earth 6.1 a loose texture but also warms it through, both of which lead to rapid sprouting. But there is a dispute about how it is to be used, and not all the experts apply it in the same way. Some mix it directly with the earth and put the mixture around the slip. Others put the manure in a layer between the earth that makes the bottom of the hole and the fill of earth at the top, since if put below it moves up after a rain (the liquid solution that moves up being, they say, the best part), but if put on top it loses its moisture to the sun, and when it rains the liquid does not reach the bottom. All however agree 6.2 to this extent: that the manure should not be pungent and strong but light, and this is why they chiefly employ that of pack-animals,<sup>1</sup> since pungent and strong manure heats too thoroughly, and some of it also dries the slips.

*Planting: Suiting the Country*

We must also do what is suited to the various kinds of country. So if one is setting slips in a torrid

animals. Litter manure is different and rates differently, some being weaker than the last, some better."



[φυτῶι]<sup>1</sup> φυτεύη, τοὺς γύρους ὕδατος ἐμπι-  
πλάναι πρότριτα, καὶ ἐπειδὴν<sup>2</sup> ἀναπίωσι,<sup>3</sup> τότε  
βάλλειν,<sup>4</sup> ὅπως ἐνικμος ἢ γῆ γενομένη μάλλον  
δέχεται καὶ καλλίω ποιῆ τὴν ῥίζωσιν.

6.3 εἰάν δὲ ἐν ἀλμῶδει ἢ ἐφάλμω, λίθους περι-  
τιθέναι περὶ τὸ πρέμνον τοῦ φυτευτηρίου καὶ  
περιχωννύναι γῆν, ὅπως ἀποστέγωσι τὴν ἀλμυρί-  
δα. συμφέρεει δὲ καὶ ἄμμον πότιμον παραβάλλειν  
καὶ ψήφους ἐκ ποταμοῦ ἢ χαράδρας · ἀποστέγει  
γὰρ καὶ ταῦτα καὶ ἅμα δι' αὐτῶν παρέχεται τινα  
δύναμιν.

εἰάν δὲ ἐφύδρα καὶ ναματώδη,<sup>5</sup> τάφρους ὀρύσ-  
σοντα, τὰς μὲν πλαγίους ἵνα τὸ ὕδωρ δέχωνται,  
τὰς δὲ ὀρθίας, καὶ λίθων πληροῦντα καὶ γῆς, ὥστε  
μὴ ἄπτεσθαι τῆς σκαπάνης, εἶτα ἄμμον ἐμβάλα-  
6.4 λοντα<sup>6</sup> καὶ χοῦν. ἅπαντα γὰρ ταῦτα ὠφελεῖ πρὸς  
τὴν ὑπερβολὴν · αἱ τε γὰρ πλαγιοὶ τάφροι, δεχό-  
μεναι τὸ ὕδωρ, ξηροτέρων ποιοῦσιν, αἱ τ' ὀρθιαί,<sup>7</sup>  
κάτω λίθους ἔχουσαι, δέχονται τὴν συρροήν · ἔτι<sup>8</sup>

<sup>1</sup> Scaliger : solo Gaza, τόπω Heinsius.

<sup>2</sup> aP : ἐπι (ἐπι u N) τὴν U.

<sup>3</sup> aP (-u u) : ἀναπίωσι U (-ιώσι N).

<sup>4</sup> τότε βάλλειν U : serere Gaza : καταβάλλειν Wimmer.

country one must fill the holes with water two days  
before and when the holes have absorbed it insert  
the slips, so that the earth, now full of moisture,  
may be more ready to accept them and make them  
root better.

If the soil is brackish or has a coating of brine 6.3  
must circle the base of the slip with stones and cover  
all this with earth so that the stones may shut out  
the brine. It also helps to put in brine-free sand or  
pebbles taken from a river or a torrent bed, since the  
sand and pebbles also shut out the brine and have  
besides a certain power of their own.<sup>1</sup>

If there is much surface water and many streams  
one must dig ditches, some of them with sloping  
banks to catch the water and others with steep  
banks, and fill the steep ditches with stones and  
earth to a level not reached by hoeing, and then 6.4  
cover the fill with sand and loose soil. For all these  
measures help against the excess of water. For the  
sloping ditches catch the water and make the  
ground drier, and the steep ditches with stones at  
the bottom receive the water that is caught, and

<sup>1</sup> They cool the roots (cf. CP 1 18. 1; 3 4. 3); the stones  
are too far from the roots to do this.

<sup>5</sup> U : δ' ἐν ἐφύδρω καὶ ναματώδει Schneider after Gaza.

<sup>6</sup> aP : -αι (no accent U) u N.

<sup>7</sup> u : ορθιαί U (δ- N aP).

<sup>8</sup> Schneider : ἔτι U.

δ' ἢ ἄμμος καὶ ὁ χοῦς ἀναξηραίνουσι.<sup>1</sup> διὰ τοῦτ' οὐδὲ [ἀν] οἱ γε <ἄν> ᾧσι<sup>2</sup> λίθοι ταῖς τοιαύταις οὐκ ἐκλεκτέοι, ὑπάρχει γὰρ φύσει τὸ βοηθοῦν· ὅλως ἐν ὁποιαοῦν, ἐὰν ὀρύττων τις λίθους εὕρη ἢ τρόχμαλον ἢ ἄμμον ἢ γῆν μοχθηράν, οὐ κακῶς<sup>3</sup> τὸ μὴ συμμειγνύναι μηδὲ σκεδαννύναι ταύτην, ἀλλὰ τοσοῦτω βαθύτερον τὸν γῦρον ἢ τὴν τάφρον ὀρύξαντα τὸν τε τρόχμαλον ὑποστρωन्नύναι καὶ τὴν ἄμμον. ὁ γὰρ λίθος ὁ μὲν πλατὺς καὶ συμ-  
6.5 φυῆς καὶ<sup>4</sup> βλάπτει τὰ δένδρα· ὁ δὲ τρόχμαλος ὑποκάτω τεθεῖς ψῦχος τε παρέχεται τὸ θ' ὕδωρ δέχεται, καὶ ταῖς ῥίζαις εὐδίοδον ποιεῖ τὸν τόπον. ἀπλῶς δὲ τοὺς γε λίθους ἐκλέγειν οὐδ' ἐκ γῆς ψιλῆς οἴονται τινες <συμ>φέρειν·<sup>5</sup> καὶ γὰρ ἀλέαν παρέχειν τοῦ χειμῶνος καὶ ψῦχος τοῦ θέρους.

ὁμοίως δὲ καὶ κατὰ τὰς ἄλλας διαφορὰς τῆς χώρας τὰ πρόσφορα ληπτέον. ὥς γὰρ ὅλως εἰπεῖν οὐδενὸς ἔλαττον, ἀλλὰ πάντων πρῶτον καὶ μέγιστον, τὸ δύνασθαι θεωρησαί ποῖον ἐν ποίᾳ χώρᾳ φυτευτέον, οὐ μόνον ἀπλῶς, ἀλλὰ καὶ αὐτῆς τῆς

<sup>1</sup> u N<sup>r</sup> (-σιν N<sup>ar</sup>) aP: ἀναξηραίνουσαι U.

<sup>2</sup> ego (οὐδ' ἐάν που ἐνώσει Schneider): οὐδε ἂν οἴγεωσι U.

<sup>3</sup> U: οὐκ ἄκος u.

<sup>4</sup> ego: ἢ U: ἢ u N: aP omit.

<sup>5</sup> Heinsius.

furthermore the sand and loose soil of the fill dry out the ground. For this reason one should not even remove any stones there are in such land, since the remedy in this case is naturally provided, and in general, whatever the character of the land, if in digging one comes upon stones or rubble or sand or poor soil, it is no bad rule not to mix this in with the earth or scatter it on the top, but to dig the hole or the ditch that much deeper and spread the rubble or sand on the bottom. For when stone is flat and unbroken it actually injures the trees, whereas in the form of rubble and placed below it provides coolness, catches the water, and makes the ground permeable to the roots. In short some experts believe it inadvisable to remove the stones even from a grain field, pointing out that they provide warmth in winter<sup>1</sup> and coolness in summer.

Similarly too with the other distinctions of country: we must find the proper measures with the distinctions in view. For to speak generally, the point that is second to none, but first and most important of all, is this: to be able to see what tree to plant in what country,<sup>2</sup> not only in the country as a whole, but also in what part of a continuous country itself

<sup>1</sup> Cf. CP 3 20. 5.

<sup>2</sup> Cf. Plato, *Phaedrus*, 271 D 7-E 2; also *HP* 2 5. 7: "Most important is the assigning of the suitable country to each tree, since then the tree does best."

6.6 συνεχοῦς, ὅταν ἀνωμαλῆς ἢ κατὰ τοὺς τόπους ἐκάστους. ὡσπερ γὰρ λέγεται πολλάκις, ἡ οἰκεία μεγίστην ἔχει<sup>1</sup> ῥοπήν καὶ πρὸς ἀντίληψιν καὶ πρὸς εὐκαρπλίαν, ὃ καὶ καθ' ὅλων τῶν γενῶν ἐστὶν καὶ ἐν αὐτοῖς τοῖς ὁμοειδέσι. οἶον ὡς μὲν ἀπλῶς εἰπεῖν ἡ συκὴ φιλεῖ τοὺς ξηροὺς τόπους, οἱ γὰρ ὑγροὶ σήπουσιν ἢ οὐ καλῶς πεπαίνουσιν, διὰ τὸ καὶ αὐτὸν εἶναι τὸν καρπὸν ὑγρόν. οὐ μὴν ἀλλ' ὅσα<sup>2</sup> γε ὑδρεύεσθαι ζητοῦσιν, καθάπερ ἡ Λακωνική, τὰ ἔφυδρα<sup>3</sup> ζητοῦσιν. ὡσαύτως δὲ καὶ τῶν ἀμπέλων αἱ μὲν στερεαὶ καὶ πυκναί, καθάπερ καὶ πρότερον ἐλέχθη, τὴν ὀρεινὴν μᾶλλον φιλοῦσιν, αἱ δὲ μαναὶ καὶ ὑγραὶ τὴν πεδινὴν· ἐκατέραις γὰρ ἡ τροφή πρὸς τὴν φύσιν σύμμετρος, ταῖς μὲν ἐλάττων οὔσα, ταῖς δὲ πλείων.<sup>4</sup>

6.7 ὅλως δὲ τὰ ἀκρόδρυα καλὰ δοκεῖ περὶ τὰς ὑπωρείας γίνεσθαι (σημεῖα δὲ ποιοῦνται τὴν αὐτομάτην γένεσιν· ὅπου γὰρ ἡ φύσις αὐτὴ γεννᾷ, τοῦτο οἰκειότατον εἶναι τόπον). αἱ δὲ καθ' ἕκαστα

<sup>1</sup> P: ἔχειν U N a.      <sup>2</sup> Schneider: ὅσοι U.

<sup>3</sup> u: ἔφυδρα U (β- N a P).      <sup>4</sup> u a P: πλείων U (πλείων N).

<sup>1</sup> Cf. CP 3 1. 6 with the passages there cited.

<sup>2</sup> Cf. HP 2 5. 7: "Among the trees of the same class too one must not be ignorant of the ones (sc. the countries)

when the country varies from one district to another. For (as we repeat)<sup>1</sup> the appropriate country has the greatest weight both in determining that a tree takes hold and that it bears well, and this applies not only to whole classes but also the varieties within the same class.<sup>2</sup> For example the fig as a class likes dry regions, since wet ones rot the fruit or fail to ripen it properly, because the fruit is itself full of fluid. Nevertheless the varieties, such as the Laconian,<sup>3</sup> that like watering like regions where there is ground water. So too with the vine: the solid and close-textured varieties (as we said earlier)<sup>4</sup> prefer mountain country, the open-textured and fluid ones prefer the plain, since each of the two varieties thus gets the right amount of food for its nature, the amount being less for the former, greater for the latter.

Fruit trees as a class are considered to turn out fine in the foothills,<sup>5</sup> the proof adduced being their growing there of their own accord, since wherever the tree's own nature generates it unaided, this (they say) is the locality most appropriate for the

appropriate to them."

<sup>3</sup> Cf. HP 2 7. 1: "The fig when watered has finer leafage but its fruit is poorer, except for the Laconian fig, and this loves water." <sup>4</sup> CP 2 4. 7.

<sup>5</sup> Cf. HP 2 5. 7: "They say that for olive, fig and vine as a class the plain is most appropriate, for fruit trees the foothills."

διαφοραὶ δῆλον ὅτι κυριώταται, καὶ γὰρ ὑπώρειαι  
πολλαὶ καὶ παντοῖαι · καὶ τὸ ὄλον, ὥσπερ μία τις  
αὕτη διαφορά, καθ' ὕψος καὶ ταπεινότητα, πολ-  
λῶν οὐσῶν ἐτέρων καὶ μειζόνων (ὥσπερ ἐν ταῖς  
ἱστορίαις εἴπομεν), ὧν οὐδεμίαν ἀθέατον<sup>1</sup> εἶναι  
χρή.

6.8 τὴν γοῦν λειμωνίαν καὶ ἔφυδρον σχεδὸν οἱ  
πλείους ὁμολογοῦσιν ἀγαθὴν εἶναι ταῖς ἀμπέλοις,  
ὥσπερ καὶ τὴν εὐγειον<sup>2</sup> ἑλάαις καὶ συκαῖς · αἱ μὲν  
γὰρ ὑγροτέρας δέονται καὶ μαλακωτέρας τροφῆς,  
αἱ δὲ ξηροτέρας καὶ σωματωδεστέρας · ὅλως δ'  
αἰεὶ<sup>3</sup> τὰ μὲν ξηρὰ ξηρὰν ζητεῖ χώραν, τὰ δὲ ὑγρά  
ὑγράν.

ὥς δ' ἀπλῶς εἰπεῖν ἀρίστη πᾶσιν ἡ μανὴ καὶ  
κούφη καὶ ἔνικμος, εὐτρεφῆς<sup>4</sup> γὰρ μάλιστα καὶ  
εὐαξῆς (εἰ μὴ ὅσα διὰ τὴν ἰσχὺν λαμβάνοντα  
πληθὺς τροφῆς ἐξυβρίξει, καθάπερ ἡ ἀμυγδαλῆ ·  
ταύτη γὰρ ἡ λεπτόγειος οἰκειότερα,<sup>5</sup> καὶ τόπος

<sup>1</sup> ego (cf. θεώμενον Plato, *Phaedrus* 271 D 8: ἀθεώρητον  
Coray): θετέον U.

<sup>2</sup> u: ευγείων U.

<sup>3</sup> U<sup>cc</sup> (αι from ε). <sup>4</sup> N (-ῆς U): εὐτραφῆς u aP.

<sup>5</sup> Scaliger: ὑγροτέρα U.

<sup>1</sup> HP 3 2. 5: "Nevertheless on the great mountains, such  
as Parnassus, Cyllene, the Pierian and Mysian Olympus

tree. But the particular distinctions are evidently  
what matters most, since there are also many  
widely different kinds of foothills. Indeed on a gen-  
eral view this is itself but one of the distinctions,  
resting on the degree of elevation, among many  
other more important distinctions (as we said in the  
History),<sup>1</sup> none of which must escape our study.

6.8 So the majority (one might say) of experts agree  
that meadow land and land with surface water is  
good for the vine,<sup>2</sup> as rich land is good for olive and  
fig; since the vine requires food with more fluid and  
softness, the others food with more dryness and  
body. In general, dry trees always like the country  
dry, whereas fluid ones like it fluid.

Put simply, the best land for all trees is loose,  
light and damp, since it feeds them best and makes  
them grow rapidly, except for trees so vigorous that  
they take too much food and get out of hand, like the  
almond.<sup>3</sup> For thin soil is the more appropriate for

and the like elsewhere, all wild trees grow because of the  
great variety of the localities, the mountains having both  
regions with lakes and water and dry regions, both regions  
of soil and regions of rocks, and the meadows that lie in  
between, and one may say all the varieties of land that  
there are; furthermore they have some regions that are in  
basins and have fair weather, others that are elevated and  
wind-swept, so that the mountains are able to produce all  
types of trees, including those that are found in the  
plains."<sup>2</sup> Cf. CP 2 4. 4.

<sup>3</sup> Cf. CP 2 16. 8, 3 18. 2.

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εὐδιεινὸς καὶ ἥλιος ·<sup>1</sup> ἐναντίως δὲ τῇ Εὐβοϊκῇ,<sup>2</sup>  
παλίскиος καὶ δροσερός).

6.9 οὐ μικρὸν δὲ οὐδὲ πρὸς τὰ πνεύματα καλῶς  
κεῖσθαι τοὺς τόπους, ὥστε καὶ τοῦτο θεωρητέον.

εὐπνον μὲν γὰρ ἅπαντα ζητεῖ, τροφαί τε γὰρ  
ἐν τοῖς τοιούτοις βελτίους καὶ οἱ καρποὶ πεπειρό-  
τεροι. πνευματώδη δὲ καὶ προσήμεμον οὐδὲν ὡς  
εἰπεῖν τῶν γε ἡμέρων, ἀναυξή γὰρ καὶ μικρὰ καὶ  
καυλώδη<sup>3</sup> γίνεται διὰ τὰς πληγὰς τὰς ὑπὸ τῶν  
πνευμάτων. ἔνια δὲ οὐδὲ τῶν ἀγρίων · οὐ γὰρ  
τελειοκαρπεῖ, καθάπερ οὐδὲ τὴν Εὐβοϊκὴν φασιν,  
ἀλλὰ μέχρι τοῦ ἄνθους ἀφικνεῖσθαι, τὰς δ' ἐν τοῖς  
ὑψηλέμοις εὐαξεῖς τε καὶ πολυκάρπους γίνεσθαι.

τὸ γὰρ ὄλον (ὥσπερ πολλάκις εἴρηται) συμμε-  
τρίας τινὸς ἔοικεν ἕκαστα δεῖσθαι πρὸς τὴν φύσιν,  
ὁμοίως ἐν τε ταῖς ἄλλαις τροφαῖς καὶ ταῖς τοῦ  
ἀέρος μεταβολαῖς. ἀλλὰ τοῦτο μὲν ἂν εἴη καθόλου  
καὶ κοινόν.

7.1 τὰς δὲ μανότητας καὶ πυκνότητας τῶν φυτευο-

<sup>1</sup> U: εὐηλος (εὐειλος Schneider) Itali.

<sup>2</sup> Scaliger: εὐβοη U.

<sup>3</sup> U<sup>c</sup>: καίκαλώδη U<sup>ac</sup>.

DE CAUSIS PLANTARUM III

the almond and a region with clear weather and  
plenty of sun; the sweet chestnut on the contrary  
likes a shady spot with dew.

Nor is it of small importance that the land should  
be well placed with regard to the winds. So this  
point is another that must be studied. 6.9

All trees like a well ventilated region, since there  
the food is better and the fruit mellow. But no  
tree (one might say), at least no cultivated tree,  
likes a region that is windy and to windward, since  
the buffeting they get from the winds makes them  
stunted, small, and thickset. Even some wild trees  
do not like such a region, since they fail to ripen  
their fruit (so they say that the sweet chestnut does  
not like such a region either, and that it gets no  
further than the blossom, whereas on the leeward  
slope it grows tall and bears abundantly).

Each tree, in a word, appears to require a certain  
quantitative adjustment to its nature (as we have  
often said),<sup>1</sup> not only in the matter of food but in  
that of the changes of the air. But this would be a  
general point and of common application every-  
where.

*Planting: Spacing*

The spacing of the slips must be considered not so 7.1

<sup>1</sup> CP 1 10. 5 (adjustment to the season), CP 2 3. 4 (to the  
atmosphere), CP 2 9. 13 (of food and air).

μένων οὐχ οὕτω πρὸς τὸν τόπον ὡς πρὸς αὐτὰ τὰ φυτευόμενα σκεπτέον — ὅσα τε φιλόσκια καὶ μῆ, καὶ ὅσα μακρόρριζα καὶ βραχύρριζα · τὰ μὲν γὰρ δηλον ὅτι μανά, τὰ δὲ πυκνὰ φυτευτέον. φιλόσκια δὲ ὧν οἱ καρποὶ ξηρότατοι<sup>1</sup> καὶ πυρηνώδεις (ὡσπερ ρόας καὶ μυρρίνου), καὶ ὅσα φύσει μανά τε καὶ ξηρὰ καὶ μῆ μακρόρριζα (καθάπερ ἡ δάφνη).

7.2 τῶν μὲν γὰρ ὁ καρπὸς ἡλιούμενος στρυφνὸς γίνεται, τὰ δὲ ὡσπερ προβολῆς δεῖται καὶ πρὸς τοὺς χειμῶνας καὶ πρὸς τὰ καύματα, διὰ τὴν ἀσθένειαν · οὐκ ἐνοχλεῖ γὰρ τῷ ταρρῷ διὰ τὴν βραχυρρίζαν. καίτοι τινὲς ἅπαντα κελεύουσιν διὰ πολλοῦ φυτεύειν, ὅπως μὴ σύνταρρα γίνηται, μηδ' ἀναυξῆ, τροφήν τε ἐλάττω λαμβάνοντα καὶ τοῦ πνεύματος ἀποκλειόμενα. οὐ μὴν ὀρθῶς γε<sup>2</sup> λέγουσιν, ἀλλ' ἐκάτερα διαιρετέον ὡσπερ εἴρηται. χρῆ δὲ καὶ πρὸς τὸν τόπον ὀρώντα ποιείσθαι τὰς ἀποστάσεις · ἐν γὰρ τοῖς ὄρειοις ἐλάττους ἢ ἐν τοῖς πεδείοις, ἐπ' ἐλαττον γὰρ αἱ τε ρίζαι προ-

<sup>1</sup> U : ξηροί τε Schneider.

<sup>2</sup> aP : τε U N.

<sup>1</sup> Those that dislike shade and have long roots.

<sup>2</sup> Cf. CP 2 7. 3-4.

much with regard to the region as with regard to the trees themselves that are being planted, by whether they like or do not like shade and have long or short roots, since the one set<sup>1</sup> must evidently be spaced thin, the others close. Those trees love shade that have very dry fruit with plenty of stone (like pomegranate and myrtle), and that are naturally of open texture, dry,<sup>2</sup> and not long-rooted (like bay).<sup>3</sup> For 7.2 in the former the fruit becomes astringent when exposed to the sun, and the latter require a screen (as it were) against both cold and hot weather because of their weakness, since they do not interfere with one another with any tangled mass of roots, because the roots are short. And yet some experts tell us to plant all trees wide apart to prevent the roots from entangling together and the trees from getting stunted by getting too little food and being shut off from the wind. They are nevertheless mistaken, and we must distinguish two groups as we have done.<sup>4</sup> But we must also consider the region in calculating the spacing, since in mountainous country the intervals are smaller than on the plain,<sup>5</sup> because on the mountains the

<sup>3</sup> The agriculturists recommended close planting (no more than nine feet apart) for pomegranate, myrtle and bay (HP 2 5. 6). <sup>4</sup> CP 3 7. 1.

<sup>5</sup> Cf. HP 2 5. 6 (the experts recommend): "that we should calculate the spacing in relation to the country, for in mountain country the distance is less than on the plain."

αύξονται καὶ ἡ κόμη.

7.3 ἄπαν δὲ φυτόν, ὅταν ἐκβλάστη,<sup>1</sup> τὸ πρῶτον ἔαν δεῖ<sup>2</sup> ριζωθῆναι, μηδὲν κινῶντα τῶν ἄνω (καθάπερ ἐπὶ τῶν ἀμπέλων ποιούσιν, ἀφιέντες<sup>3</sup> τὰς ῥάχους), εἴθ' ὅταν ἰσχωσιν,<sup>4</sup> τότε περιαιρέιν<sup>5</sup> τὰ ἄνω, καταλιπόντα τὰ κάλλιστα καὶ τὰ ἐπιτηδειότατα πεφυκότα (κατὰ γὰρ τὰ δένδρα τοῦτ' ἀναγκαῖον, οὐχ<sup>6</sup> ὥσπερ ἐπὶ τῶν ἄλλων ἀφαιρέιν ἐνδέχεται πάντα καὶ τέμνειν ἰσόγεων<sup>7</sup>)· ἀρριζώτου<sup>8</sup> γὰρ ὄντος ἐὰν περιαιρῆ<sup>9</sup> καὶ κινῆ τις, ἀσθενὲς ὄν, συναισθήσεται<sup>10</sup> μᾶλλον· ἐὰν δ' ἐρριζωμένου καὶ ἰσχύοντος, αὐτό τε ἀπαθὲς ἔσται καὶ τὴν τροφήν ἀποδώσει πλεονα τοῖς καταλοίποις.

7.4 ἡ δ' ἀναγωγὴ καὶ ἦν καλοῦσιν οἱ πολλοὶ τῶν φυτειῶν<sup>11</sup> παιδείαν οἷον σχηματισμὸς ἔστι καὶ μόρφωσις τῶν δένδρων ὕψει τε καὶ ταπεινότητι,

<sup>1</sup> Wimmer: ἐκβλαστῆ U.

<sup>2</sup> ego: δὲ U<sup>ar</sup>: U<sup>r</sup> N aP omit. <sup>3</sup> Heinsius: -ας U.

<sup>4</sup> ἰσχωσιν U: ἰσχύοσι Itali: tenuerit: conuaueritque Gaza.

<sup>5</sup> Schneider: περιαιρέιν U. <sup>6</sup> οὐχ' U: οὐδ' Schneider.

<sup>7</sup> Schneider: ἰσόγεων U. <sup>8</sup> Wimmer: ἀρριζίου τε U.

<sup>9</sup> Schneider: περιαιρή U.

<sup>10</sup> συναισθήσεται U: συναιρεθήσεται u: συνθήσεται N: σωθήσεται aP. <sup>11</sup> U: φυτῶν Gaza, Schneider.

roots and foliage do not grow out so far.

*The Sapling: Cutting Back*

One should allow every slip, when it has come out, first to strike root, and not disturb the parts above ground (so growers do with the vine when they let the rough shoots grow). Only later, when the slips have got their roots, should one cut back the parts above ground, leaving however the parts that are finest and that grow in the most convenient positions (since in trees we are forced to leave some parts behind, because it is not possible as with other plants<sup>1</sup> to remove the whole upper growth and cut them down to the ground). For if one cuts back the parts and interferes with the slip when it has not yet got rooted, it will, in this weak state, be more sensitive to the procedure; but if one cuts when it is rooted and strong, it will suffer no harm itself and pass more food to the parts allowed to remain.

*The Sapling: Training*

The training and what is commonly termed the schooling in habit<sup>2</sup> is a forming (one might say) and shaping of trees in vertical and lateral extent and in

<sup>1</sup> Cf. CP 2 15. 6 with note a.

<sup>2</sup> "Habit" renders *phyteia*; for this use of the word cf. HP 3 8. 4.

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καὶ πλάτει, καὶ τοῖς ἄλλοις. ὡς δ' ἐπίπαν φυτεύουσι<sup>1</sup> τὰ ὑψηλά (πλὴν ὅσα φύσει τοιαῦτα καὶ ἔστι καὶ βούλεται, καθάπερ φοῖνιξ, πεύκη, κυπάριτος)· ἀκαρπότερα γὰρ γίνεται, διὰ πολλοῦ τῆς τροφῆς λούσης καὶ ἐνταῦθα καταναλισκομένης. ἀλλὰ δεῖ<sup>2</sup> πολὺκλαδα καὶ πολυβλαστῆ ποιεῖν, ἅμα γὰρ τῇ πολυκαρπία καὶ εὐτρυγητότερα καὶ τὸ ὅλον εὐθεραπευτότερα γίνεται· διὸ καὶ περιαιρέτεον καὶ κωλυτέον τὰς μὴ κατὰ καιρὸν βλαστῆσεις.

7.5 σχεδὸν δ' ἡ τοιαύτη θεραπεία καὶ κατάστασις ὁμοία τῇ διακαθάρσει τυγχάνει τελείων ὄντων τῶν δένδρων· ὑπὲρ ἧς καὶ δεικτέον πρῶτον τῶν κατὰ τὰς θεραπείας, εἴθ' οὕτω περὶ τῶν ἄλλων, ὥσπερ γὰρ ἐφεξῆς ταῦτα τῶν περὶ τὴν φυτουργίαν ἔστί.

κοινοτάτη μὲν οὖν καὶ μάλιστα ἔνδηλος ἐπὶ τῶν ἀμπέλων τυγχάνει· πάντες γὰρ χρῶνται καὶ πάντες ἀμπελουργοῦσιν, ὥσπερ ὑπ' αὐτῆς ἀναγκαζόμενοι τῆς φύσεως, διὰ τὴν εὐβλάστειαν καὶ πολυβλαστίαν· ὑπὲρ ἧς ἐπειδὴ καὶ ἐν τῇ κλάσει καὶ ἐν τοῖς ἄλλοις διηκριβῶται μάλιστα ἡ θερα-

<sup>1</sup> U: παιδεύουσι Dalecampius: ἀποτέμνουσι Schneider: ἐπιτέμνουσι Wimmer. <sup>2</sup> u aP: δὴ U N.

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other ways. On the whole it is the tall trees that are trained (with the exception of those that are naturally tall and strive for height, as the date-palm, pine and cypress), since unless they are shortened they tend to bear less fruit, because the food has a long distance to go and is used up on the way. Instead one should make them many-branched and many-shooted, for besides bearing more they will then become easier to harvest and in general easier to tend, which is why we should also remove and prevent any shoots that grow in inconvenient positions.

### *The Mature Tree: Pruning*

This sort of tending and ordering is similar (one might say) to the pruning of the adult trees. Of the procedures involved in the care of trees we must first discuss pruning and then proceed to the rest, since this subject comes next in order (as it were) to the procedures dealing with the immature tree. 7.5

Pruning, then, is most universally applied to the vine and most clearly seen in its case, since all resort to it and all dress the vine, as if they were compelled to do so by its very nature, owing to the rapid and abundant sprouting. Since the dressing of the vine has been worked out in the greatest detail both in the matter of pruning and in all its other aspects, we must endeavour to study these pro-



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πεία, πειρατέον αὐτὰ καθ' αὐτὰ θεωρεῖν ὕστερον ·  
νῦν δ' ὑπὲρ τῶν ἄλλων λέγομεν.<sup>1</sup>

7.6 οὐδὲ γὰρ οὐδ' ἐπὶ τούτων μικρόν ἐστι τὸ κατα-  
στήσασθαι πως τὰ δένδρα καὶ κακῶς πεφυκότα  
καὶ τὰ<sup>2</sup> ἐμποδιζόμενα<sup>3</sup> τοὺς καρποὺς ἀφαιρεῖν  
(ἐμποδίζει γὰρ οὐ ταῦτα μόνον, ἀλλὰ καὶ τὰ  
ἀπηρητημένα καὶ αἶα καὶ<sup>4</sup> ὅλως τὰ παρακαίρως  
πεφυκότα) · διὸ δεῖ ταῦτ' ἐξαιροῦντα μετατιθέσθαι  
τὴν βλάστησιν εἰς τὸ δέον. ἔοικεν γὰρ ὡσπερ<sup>5</sup>  
ὁχετεία τις εἶναι τῆς<sup>6</sup> τροφῆς τῶν δένδρων, ὅπως  
ἂν ἄγῃ<sup>7</sup> τις · εἰς γὰρ τὰ καταλειπόμενα ῥεῖ καὶ  
ταῦτ' αὐξάνει.

7.7 τοῦτο δὲ ξυμβαίνει διότι τοῖς μέρεσιν ἄριστα  
πέφυκεν, καὶ ἔτι προσεπιβλαστάνει κατ' ἐπι-  
αυτόν · ἐπεὶ καὶ εἴ τις αἰεὶ βούλεται κολοῦσθαι<sup>8</sup> τὰ  
ἄνω, πρὸς τὰς ρίζας ἢ τροφήν πᾶσα φέρεται,  
καὶ κείναι λαμβάνουσιν αὐξήσιν ὥστε συνταρροῦσ-  
θαι<sup>9</sup> τὰ χωρία, καὶ τέλος ἀναυξή γίνεται τὰ ἄνω,  
πάσης ἐνταῦθ' ὠρμηκυίας τῆς τροφῆς, οἷον γὰρ  
ἤδη φύσις γίνεται χρονισθέντων.

<sup>1</sup> UNP: λέγομεν u Gaza a. <sup>2</sup> [τα] Schneider.

<sup>3</sup> aP: ἐμποδιζόμενα UN. <sup>4</sup> αἶα καὶ Schneider: αὐτὰ U.

<sup>5</sup> Gaza a: ὡστε περ UNP. <sup>6</sup> [τῆς] Schneider.

<sup>7</sup> Gaza, Schneider: ἀναγκη U.

<sup>8</sup> U<sup>c</sup>: κωλύειν U<sup>ac</sup>. <sup>9</sup> Gaza (*radicibus impleantur*),

Scaliger: συνταρραττεσθαι U.

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cedures later in a separate section<sup>1</sup>; at present we  
deal with the other trees.

So too in the grown tree: it is of no small impor- 7.6  
tance to reduce the tree to a certain order and  
remove the parts that are ill grown and that impede  
the fruit (for not only do the ill-grown parts impede  
it but so too do the parts that grow away from the  
rest and the deadwood and indeed all parts that  
have grown in an inopportune way). We must  
therefore remove these and thus shift the sprouting  
to where it is wanted, since this removal appears to  
be a channelling (one might say) of the tree's food by  
guiding it as one pleases, the food flowing into the  
parts allowed to remain and making them grow.

This happens because of all plants trees are the 7.7  
best endowed in their parts, and moreover have a  
second growth of shoots every year.<sup>2</sup> Indeed if one  
wishes to cut back all the new upper growth as it  
grows out, all the food moves to the roots, and these  
grow to such an extent that the orchards are matted  
with them, and finally the parts above cease to  
grow, all the food having taken its course to the  
parts below, for when training has lasted long  
enough it turns as it were into nature.<sup>3</sup>

<sup>1</sup> CP 3 11. 1-3 16. 4.

<sup>2</sup> Cf. HP 3 5. 4: "... but the second sproutings in the  
dog-days and at the rising of Arcturus are (one may say)  
common to all (sc. trees)..."

<sup>3</sup> Habit becomes nature: cf. CP 2 5. 5 with note.

ἡ μὲν οὖν ἄμπελος ἀεὶ τὴν τομὴν ἐπιζητεῖ  
κατ' ἐνιαυτόν, διὰ τὸ εὐαξές· τὰ δὲ ἄλλα, τὰ μὲν  
παρ' ἔτος, τὰ δὲ διὰ τετραετίας,<sup>1</sup> οὐδὲν γὰρ  
οὕτως εὐαξές· ἐπεὶ εἴ γέ τι τοιοῦτον εἶη, δέοιτ'  
7.8 ἄν. <ᾧν> ἀφαιρεῖν<sup>2</sup> ἀπὸ τῶν ὑγρῶν περιέργον,  
ἅμα δ' ἡ ἔλκωσις πόνον παρέχει καὶ κακοὶ τὰ δέν-  
δρα, διὸ καὶ μετὰ τὴν διακάθαρσιν εὐθύς οἴονται<sup>3</sup>  
δεῖν κοπρίξιν καὶ τὴν ἄλλην ἀποδιδόναι θερα-  
πείαν, ὅπως ἐπαναλάβωσι τῇ τροφῇ τὴν κακο-  
πάθειαν· ἀλλὰ μόνον τό γε συνεχές ἐν τῇ τῶν  
αὐτῶν ἀφαιρέσει ποιέσθαι· ταῦτα γὰρ οὔτε πόνον  
ποιεῖ τῇ ἐλκώσει, κωλύει τε προσηρτημένα τὰς  
τροφάς.

7.9 ἐν δὲ τῇ διακαθάρσει τὰ τε μὴ κάρπιμα  
διαιρετέον, καὶ ὅσα τῶν ἐτέρων αὐξήσιν ἀφαιρεῖ-  
ται, καὶ ὅσα διαπέφυκεν (ἐν τοῖς ἔξω γὰρ δεῖ τὴν  
βλάστησιν εἶναι), καὶ ἔτι τὰ πυκνὰ καὶ ἀλλήλοις  
ἐπιβάλλοντα, καὶ ὅσα τὴν ἔκφυσιν ἐκ τῶν μέσων

<sup>1</sup> u a (in an omission in P): τετραετίας U: τετραετίας N.

<sup>2</sup> <ᾧν> ἀφαιρεῖν ego: ἀφαιρεῖν <δ' ἀεὶ> Schneider.

<sup>3</sup> u: οἶον τε U.

<sup>1</sup> As opposed to removing deadwood.

<sup>2</sup> Cf. HP 2 7. 2: "All trees need pruning, since they are better when the deadwood, which is (as it were) something

Whereas the vine requires the pruning to be  
annual because its growth is so rapid, the rest  
require pruning in some cases every other year, in  
others every third year, none being so rapid a  
grower as the vine; indeed if any should grow so  
7.8 rapidly, it would need pruning annually. But to  
keep pruning from the fresh wood<sup>1</sup> in these others  
is needless trouble, and then too the wounding is an  
affliction and a hardship, which is why the experts  
believe that immediately after pruning one should  
manure the tree and give it the other attentions, to  
let it make up for the hardship by good feeding, and  
that only the removal of deadwood should be main-  
tained without interruption, since deadwood can be  
removed without inflicting wounds and when it is  
left on the tree prevents feeding.<sup>2</sup>

7.9 In pruning the branches of the grown tree we  
must distinguish from the rest<sup>3</sup> the parts that do  
not bear, those that prevent the growth of other  
parts, and those that grow in between<sup>4</sup> (since the  
sprouting should be at the periphery);<sup>5</sup> further we  
must distinguish the parts that are too crowded and  
cross one another, and those that grow from the

foreign, is removed, and it furthermore obstructs growth  
and feeding."

<sup>3</sup> And remove.

<sup>4</sup> That is, they grow in between other branches and stop  
short of the periphery.

<sup>5</sup> Because the fruit will then be exposed to sun and air.

ἔχει, πάντα γὰρ ταῦτα καὶ τὸ πνεῦμα καὶ τὸν ἥλιον ἀφαιρείται· δεῖ δὲ καὶ εὖπνον εἶναι καὶ πρόσκειλον τὸ δένδρον, διὸ καὶ οὐ κακῶς οἱ οὕτως ῥυθμίζοντες ὥστε πρὸς μεσημβρίαν βλέπειν (καθάπερ οἱ τὰς συκᾶς<sup>1</sup> καὶ τὰ ἄλλα καὶ μάλιστα τὴν ἐλάαν).

7.10 ἐπεὶ δ' ἐπίπονος ἢ διακάθαρσις διὰ τὰς πληγὰς, διὰ τοῦτ' οὐ τὴν τυχοῦσαν ὥραν, ἀλλὰ <τὴν><sup>2</sup> μετὰ Πλειάδα ληπτέον· ἰσχυρότατα γὰρ τότε καὶ μάλιστα αὐτῶν<sup>3</sup> τὰ δένδρα, καταναλωκότα τὸ ὑγρὸν εἰς τοὺς καρπούς, ἕτερον δὲ οὐδέπω δεδεγμένα·<sup>4</sup> τὰ δ' ὀψικαρπότερα δῆλον ὅτι κατὰ λόγον, μετὰ τὴν τῶν καρπῶν ἀφαίρεσιν. ἴδιον δ' ἐπὶ τῆς συκῆς· μόνη γὰρ διακαθαίρεται μικρὸν πρὸ τῆς βλαστήσεως. αἴτιον δ' ὅτι τότε μάλιστα εὐσύμφυτον·<sup>5</sup> δεῖ δὲ τοῦτο<sup>6</sup> σπεύδειν, ἀσθενὲς γὰρ ὄν καὶ μανόν, πονεῖ μάλιστα διὰ τοῦ μετοπώρου καὶ περὶ Πλειάδα, ξηροτέρας οὔσης τῆς ὥρας οὐ δυναμένη<sup>7</sup> συμφῦναι, σήπεται τε παραρρέοντος τοῦ ὕδατος, καὶ ὑπὸ τῶν χειμῶνων κακοπαθεῖ, καὶ

<sup>1</sup> Gaza, Itali : οἰκειᾶς U : συκέας u : συκίας N : συκῶς aP.

<sup>2</sup> Schneider.

<sup>3</sup> Scaliger (cf. *ἐαυτοῦ* CP 3 4. 4) : αὐτῶν U.

<sup>4</sup> Gaza (*susceperint*), Heinsius : δεδειγμένα U.

<sup>5</sup> U N P : -ος a. <sup>6</sup> Gaza (*quod*), Scaliger : ταντὸ U.

middle of the branch, for all shut out wind and sun, and the tree must be both well-aired and exposed to the sunshine. This is why it is a good precept to discipline it so that it faces south, as is done with the fig and the rest,<sup>1</sup> especially the olive.

Since branch pruning is a hardship because of 7.10 the wounds we must choose for it not any season that we please but the season after the setting of the Pleiades, since the trees are then strongest and most their own selves,<sup>2</sup> having expended their fluid on the fruit and not yet received a new supply. Later-fruiting trees must be pruned at a correspondingly later time, after the fruit has been harvested. The fig-tree is a special case: it is the only tree that is pruned shortly before it sprouts. The reason is that the wounds are then most easily closed, and this must be our aim, since the tree is a weak and open-textured one and suffers more than any other in the course of the autumn and at the setting of the Pleiades, since the fig is unable to close its wounds when the season is drier, and when the rains come it decomposes when the water gets into the cuts, and

<sup>1</sup> That is, the rest mentioned in this connection by the agriculturists; it is equivalent to "etc."

<sup>2</sup> For the phrase cf. CP 3 4. 4; 4 3. 4. It indicates that the tree is not responding to some seasonal urge or to some emergency.

<sup>7</sup> U<sup>r</sup> : δυναμένης U<sup>ar</sup> N aP.

τὸ ὄλον διαφθείρεται.

τοῦτο μὲν οὖν ἴδιον τῶν ἀσθενῶν καὶ μανῶν.

7.11 οὐκ ἴση δὲ πάντων ἡ ἀφαίρεσις, ἀλλὰ πλείων<sup>1</sup>  
τῶν μᾶλλον δεομένων· δεῖται<sup>2</sup> δὲ τὰ εὐβλαστοῦν-  
τα πολλῆς γενομένης,<sup>3</sup> οἷον ἐλάα δοκεῖ καὶ ρόα  
καὶ μύρρινος· ὅσω γὰρ ἂν τις<sup>4</sup> ἐλάττω τούτοις  
καταλίπη, βέλτιον βλαστάνει καὶ τοὺς καρποὺς  
φέρει βέλτιον· τοῦτο δ' ὅτι πυκνόβλαστα  
[ἔστιν]<sup>5</sup> καὶ λεπτόβλαστα [ἔστιν]<sup>6</sup> καὶ ταχὺ  
παραυαίνόμενα (διὸ καὶ φρυγανικώτατα πάντων  
τῇ προσόψει).

7.12 χρῆ δὲ καὶ<sup>7</sup> ὅσα πρὸς τὰς τομὰς ἀσθενῆ, καθά-  
περ ἄπιος καὶ μηλέα καὶ εἴ τι ἄλλο ξηρὸν καὶ  
λεπτόφλοιον,<sup>8</sup> καὶ γὰρ ταῦτα πονεῖ· διὸ τὰ τοι-  
αῦτα<sup>9</sup> τούτων ἢ ταῖς χερσὶν ἀφαιρεῖν, ὥσπερ  
ἐλέχθη τε καὶ<sup>10</sup> κελεύουσιν, ἢ τοῖς σιδηροῖς<sup>11</sup> ὡς  
ἐλαφρότατα· κίνδυνος γὰρ ἅμα τῷ πόνῳ διὰ τὴν  
ἐλκωσιν. ὥσπερ γὰρ καὶ τῶν ῥιζῶν ἐν τῇ σκαπά-  
νῃ τιτρωσκομένων χεῖρω γίνεται, πολλάκις δὲ καὶ

<sup>1</sup> U<sup>ac</sup> u : πλείον U<sup>c</sup>. <sup>2</sup> Schneider : δεῖ U.

<sup>3</sup> U : γενομένης Wimmer.

<sup>4</sup> aP : τι U. <sup>5</sup> aP.

<sup>6</sup> Schneider. <sup>7</sup> δὲ καὶ U : δ' ἐλάττωνος Wimmer.

<sup>8</sup> λεπτόφλοιον < . . . > Schneider. <sup>9</sup> U : αὐα Schneider.

<sup>10</sup> [τε καὶ] Schneider : τινὲς Wimmer.

<sup>11</sup> u : σιδηροῖς U.

it suffers from the cold weather and is even killed.

So this is a special case applying to trees that are weak and of open texture.

The amount removed is not the same for all trees, 7.11  
but greater for those that require it more, and rapid  
sprouters require that the removal should have  
been extensive, as is held to be the case with the  
olive, pomegranate and myrtle; for the fewer parts  
one has left in these the better the tree sprouts and  
bears.<sup>1</sup> The reason for this is that the trees have  
crowded shoots that are thin and quickly wither  
(which is why of all trees they bear the closest  
resemblance to undershrubs).

We must also prune trees that are too weak to 7.12  
take cutting well, as pear, apple and other dry trees  
with thin bark (for these too<sup>2</sup> suffer). So one must  
remove such parts from them either with the bare  
hands (as we said<sup>3</sup> and as experts advise) or, if we  
use iron tools, we must cut as gently as possible,  
since not only is hardship involved, but danger too  
from the wounds. For just as trees deteriorate and  
often even get diseases and wither away when the

<sup>1</sup> Cf. HP 2 7. 2: "Androtion says that the trees requiring the greatest amount of pruning are the myrtle and olive, for the fewer parts you leave, the better these will sprout and the more abundant will be the fruit they bear"; HP 2 7. 3: "Androtion says . . . that olive, myrtle and pomegranate . . . require the most pruning . . ."

<sup>2</sup> Like the fig: cf. CP 3 7. 10. <sup>3</sup> CP 3 2. 2.

νοσεῖ καὶ ἀφαναίνεται, τὸν αὐτὸν τρόπον οἶεσθαι  
 χρῆ καὶ ἀπὸ τῶν ἄνωθεν ἐν τοῖς μὴ δυναμένοις  
 φέρειν.

καὶ περὶ μὲν καθάρσεως ἀρκείτω τὰ εἰρημένα.

8.1 ῥιζοτομεῖται δὲ μετὰ τὴν φυτείαν καὶ ὅταν ᾗ  
 νέα πάνθ' ὡς εἰπεῖν, ὅπως τε κατὰ βάρους ὠθών-  
 ται καὶ πλείω λαμβάνωσιν ἀξήσιν, μάλιστα δ'  
 ὠν<sup>1</sup> ἐπιπολῆς αἱ ῥίζαι, καθάπερ ἐλάα καὶ ἄμπε-  
 λος · ὅταν δὲ πρεσβύτερα γένηται, τὰς μὲν ἐπε-  
 τείους καὶ ὅλως τὰς ἐπιπολῆς ἀφαιρετέον, ὅπως  
 αἱ κάτω πλείους καὶ ἰσχυρότεραι γίνωνται, φθεί-  
 ρουσι γὰρ ἐκεῖνας αὐταὶ καὶ ἐμποδίζουσιν, αὐταὶ<sup>2</sup>  
 δ' οὐ δύνανται παρέχειν τροφήν, ἀλλὰ καὶ πονοῦσι  
 καὶ ὑπὸ τοῦ ἡλίου καὶ ὑπὸ τοῦ ψύχους · ἀφαιρετέον  
 δὲ καὶ τὰς αὔας, προσηρητημένοι γὰρ καὶ ἄλλως  
 λυμαίνονται καὶ σκώληκας ἐμποιοῦσι τοῖς δέν-  
 δροις.

8.2 τὰς δὲ ἄλλας οὐ κινητέον · οὐδὲ γὰρ τὴν δια-  
 κάθαρσιν ἔστιν ὡσπερ τῶν ἄνω ποιείσθαι, καὶ γὰρ  
 τὸ γυμνοῦν ἐπὶ πλεον χαλεπὸν, καὶ ὅλως οὐκ εὐ-  
 σημον ὅθεν ἀφαιρετέον · ἅμα δὲ καὶ ὀποθενοῦν<sup>3</sup>

<sup>1</sup> u : ὡς U.

<sup>2</sup> Wimmer : αὐτοῖς U.

roots are wounded in spading, in the same way we  
 must suppose that ill effects arise from what is done  
 to the parts above ground in trees that are unable to  
 bear it.

Let this discussion suffice for pruning.

*The Mature Tree: Root-Pruning*

After planting and when they are young practi- 8.1  
 cally all trees are root-pruned, to make the roots  
 thrust deep and grow larger, especially trees with  
 shallow roots, like the olive and vine. When they  
 get older we should remove the roots produced dur-  
 ing the year and indeed all roots at the surface, so  
 that the lower roots may increase in number and  
 vigour, since the surface roots destroy and interfere  
 with these, but cannot supply food themselves, and  
 suffer instead from the sun and the cold. We must  
 also remove the withered roots, since when they  
 remain they hurt the trees in various other ways  
 and give them worms.

But the other roots should not be disturbed. 8.2  
 Indeed one cannot prune them as one does the parts  
 above, for to lay them bare to any extent is difficult;  
 and in any case it is not easy to tell at what point to  
 prune. Then too, no matter from what point a root

<sup>3</sup> Schneider : πῶθεν οὖν U.

φυομένη, μόνον δὲ ἰσχύουσα, τὴν τροφήν ἀποδώσει, κάλλιον δ' ἔαν πανταχόθεν · τὸ δὲ δὴ μῆκος καὶ πλάτος, ὅσω<sup>1</sup> ἂν ᾗ πλέον, ὠφελιμώτερον, ὥστε τὰ πρὸς τὴν βλάστησιν καὶ τὴν εὐτροφίαν μόνον δεῖ παρασκευάζειν.

8.3 περὶ δὲ ἀρδεύσεως καὶ ὑδάτων σχεδὸν εἴρηται πρότερον, ὅσα γὰρ ἐν τοῖς οὐρανίοις ὠφέλιμα κατὰ ποιᾶς<sup>2</sup> ὥρας ἢ<sup>3</sup> ἔτους, ἢ νύκτωρ ἢ μεθ' ἡμέραν, δῆλον ὅτι καὶ ἐν τοῖς ἐπιρρύτοις καὶ ὀχετευομένοις ὁμοίως ἔσται. τοῦ δὲ θέρους εὐλόγως μάλιστα χρῶνται, διὰ τὴν σπάνιν τῶν ἐκ Διός, καὶ ἅμα πρὸς τὴν ἐκτροφὴν τῶν καρπῶν ἀναγκαῖον · οἱ<sup>4</sup> δὲ καὶ οἴονται τότε μάλιστα δεῖσθαι, πλείστης ἀφαιρέσεως καὶ κυριωτάτης γινομένης.

8.4 ἰσχυρὸν δ', ὥσπερ ἐν τοῖς ἄλλοις, καὶ ἐν τούτοις τὸ ἔθος, οἷον γὰρ φύσις γίνεται · διὸ καὶ τὰ ἐν τοῖς ξηροῖς καὶ ἀνύδροις οὐθὲν ζητεῖ πλὴν τὸ ἀναγκαῖον, καὶ χεῖρω γίνεται βρεχόμενα, καθάπερ τὰ

<sup>1</sup> Schneider: ὅσων U: ὅσον u.

<sup>2</sup> u: ποιᾶς UN aP.

<sup>3</sup> U (season either of the year or of the day): τοῦ Schneider.

<sup>4</sup> aP: εἰ UN.

comes, so long as it is vigorous it will supply its quota of food, and the roots will do this better if they grow from all sides of the tree. As for length and lateral extent, the greater the better. All we need to do then is to see that these roots come out and are well fed.

### Watering

What is to be said about watering and the kinds 8.3 of water has to all intents been said before,<sup>1</sup> since all the benefits from rain that come from its falling at one season or the other of the year or in the dark or light hours of the day will, it is evident, be equally present in water from streams and irrigation ditches. It is reasonable that growers resort to watering chiefly in summer because of the scarcity of rain at the very time when water is indispensable for bringing the fruit to maturity. Some authorities 8.4 moreover believe that watering is then most needed by the trees because they are undergoing the greatest and most important loss of their fluid.

Here as elsewhere the force of habit is great, for 8.4 it turns (as it were) into nature.<sup>2</sup> This is why trees in dry and waterless country do not seek water beyond the indispensable minimum and deteriorate on being watered, just as trees do that are accus-

<sup>1</sup> CP 2 2. 1-4.

<sup>2</sup> Cf. CP 2 5. 5 with note c; CP 3 3. 7.

εἰωθότα μὴ<sup>1</sup> βρέχεσθαι.<sup>2</sup> καὶ κίνδυνος δ' ἔαν<sup>3</sup> μὴ  
 συνεχῶς ἀποδιδῶ, βρέχειν<sup>4</sup> ἀρξάμενος·<sup>5</sup> ἐκείνην  
 τε γὰρ ἀφαιρεῖται τὴν ἰσχὺν καὶ τὴν τροφήν, καὶ  
 ἑτέραν οὐ διδούς, ἀμφοτέρων πλείω διαμαρτάνει,  
 ὥστε πολλάκις ὑπὸ τῶν καυμάτων ἀυαίνεται.  
 σχεδὸν δὲ οἱ καρποὶ χεῖρους τῶν γε πλείστον<sup>6</sup> δε-  
 χομένων· ἔαν δὲ συμμέτρως, ἅμα<sup>7</sup> πλείονες<sup>8</sup> καὶ  
 καλοὶ<sup>9</sup> μᾶλλον.<sup>10</sup>

- 9.1 περὶ δὲ κοπρίσεως ἀκολούθως δηλον ὅτι τῇ δια-  
 καθάρσει<sup>11</sup> κατὰ<sup>12</sup> τοὺς χρόνους, ἄλλως τε εἰ καὶ  
 μετ' ἐκείνην εὐθὺς κοπρίζειν δεῖ· ἅμα δὲ καὶ οὐδ'<sup>3</sup>  
 ἂν δύναιτο δέχεσθαι συνεχῶς, ἀλλ' ἀφαναίνονται  
 διὰ τὴν θερμότητα. τὸ γὰρ τὴν ψιλὴν κοπρίζειν  
 οὐχ ὅμοιον· ἐν ἐκείνῃ μὲν γὰρ εἰς πολλὰ μερίζεται  
 καὶ ἐξαναλίσκεται τὰ δεόμενα<sup>13</sup> τῶν σπερμάτων,  
 ἐνταῦθα δὲ εἰς αὐτὰς τὰς ρίζας δύεται, καὶ οὐ

<sup>1</sup> U<sup>c</sup>: U<sup>t</sup> omits. <sup>2</sup> U<sup>cc</sup> from βρεχεσθαι (?).

<sup>3</sup> N: δὲ ἂν U<sup>c</sup> (δὲ from δ'ε) aP.

<sup>4</sup> after βρέχειν two letters erased U<sup>c</sup>.

<sup>5</sup> u<sup>ac</sup> (ἀρξάμενος U): ἀρξάμενοις u<sup>c</sup>.

<sup>6</sup> u: πλείστον UN aP. <sup>7</sup> ego: ἅμα U.

<sup>8</sup> u: πλείονι U: πλείον NP: καὶ πλείον a.

<sup>9</sup> ego: πολυ U: πολλοὶ u: πολλῶ NP aP.

<sup>10</sup> U: καλλίους Wimmer.

<sup>11</sup> Schneider: τῇ ἰδίᾳ καθάρσει U.

tomed to not getting watered. And it is actually  
 risky to start watering and not keep it up, since you  
 deprive them of their earlier strength and way of  
 feeding and then by withholding any other make a  
 greater mistake than either the steady waterer or  
 steady non-waterer, so that the hot weather often  
 withers the trees. One may say that in the trees,  
 those at least that get the greatest amount of water,  
 the fruit deteriorates<sup>1</sup>; whereas if it is received in  
 the right amount the fruit is more abundant and  
 tends to be finer.

### Manuring

As for manuring, it should correspond to pruning 9.1  
 in the time of application,<sup>2</sup> especially as we are told  
 to manure immediately after pruning.<sup>3</sup> Then too  
 trees could not stand constant manuring, but dry  
 out from the heat. For manuring field crops is not a  
 similar case: in the field the manure is divided up  
 into many portions and used up by the grain seeds  
 that need it, whereas with trees it sinks to the roots,

<sup>1</sup> Cf. HP 2 7. 1: "When watered the fig sprouts faster but  
 its fruit deteriorates . . ."

<sup>2</sup> Cf. CP 3 7. 10.

<sup>3</sup> Cf. CP 3 7. 8.

<sup>12</sup> ego (λεκτέον Schneider): μετὰ U.

<sup>13</sup> ego (διαδιδομένη Schneider: τὰ δεχόμενα Wimmer): τὰ δὲ  
 οὐ μόνον U.

9.2 δύναται πᾶν διαδιδόναι τοῖς καρποῖς, οὐχ ὁμοίως  
 εὐτροφον <ὄν><sup>1</sup> οὐδὲ πολύχουν, ὥστε πάλιν  
 ἄλλης καὶ ἄλλης ἐπιγινομένης, ὡς ἐκθερμαινόμε-  
 νον, ἀαίανεται. ἐπεὶ<sup>2</sup> καὶ ὁ σίτος, ἂν τις κατα-  
 κόρως χρῆται καὶ <μῆ><sup>3</sup> ἐπιγίνηται πλῆθος ὕδα-  
 τος · διὸ καὶ ταῖς ἐπομβρίοις<sup>4</sup> χρησιμώτερος ὁ γε  
 συνεχῆς καὶ πλείων κοπρισμός, ἐν δὲ ταῖς ἀρχμῶ-  
 δεσι καὶ λεπταῖς ὁ σύμμετρος. διὰ ταῦτα δὲ ἴσως  
 οὐδὲ ἡ δριμυτάτη τοῖς δένδροις ἀρμόττει. καίτοι  
 δόξειεν ἂν ἄτοπον εἶναι τὸ μὴ τοῖς <ἰσχυροτάτοις  
 τῆν><sup>5</sup> ἰσχυροτάτην · ἀλλ' ἐν τῷ προειρημένῳ τὸ  
 αἴτιον ληπτέον. ἐπεὶ<sup>6</sup> καὶ τοῖς λαχάνοις διὰ  
 τοῦθ' ἄρμόττει, <καὶ><sup>8</sup> διὰ τοῦτο<sup>9</sup> μεθ' ὑδρείας  
 ἢ χύλωσις καὶ ὄλως, ὅτι πολλῶ τῷ ὑγρῷ χρῶνται  
 καὶ καθ' ἡμέραν, καὶ αὐτὰ φύσει ὑγρά · φυλλοφο-  
 ρεῖν γὰρ ἐθέλουσιν, οὐ καρπογονεῖν αὐτά.  
 9.3 οὐ μὴν ἀλλ' ἐνίαις γε<sup>10</sup> χρῶνται καὶ πρὸς τὰ  
 δένδρα τῶν ἰσχυροτέρων, καὶ μάλιστα εἰς μαλακό-

<sup>1</sup> Wimmer. <sup>2</sup> u : ἐπι U.

<sup>3</sup> U : φυτῶν Gaza, Schneider.

<sup>4</sup> ego (ἐπόμβροις Schneider) : -ίαις U.

<sup>5</sup> Gaza, Schneider.

<sup>6</sup> U<sup>c</sup> from ἐπι.

<sup>7</sup> [δια τοῦθ'] Heinsius.

<sup>8</sup> ego.

<sup>9</sup> [δια τουτο] Schneider.

<sup>10</sup> Schneider : τὲ U.

and not every tree has the power to apportion it  
 among the fruiting parts, since a tree is not so good  
 a feeder or so prolific a producer as grain. So with  
 more and more manure accumulating, the tree  
 becomes over-heated and withers away. Indeed 9.2  
 cereals wither too if manuring is carried to an  
 extreme and not followed by heavy rain; and this is  
 why sustained and copious manuring is more useful  
 in rainy country, but moderate manuring in dry  
 country and thin soil. This is perhaps also the rea-  
 son why the most pungent manure does not agree  
 with trees.<sup>1</sup> Yet it might be thought strange that  
 the strongest manure should not agree with the  
 strongest of plants. But the explanation is to be  
 taken from what we said before.<sup>2</sup> Indeed the  
 strongest agrees with vegetables for this reason  
 (and this is why there is such a thing as the use with  
 them of liquid manure, and so manuring and water-  
 ing them at once): gardeners use plenty of water and  
 use it daily, and the plants are themselves by nature  
 fluid (since cultivators want leaves from them, not  
 fruit).<sup>3</sup>

Nevertheless some of the stronger manures are 9.3  
 also used with trees, chiefly to obtain softer stones

<sup>1</sup> Cf. CP 3 6. 2.

<sup>2</sup> CP 3 9. 1.

<sup>3</sup> Cf. HP 7 5. 1: "All vegetables except rue like water and manure ... Gardeners ... also use fresh human dung in making liquid manure."



τητα καὶ μεταβολὴν τῶν καρπῶν, οἶον ὑεῖα<sup>1</sup> πρὸς τὸ<sup>2</sup> γλυκαίνειν καὶ ἀπυρῆνους<sup>3</sup> ποιεῖν τὰς ῥόας, καὶ τὰς ἀμυγδαλᾶς ἐκ πικρῶν γλυκείας, καὶ ὡς παρὰ τοὺς μυρτίνους κελεύουσιν ἰσχυροτέραν ἔτι παραβάλλειν, οἶον τὴν βυρσοδεψικὴν, καὶ οὖρον παραχεῖν<sup>4</sup> ὅταν ἐκβλαστήσωσιν,<sup>5</sup> ὡς ἂν ἀπυρῆνων γινομένων · οἱ δὲ καὶ τῇ ἐλάᾳ συμφέρειν οἶονται<sup>6</sup> πρὸς εὐκαρπῖαν.

9.4 ἔοικεν δὲ τὸ ἐν τῇ ἀρχῇ μέγα διαφέρειν, εἴ γε καὶ τὰ τῶν σικύων σπέρματα γάλακτι βρεχόμενα καὶ μελικράτῳ γλυκυτέρους ποιεῖ. νομίσειε δ' ἂν τις ταῦτα καὶ ἐπὶ τῶν ἄλλων γίνεσθαι λαχάνων, ἀλλ' ἴσως τὸ δριμύ χρησιμώτερον. ἡ δὲ ῥίζα τῶν δένδρων ἀρχὴ τις οὖσα, καὶ τὰ περικάρπια συνεχόμενοι τὰ ἀφ' ἑαυτῆς. περὶ μὲν οὖν τούτων καὶ πρότερον εἴρηται.

τὴν δὲ χρησίμην αἰεὶ πρὸς τὰς δυνάμεις ἀποδοτέον, τῆς μὲν δριμυτέρας ἐλάττονα τῆς δὲ μαλακωτέρας πλείονα.

<sup>1</sup> Wimmer (*suillo* Gaza : τῇ ὑεῖα Scaliger) : τῇ U.

<sup>2</sup> N aP (το U) : τῶ u.

<sup>3</sup> Gaza : ἀπύρους U.

<sup>4</sup> U<sup>r</sup> : παρασχεῖν U<sup>ar</sup> N aP.

<sup>5</sup> N aP : ἐμβλαστήσωσιν U.

<sup>6</sup> u : οἶον τε U.

in the fruit and change the taste, as swine manure is used to make pomegranates sweet<sup>1</sup> and produce "stoneless" fruit, and to change almonds from bitter to sweet,<sup>2</sup> and with myrtles<sup>3</sup> we are told to use even stronger manure, such as tanner's, and pour urine round them when the shoots come out, since then it appears the fruit will have no stone. Some<sup>4</sup> think that strong manure also helps the olive to bear well.

It appears that what happens at the beginning 9.4 makes a great difference,<sup>5</sup> inasmuch as when cucumber seeds are soaked in milk<sup>6</sup> or hydromel<sup>7</sup> they make sweeter cucumbers (one would suppose that this would happen with the other vegetables as well, but perhaps pungency is here a more desirable character), and since the root is a kind of beginning of trees, it gives the pericarpia that come from it a quality similar to its own. But this has been discussed earlier.<sup>8</sup>

As for the manure that is useful, one must always apply it in amounts that vary with its differences of potency, less of the more pungent, more of the less.

<sup>1</sup> Cf. CP 2 14. 2 with note a. <sup>2</sup> Cf. CP 2 14. 2.

<sup>3</sup> In HP 2 7. 3 Androtrion is quoted as saying that olive, myrtle and pomegranate require the most pungent manure.

<sup>4</sup> No doubt Androtrion: see the preceding note.

<sup>5</sup> Cf. CP 3 2. 7. <sup>6</sup> Cf. CP 2 14. 3 with note a.

<sup>7</sup> Cf. CP 5 6. 12 (honey). <sup>8</sup> CP 2 14. 3.

9.5 δέει δὲ καὶ τὴν πρόσφορον ἐκάστοις τῶν δένδρων μὴ ἀγνοεῖν · οὐ γάρ, ὡσπερ ὕδωρ τὸ αὐτὸ πᾶσιν, οὕτω καὶ κόπρος, ἀλλ' ὡσπερ τὰ ἐδάφη πρὸς ἕκαστον οἰκεία, οὕτω καὶ ἡ κόπρος. ἐπεὶ καὶ κατὰ τὰς ἡλικίας τῶν δένδρων ἐστὶν τις διαφορὰ · διὸ καὶ φυτεύοντες ὑποβάλλουσιν εὐθὺς (ὡσπερ ἐλέχθη) τὴν τῶν λοφούρων, ὅτι κουφοτάτη, τὸ δ' ἀσθενὲς κουφοτάτης δέεται. τὸ δ' ὄλον ἐν ταῖς θεραπαίαις τῶν δένδρων ὅσα μὲν κοινὰ πᾶσιν ἐστίν, ταῦτα τῷ ποσῷ καὶ τῷ ποιῷ διοίσει καὶ τοῖς καιροῖς,<sup>1</sup> οἷον τομῇ διακάθαρσις<sup>2</sup> σκαπάνη κόπρισις. ταῖς δ' οὖν ἀμπέλοις ἢ διὰ τεττάρων ἢ πλειόνων ἐτῶν παραβάλλουσι<sup>3</sup> κόπρον, οὐ γὰρ δύνανται φέρειν δι' ἐλαττόνων, οὐδ' ἐστὶ βοήθεια, καθάπερ τοῖς δένδροις, ἢ ὕδρευσις, ἀλλ' ἐκκαίονται. διὸ (καθάπερ ἐλέχθη) ταῖς ἐπομβρίοις<sup>4</sup> χώραις συμφέρει<sup>5</sup> μᾶλλον · ἄλλως<sup>6</sup> γὰρ κίνδυνος, μὴ ἐπιγυνομένων τῶν ἐκ Διός.

<sup>1</sup> Schneider: καρπῶς U.

<sup>2</sup> u: διακάθαρσις U.

<sup>3</sup> U aP<sup>c</sup>: περιβάλλουσι u: παρεβάλλουσι N P<sup>ac</sup> (?).

<sup>4</sup> Heinsius (ταῖς ἐπόμβροις Schneider): ταῖς ἐπομβρίαις U  
N aP: τὰς ἐπομβρίας u.

<sup>5</sup> v: -ειν UN aP.

<sup>6</sup> u a: ἄλλος UNP.

We must also not be ignorant of what manure is suited to each tree, since it does not hold of manure, as of water, that the same is good for all, but rather, just as soils vary in their appropriateness to each tree, so too does manure.<sup>1</sup> Indeed even the different ages of a tree make a certain difference in the manure to be used; this is why at the very beginning, when the tree is planted, growers put in pack-animal manure (as we said)<sup>2</sup> because it is lightest, and the weak plant requires the lightest. And in general in the care of trees the measures used for all will differ for each in quantity and quality and times, as cutting back, pruning, spading and manuring.<sup>3</sup> With the vine at all events manure is applied every three years or at even greater intervals, since the vine cannot stand more frequent manuring, and watering is here no remedy, as it is with trees, but the vine is burnt and dies out. This is why manuring (as we said)<sup>4</sup> is better for rainy countries; otherwise there is risk if no rain follows.

<sup>1</sup> Referred to at CP 5 15. 3. Cf. HP 2 7. 4: "Manure does not suit all trees alike nor does the same suit all; for some require it to be pungent, some require it to be less so, and some require it to be quite light." For the variation of soils cf. CP 2 3. 4-5. <sup>2</sup> CP 3 6. 1-2.

<sup>3</sup> Cf. HP 2 7. 1: "In tillage and tendance some measures are common to all trees, some peculiar to a kind. Common to all are spading, watering and manuring, and further pruning and the removal of deadwood."

<sup>4</sup> CP 3 9. 2.

10.1 σκαπάνη δὲ πᾶσι συμφέρει, τὰ τε γὰρ ἐμποδί-  
ζοντα καὶ τὰ παραιρούμενα <τὰς><sup>1</sup> τροφᾶς ἐξαι-  
ρεῖ καὶ αὐτὴν τὴν γῆν ἐνικμοτέραν ποιεῖ καὶ κου-  
φοτέραν· ἔτι δ' ὁ ἀὴρ ἐγκαταμιγνύμενος (ἀνάγκη  
γὰρ ἐγκαταμίγνυσθαι κινουμένης<sup>2</sup>) ἰκμάδα τέ  
τινα δίδωσιν καὶ παρέχει τροφήν. διὸ καὶ τὴν  
αὐχμῶδη καὶ ἄνυδρον σκάπτειν δεῖ<sup>3</sup> καὶ μετα-  
βάλλειν πολλάκις, ὥσπερ καὶ πρότερον εἴρηται·  
συμφέρει δ' ἡ σκαπάνη καὶ τοῖς ἐλώδεσι καὶ τοῖς  
ἐφύδροις. καίτοι δόξειεν ἂν ἄτοπον εἰ τοῖς ἐναν-  
τίοις· ἀλλ' οὐδὲν ἄτοπον, τὴν μὲν γὰρ ξηραίνει,  
τὴν δ' ὑγραίνει, δεῖται δὲ ἑκάτερα<sup>4</sup> τοῦ ἐναντίου.

10.2 τροφῆς δὲ πλείονος καὶ βελτίονος γινομένης  
αὐτὸ τὸ δένδρον εὐθενεῖ καὶ οἱ καρποὶ καλλίους·  
ποιεῖ γὰρ καὶ τοὺς πυρῆνας ἐλάττους, καὶ ὄσων<sup>5</sup>  
ξυλώδη καὶ δερματικά τὰ ἐκτός (οἷον ἀμυγδαλῆς  
καρύας Εὐβοϊκῆς), τούτων λεπτότερα ταῦτα, τὰ  
δ' ἐντός<sup>6</sup> μείζω· τὸ γὰρ ὄλον ἢ εὐτροφία διωγραί-

<sup>1</sup> u : U omits between 195<sup>r</sup> and 195<sup>v</sup>.

<sup>2</sup> U : κινούμενος u N : κινούμενον aP. <sup>3</sup> u : δὴ U.

<sup>4</sup> u : ἑκάτερα U. <sup>5</sup> Gaza, Wimmer : ὄσα U.

<sup>6</sup> Gaza, Itali : ἐν τοῖς U.

<sup>1</sup> Cf. HP 2 7. 5: "The authorities hold spading good for all trees, as hoeing for the smaller plants, since they then get better fed."

*Trees: Spading*

Spading is good for all,<sup>1</sup> since it removes the 10.1  
blockers and interceptors of the supply of food and  
makes the earth itself damper and lighter; again,  
air gets mixed in with the earth, as it must when the  
earth is turned up, and imparts a certain moisture  
and so provides food. This is why one must spade  
even dry and waterless ground and turn it up fre-  
quently (as we said before)<sup>2</sup>; but spading is also  
good for land that is marshy and has surface water.  
Yet it might seem strange that it is good for opposite  
kinds of land. But there is nothing strange here,  
since it dries the wet ground and wets the dry, and  
each requires its opposite.

With more and better food the tree enjoys well- 10.2  
being itself and its fruit is finer, for such food  
reduces the size of the stones and where the outside  
is woody or leathery (as in almond and sweet chest-  
nut) makes this thinner and the inside larger. For  
good feeding in general soaks with fluid and makes

<sup>2</sup> HP 2 7. 5: "Dust too is considered to be nutritious to certain plants and to make them flourish, as it does to the grape-cluster, and growers therefore dust it frequently; some also hoe the fig-trees where this is needed. At Megara they also hoe and cover with dust the cucumbers and gourds when the Etesians winds have begun to blow, and by this means render them sweeter and tenderer without having to water them."

νει καὶ τὸ σαρκῶδες αὖξει, διὰ ταῦτα καὶ κατὰ λόγον ἀμφοῖν τὸ συμβαῖνον. ποιεῖ δὲ καὶ εὐχυλότερα καὶ μείζω καὶ ἡδίω μετὰ τῆς ἄλλης θεραπείας ὅτι καὶ τροφή<sup>1</sup> πλείων καὶ πέψις γίνεται μᾶλλον. ἐπὶ δὲ τοῦ κράνου (περὶ τούτου γὰρ μάλιστα ἀντιλέγεται) δῆλον <ὡς> (εἴπερ [ὡς] ἀληθές)<sup>2</sup> πλείον<sup>3</sup> ἂν λαμβάνοι<sup>4</sup> τῆς συμμέτρου τροφῆς, ὥσθ' ἦττον ποιεῖν εὐχυλον, ὅπερ καὶ ἐπ' ἄλλων συμβαίνει περικαρπίων ἐν ταῖς πιείραις λίαν χώρας καὶ εὐτρόφοις.

- 10.3 ἡ μὲν οὖν σκαπάνη πάντα ταῦτα συναπεργάζεται, καὶ τὸ ὄλον ὠφελεῖ, διὰ τὸ ἐξαιρεῖν τὰ παραιρούμενα · ἐπεὶ καὶ τὰ παραφυτευόμενα καὶ τὰ παρασπειρόμενα διὰ τοῦτο βλάπτει πάντα, τὰ δὲ καὶ ὄλως ἀναιρεῖ, πλὴν ὅσα γ' ἐν φαρμάκου μέρει · λέγω δ' ὡς οἱ τὰς κριθᾶς ἐπισπείροντες τοῖς τῶν ἀμπέλων φυτοῖς, ἢ εἴ τι ἄλλο ξηρόν, ὅπως

<sup>1</sup> u aP: -φῆς UN.

<sup>2</sup> ego (εἴπερ ὡς ἀληθῶς Schneider): εἴπερ ὡς ἀληθές U.

<sup>3</sup> u: πλείων U.

<sup>4</sup> ego: ἀναλαμβάνοι U (-ει N aP).

<sup>1</sup> Cf. HP 3 2. 1: "... and they (sc. wild trees) promise more fruit (sc. than cultivated ones) but concoct it less, if

the fleshy part grow, and on this account what happens to both parts is reasonable. Spading also (when joined to the other kinds of care) makes the fruit juicier, larger and better tasting because not only is there more food but also better concoction. In the case of the cornel cherry (for it is here that the point is most disputed)<sup>1</sup> it is clear (if the fact is true) that the tree must get more than the right amount of food, so that cultivation makes the fruit less juicy; and this also happens with other pericarpia in countries that are fat and nutritious to excess.<sup>2</sup>

*An Excursus on Good and Bad Neighbours*

So spading helps to bring all this about and is generally beneficial because it removes whatever intercepts the food. Indeed plants also that are planted or sown as neighbours are all of them injurious for this reason, some actually destroying a tree, except where they serve as an antidote. I mean the cases where growers sow barley (or some other dry

not all of them, at least the wild varieties when compared with the cultivated ones of the same tree ... For all such wild varieties do so, with rare exceptions, as with cornel cherries and sorb apples, since they say that here the wild fruit is mellow and sweeter than the cultivated ..."

<sup>2</sup> Cf. CP 2 4. 3.

- 10.4 τῆς ὑγρότητος ἀφαιρεθῆ, καὶ ὡς ταῖς ραφανίσι<sup>1</sup>  
 τοὺς ὀρόβους πρὸς τὸ<sup>2</sup> μὴ κατεσθίεσθαι,<sup>3</sup> καὶ εἰ δὴ  
 τι ἄλλο τοιοῦτον· καὶ ὅσα προσφιλῆ τυγχάνει,  
 καθάπερ δοκεῖ τῶν δένδρων ἐλάα καὶ μύρρινος·  
 τὰς τε γὰρ ῥίζας συμπλέκεσθαι φησι τῶν δένδρων  
 Ἀνδροτίων, καὶ τὰς τοῦ μυρρίνου ῥάβδους φύεσθαι  
 διὰ τῶν ἀκρεμόνων τῆς ἐλάας, τὸν τε καρπὸν,  
 ἔχοντα τοῦ ἡλίου καὶ τῶν ἀνέμων προβολὴν τὴν  
 ἐλάαν, ἀπαλὸν<sup>4</sup> γίνεσθαι καὶ γλυκύν, ἐλάττω<sup>5</sup> δὲ  
 τοῦ ἐν τοῖς προσείλοις. ἄλλο δ' οὐδὲν ἐθέλει φυ-  
 10.5 τεύεσθαι πρὸς ταῖς ἐλαίαις. εὐμενὲς δὲ καὶ ἡ πεύ-  
 κη δοκεῖ πᾶσιν εἶναι, διὰ τε τὸ μονόριζος εἶναι  
 καὶ βαθύριζος· ὑποφυτεύεται γὰρ ὑπ' αὐτῆ καὶ  
 μύρρινος καὶ δάφνη καὶ ἕτερα πλείω, καὶ αὐξήσω  
 λαμβάνει. καὶ φανερόν ὅτι μᾶλλον παροχλοῦσιν αἱ  
 ῥίζαι τῆς σκιᾶς·<sup>6</sup> σκιὰν γὰρ πολλὴν ποιεῖ [ἡ πευ-  
 κη].<sup>7</sup> κατὰ λόγον δὲ καὶ τᾶλλα τὰ ὀλιγόριζα καὶ  
 10.6 βαθύριζα, καὶ πρὸς τοῖς<sup>8</sup> ὦν<sup>9</sup> μὴ κατὰ τὴν αὐτὴν  
 ὥραν ἢ βλάστησις καὶ καρποτοκία.<sup>10</sup> τροφήν τε  
 γὰρ ἐλαχίστην παραιρεῖται ταῦτα, καὶ παραλλάτ-

<sup>1</sup> Schneider: ραφάνοις U.    <sup>2</sup> U aP: τῶ u N.

<sup>3</sup> Heinsius: κατασθίεσθαι U.

<sup>4</sup> u P: ἀπαλὸν U (ἀ- N a).

<sup>5</sup> Schneider after Gaza: ἐλαττων U.

- plant) among vine slips to reduce their wetness,<sup>1</sup> or  
 sow bitter vetch among radishes to save them from  
 being devoured,<sup>2</sup> and the like. Another exception 10.4  
 are the companionable plants, as olive and myrtle  
 are held to be among trees. So Androtion says that  
 they entwine their roots together and that the canes  
 of the myrtle grow between the branches of the  
 olive, and its fruit, screened by the olive from sun  
 and wind, becomes tender and sweet, although  
 there is less of it than in the trees that stand in the  
 sun. But nothing else cares to be planted next to  
 the olive. The pine too is held to be friendly to all 10.5  
 because it has a single root and the root goes deep.  
 So myrtle, bay and a number of other trees are  
 planted under it and grow in size. And it is clear  
 that roots interfere more than shade, since the pine  
 casts a large shadow. Other trees are correspond-  
 ingly friendly as their roots are fewer and deeper;  
 and so moreover are trees with different times of  
 sprouting and fruiting. For all these intercept the 10.6  
 smallest amount of food and their different season

<sup>1</sup> Cf. CP 218.1 and note a.

<sup>2</sup> Cf. CP 218.1 and note b.

<sup>6</sup> Gaza (*quam umbram*), Itali: ταῖς σκίλλαις U.

<sup>7</sup> ego.

<sup>8</sup> U: τούτοις Wimmer.

<sup>9</sup> Heinsius: ὦ U.

<sup>10</sup> U<sup>r</sup> N aP: -ων U<sup>ar</sup>.

τοντες οί χρόνοι τῇ τε βλαστήσει καὶ τῇ τελειώσει τῶν καρπῶν ἦττον λυποῦσι. χαλεπώτατα δὲ καὶ ἀμπέλω καὶ τοῖς ἄλλοις συκῇ καὶ ἔλαα· καὶ γὰρ τροφήν πολλήν ἀμφότερα λαμβάνει, καὶ σκιὰν παρέχει πλείστην· χαλεπὸν δὲ καὶ ἡ ἀμυγδαλή, διὰ τε τὴν ἰσχὺν καὶ διὰ τὴν πολυρριζίαν. καίτοι φυτεύουσι τινας ἐν ταῖς ἀμπέλοις ὡς ἀσυνέστατον, τροφῆς τε ἐλαφρᾶς δεομένην καὶ ἅμα διὰ τὸ πρῶτ-καρπον καὶ μὴ πολὺσκιον ἤκιστα ἐνοχλοῦσαν· οὐ μὴν ὀρθῶς γε<sup>1</sup> λέγουσιν. οὐ γὰρ οὕτως ἡ σκιά λυπεῖ (καθάπερ εἴρηται) καὶ τὸ ὄψιον ὡς ἡ ἰσχὺς τῶν ριζῶν· ἀφαιρεῖται γὰρ τὴν τροφήν σύνταρρον γινόμενον.<sup>2</sup> ἀλλὰ κουφότατα<sup>3</sup> καὶ ἀσυνέστατα<sup>4</sup> πάντων ἐστὶ μηλέα καὶ ῥόα· καὶ γὰρ οὐ πολὺρριζα, καὶ τροφῆς ἐλαφρᾶς δεῖται, καὶ ταχὺ γηράσκουσιν, ὥστε μὴ πολὺν χρόνον ἐνοχλεῖν. ἀπλῶς δὲ πάντ'<sup>5</sup> ἐπισωῆ καὶ βλάπτει τῇ παραφύσει.

10.8 καίτοι συμβαίνειν<sup>6</sup> γ' ἐνίοτε, τῶν παραφύτων<sup>7</sup> παραιρουμένου θατέρου, καὶ θάτερον ἀναίνεσθαι· τοῦτο γὰρ ἤδη τιμὴ συνέπεσεν, ἅμα πεφυκειῶν ἀναδενδράδων καὶ συκῶν, ὡς αἱ συκαὶ παρηρέθη-

<sup>1</sup> aP: τε UN. <sup>2</sup> U: συντάρρων γινόμενων Schneider.

<sup>3</sup> Gaza (facillime [-ae G<sup>ur</sup>]): κουφότατον U. <sup>4</sup> U: -ον u.

<sup>5</sup> ego (tamen omnia Gaza, δ' ἅπαντα Itali): δ' πάντων U: δ' ἀπάντων N aP.

makes them less harmful both to sprouting and to maturing the fruit. The worst neighbours not only for the vine but for the rest are fig and olive, since they both take a great amount of food and cast a very large shade. The almond too is a bad neighbour both because of its strength and because of its many roots. And yet some growers plant it among the vines as being very harmless, needing but light food and then too interfering least of all, since it fruits early and does not cast a great shade. But their reasoning is mistaken. For it is not shade (as we said)<sup>1</sup> and fruiting late that does the harm so much as the strength of the roots, since the tree intercepts the food when its roots become matted with those of the other. The easiest and most harmless neighbours of all are rather the apple and pomegranate, since they are not many-rooted, need but light food, and rapidly age (and so are not a burden for long). But absolutely speaking all trees are harmful and do injury by growing near.

Yet we hear that it sometimes occurs that when one of two neighbours is removed the other withers. For this once happened to a man who had fig-trees growing with his climbing grapes after he took away

<sup>1</sup> CP 3 10. 5.

<sup>6</sup> U<sup>ar</sup>: -ει U<sup>r</sup> N aP.

<sup>7</sup> Schneider: παραφυτῶν U.

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σαν. αἴτιον δ' ὅτι μεγάλην ἐποίησεν μεταβολήν, συνηυξημένων ἤδη καὶ συνεκτεθραμμένων, ὥσπερ γὰρ μία φύσις ἐγεγένητο διὰ τὸν χρόνον· εἰ δὲ νέων<sup>1</sup> ὄντων εὐθύς παρείλεν, οὐχ ὅτι ἂν ἀφ- ἠύανεν,<sup>2</sup> ἀλλὰ καὶ εὐαξεστέρας καὶ καλλίους ἐποίησεν.

καὶ περὶ μὲν τῶν ἄλλων δένδρων ἐκ τούτων θεωρείσθω.

11.1 περὶ δὲ ἀμπέλων ὅσα μὴ κοινὰ καὶ ἐν τοῖς πρό-  
τερον εἴρηται λεκτέον ὁμοίως.

ἐπεὶ δὲ καὶ τὰ γένη διαφέρει, καὶ αἱ χῶραι, τοῦτο χρὴ πειρᾶσθαι διαιρεῖν· τὰ ποῖα, καὶ<sup>3</sup> ταῖς ποίαις, οἰκεῖα· κατὰ φύσιν μὲν γὰρ εἴαν φυτεῦ-  
γαι, ἀγαθὰ, παρὰ φύσιν δέ, ἄκαρπα γίνεται. τὸ δὲ

<sup>1</sup> ego (*nam si cum novellae ... essent* Gaza : εἰ μὲν νέων Itali : ἐπεὶ εἴ γε νέων Schneider : ἐπεὶ νέων Wimmer) : εἰνε-  
νεων U.

<sup>2</sup> ego (ἂν ἀφάυανεν Wimmer) : ἀναφάνεν U.

<sup>3</sup> [καὶ] Gaza, Scaliger.

<sup>1</sup> For the whole subject cf. G. Senn, "Der Rebbau im antiken Griechenland," *Gesnerus*, vol. i (1944), pp. 77-91.

<sup>2</sup> Cf. *HP* 2 5. 7: "For when vines are planted naturally

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the trees. The reason is that he made too great a change, the vines having by then grown to the tops of the trees and been brought up in their society, for a single nature (as it were) had come about from the long time spent together. But if he had removed the trees when the vines were still young, far from making them wither, he would have made them faster-growing and finer vines.

The other trees are to be studied in the light of this discussion.

### *The Vine: Special Measures*

As for the vine, we must similarly discuss meas- 11.1  
ures not common to the rest and not treated ear-  
lier.<sup>1</sup>

### *Matching the Kinds of Vine with the Kinds of Country*

Since not only the varieties of vine but also the countries differ, we must endeavour to distinguish what varieties are appropriate to what countries, since if one plants them in the natural way they turn out well, whereas if one plants them unnatur- ally they fail to bear.<sup>2</sup> Authorities find what is

they are said to turn out well, but when planted unnatur- ally they fail to bear."

κατὰ φύσιν σχεδὸν καθ' ὁμοιότητά τινα λαμβάνουσι (ὡσπερ εἶπομεν), ἐν μὲν τῇ στερεᾷ καὶ ἀνυμῶδει τὰ στερεά, καὶ τῶν λευκῶν καὶ τῶν μελάνων<sup>1</sup> (ὡς δ' ἐπὶ τὸ πᾶν τὰ μέλανα στερεώτερα), ἐν δὲ τῇ ἐπόμβρῳ τὰ μανά. διάδηλα δὲ τὰ πυκνὰ καὶ τὰ μανά ταῖς μήτραις, ἃς δεῖ<sup>2</sup> θεωρεῖν ἀποτέμνοντας τὰ νέα τῶν κλημάτων· ἔχει γὰρ ἡ μὲν μανὴ πολλήν, τὸ δὲ ξύλον λεπτόν, ἡ δὲ πυκνὴ μικράν, τὸ δὲ ξύλον παχύ.

11.2 ὅτι δὲ ἑκάτερον ἑκατέρα τῇ χώρᾳ συμφέρει, διὰ τῶνδε φανερόν· ὦν μὲν γὰρ ἡ μήτρα μεγάλη, τούτων καὶ πολλοὶ πόροι<sup>3</sup> καὶ<sup>4</sup> εὐρέες, ὦν δὲ μικρά, στενοὶ τε καὶ ὀλίγοι, διὸ καὶ αὐτὰ στερεά·<sup>5</sup> τροφῆς <δ'><sup>6</sup> ἐλάττονος δεῖται τὰ πυκνά, καὶ ἅμα διατηρεῖν δύναται τὸ ὑγρὸν εἰς τὸ θέρος· ὁ γὰρ ἥλιος οὐχ ὁμοίως ἐξάγει διὰ τὴν πυκνότητα, διὸ μικρᾶς τῆς ἀφαιρέσεως γινομένης ἐπαρκοῦσιν αἱ ῥίζαι τὸ σύμμετρον εἰς τὸν καρπὸν· αἱ δὲ μανά, πολλῆς μὲν τῆς ἀφαιρέσεως οὐσης, ὀλίγης δὲ τῆς ἐπιρροῆς διὰ τὴν ξηρότητα τῆς γῆς, τὰ τε

<sup>1</sup> u : μελανῶν U : μελαιῶν φυτεύοντες Schneider.

<sup>2</sup> u aP : δὴ U N.

<sup>3</sup> ego (οἱ πόροι <πολλοὶ> Wimmer : *meatus ampli multique* Gaza) : οἱ πόροι U.

natural (as we said)<sup>1</sup> by following a certain similarity (as it were): in firm and rainless country they plant the vines of solid texture (both of the white and dark varieties; but on the whole the dark are the more solid), in rainy country the vines of open texture. Close and open texture can be distinguished by the types of pith, which must be studied in cross sections taken from the younger branches: the open-textured vine has more pith than wood, the close-textured more wood than pith.

That each of the two types of vine thus distinguished goes with the type of country described is clear from the following: where the pith is large the passages are numerous and wide; where it is small they are narrow and few and the vines are therefore themselves solid. Close textured plants require less food and then too are able to retain their fluid for the summer, since the sun does not extract so much of it because of the closeness of their texture. Consequently, the loss being small, the roots supply the right amount for developing the fruit. The vines of open texture, on the other hand, the loss being great and the influx small (owing to the dryness of the

11.2

<sup>1</sup> CP 24. 7.

<sup>4</sup> [καὶ] u aP.

<sup>5</sup> αὐτὰ στερεά ego (Gaza omits : Schneider deletēs : διὰ τοῦ ἔαρος Wimmer) : αὐτὰ στερεᾶς U.

<sup>6</sup> ego.



11.3 κλήματα ἀσθενῆ καὶ τοὺς καρποὺς ἀτελεῖς φέρου-  
 σιν. τῇ δὲ ἐπόμβρῳ προσφορώτατον τὸ γένος, αἶτε  
 πολλῆς τροφῆς δεόμενον· καὶ μεγάλης ἀφαιρέ-  
 σεως γινομένης (ὁ <γὰρ><sup>1</sup> ἥλιος ἐξάγει), τοσοῦ-  
 τῳ πλέον<sup>2</sup> ἐπιδίδωσιν καὶ εἰς μέγεθος καὶ εἰς  
 εὐκαρπίαν, ἀφθονον μὲν τροφὴν ἔχουσα,<sup>3</sup> ταύτης  
 δὲ κατακρατοῦσα καὶ πέττουσα ραδίως. διὰ τοῦτο  
 γὰρ καὶ ἡ λειμωνία δοκεῖ ταῖς ἀμπέλοις εἶναι καὶ  
 κρατίστη, διότι πρὸς τῷ<sup>4</sup> κούφῃ καὶ μὴ πίερα εἶ-  
 ναι, καὶ ὑφυδρὸς<sup>5</sup> ἔστιν ὥστε μὴ δύνασθαι τὸ οὐ-  
 11.4 ράνιον ὑδαρ δικνεῖσθαι πρὸς τὸ ἐκ τῆς γῆς. ἡ δ'  
 ἀμπελος ὑδατος πλείστου δεῖται διὰ τὸ καὶ ἐν τῷ  
 καρπῷ τὸ<sup>6</sup> πλείστον ἔχειν τὸ ὑγρόν· ἔτι δὲ  
 μάλιστ' ἀντέχειν δύναται ἐν ταῖς ἐπομβρίαις.

ἐὰν δὲ ἡ χώρα μήτε ἀρχμηρὰ μήτε ἔπομβρος,  
 ἀλλὰ μέση τυγχάνῃ, τὰ ἀνὰ μέσον φυτεύειν, ὅσα  
 μήτε πυκνὰ μήτε μαλά.

γένη μὲν οὖν πρὸς ἐκάστην ταῦτα οἰκεία δια-  
 ρεῖται.

<sup>1</sup> ὁ <γὰρ> ego (quo ... magis Gaza: <σω πλέον> ὁ  
 Schneider.

<sup>2</sup> U: μάλλον Schneider.

<sup>3</sup> Wimmer: ἔχει U. <sup>4</sup> τῷ u: το U.

<sup>5</sup> Schneider (cf. CP 2 4. 4): ἔφυδρος U.

<sup>6</sup> [τὸ] aP.

ground),<sup>1</sup> bear weak branches and unfinished  
 fruit. But this variety is very well adapted to rainy 11.3  
 country, needing as it does a great deal of food; and  
 although the vine loses a great deal of fluid (for the  
 sun extracts it),<sup>2</sup> it increases all the more both in  
 size and in excellence of fruit, since it has an  
 unstinted supply of food and masters and concocts it  
 easily. This in fact is why meadow land is regarded  
 as the very best for vines: besides being light and  
 not fat, it also contains water and so prevents the  
 rain water from joining the water coming from the  
 earth.<sup>3</sup> And the vine requires the greatest amount 11.4  
 of water because it is also the tree with fluid as the  
 largest component of its fruit; and it is further the  
 tree best able to hold out in rainy weather.

If the country is neither droughty nor rainy but  
 intermediate, we are told to plant the intermediate  
 varieties, neither close nor open in texture.

So the kinds of vine that are distinguished as  
 appropriate to the different countries are these.

<sup>1</sup> That is, of the ground suited to the solid vine.

<sup>2</sup> From the open texture.

<sup>3</sup> Cf. CP 2 4. 4; *Geoponica*, v. 1–2: "Black earth, which is  
 not tightly packed, and which has below ground a  
 moderate supply of sweet water, is suited to the vine. For  
 earth like this, when it receives the rain, neither loses it by  
 sending it below entirely, nor keeps it on the surface above  
 ..."; Columella, *On Trees*, chap. iii. 7 (on land good for  
 planting the vine): "but the land which transmits the rain  
 or keeps it long on the surface is to be avoided."

11.5 *περὶ δὲ τῶν σπερμάτων, ἐπεὶ περ ἰσχυρότατα δει, διὰ τοῦτό τινες κελεύουσιν ὡς ἐκ ψυχροτάτης χώρας λαμβάνειν · πυκνότατα γὰρ ὄντα μᾶλλον ἔχειν<sup>1</sup> ὥστε καὶ ἐν ταῖς λεπταῖς ἀντιλαμβάνεσθαι, καὶ ἐν ταῖς ἐπομβρίοις<sup>2</sup> μὴ ἐκσῆπεςθαι (διὰ τοῦτο γὰρ καὶ τὰ μοσχεύματα δεῖν εἰς<sup>3</sup> τὰς ἐπομβρίους μᾶλλον ἐμβάλλειν ἢ τὰ φυτεύματα πάντων τῶν δένδρων, ὅτι τὰς ρίζας τὰς καθιεμένας τῶν φυτευμάτων, ἀσθενεῖς οὖσας, ἐκσῆπει,<sup>4</sup> [ἦ]<sup>5</sup> τῶν <δὲ><sup>6</sup> μεμοσχευμένων ἰσχυρότεροι,<sup>7</sup> καὶ εὐθὺς ἀντιλαμβάνεται).*

11.6 *τὰ δὲ πάχη τῶν φυτῶν εἰς μὲν τὴν ἐπομβρον οἰκεία · δεῖ γὰρ ὅτι<sup>8</sup> μάλιστα ἰσχυρά, καθάπερ λέγομεν · εἰς δὲ τὴν ἀρχμῆραν μῆτε παχέα μῆτε ἄγαν λεπτά · τὰ μὲν γὰρ οὐκ ἂν δύναιντο σῆψαι, τὰ δὲ ἀσθενῆ κίνδυνος μὴ πρὸ τῆς βλαστήσεως ἀποξηρανθῆ.*

*παραλλάττουσι δὲ καὶ οἱ χρόνοι τῆς φυτείας καθ' ἑκάτερον ·<sup>9</sup> τὴν μὲν γὰρ ἐπομβρον καὶ ψυ-*

<sup>1</sup> U: ἀντέχειν Heinsius.

<sup>2</sup> ego: -ίας U. <sup>3</sup> Schneider: ἐς U.

<sup>4</sup> ἐκσῆπει <ἢ ὑγρότης> Schneider after Gaza.

<sup>5</sup> N<sup>ac</sup> M (ἦ U: N<sup>c</sup> adds ἦ after τῶν): ἦ aP.

<sup>6</sup> Schneider after Gaza. <sup>7</sup> U<sup>c</sup> from -a.

<sup>8</sup> U<sup>cm</sup> (with index): U<sup>t</sup> omits.

<sup>9</sup> U: ἐκατέρων Schneider.

*The Vine: Planting*

As for the vine slips, since they should be very strong we are told by some agriculturists to take them from the coldest possible country, since when the slips are closest in texture they are better able (they say) not only to take hold in thin country but also not to rot out in rainy country. (This indeed is why we are told with all trees to plant rooted slips<sup>1</sup> and not just cuttings in country with heavy rain, because the ground rots out the roots that are sent down by a cutting, since they are weak, whereas the roots of a rooted slip are stronger and the slip takes hold at once.)

Thickness in a slip suits it for rainy country, since (as we are saying)<sup>2</sup> the slip should be the strongest possible; but for ground with little rain neither a thick nor a very slender slip is suitable, since the rainfall would never be able to decompose<sup>3</sup> the thick ones, and the weak ones are in danger of drying out before they can sprout.

The time of planting also differs for the two regions; so one should plant rainy and cold country

<sup>1</sup> "Rooted slips" renders *moscheumata*: for this see note 1 on CP 3 5. 3.

<sup>2</sup> CP 3 11. 5.

<sup>3</sup> That is, make them germinate; the usage was doubtless taken from an agricultural writer.

χρὰν ὀλίγον πρὸ ἰσημερίας δεῖ, τότε γὰρ ξηρότατα καὶ θερμότατα.<sup>1</sup> τὴν <δ><sup>2</sup> αὐχμηρὰν καὶ θερμὴν μεθ' ἡλίου τροπᾶς· ὅσῳ γὰρ ἂν μᾶλλον βρέχεται, τοσοῦτω βελτίων ἢ βλάστησις· τὴν δ' ἄλλην ἅπασαν τεκμαιρόμενον πρὸς τοῦτο τὸν<sup>3</sup> χρόνον.

- 12.1 χρῆ δὲ καὶ τὴν ἐργασίαν ποιεῖσθαι πρὸς τὴν χώραν, εὐθύς ἐπ'<sup>4</sup> αὐτῶν τῶν γύρων ἀρξαμένους· οἶον ἐν τῇ ἐπόμβρῳ μήτε μεγάλους ὀρύττοντας μήτε βαθεῖς, ὅπως μὴ πολὺ συνιστάμενον ἐκσῆπη τὸ ὕδωρ (διὰ τοῦτο γὰρ ἐὰν σφόδρα κάτομβρος ᾖ τοῖς πατάλοισι τοῖς σιδηροῖς<sup>5</sup> φυτεύουσιν)· μηδὲ δὴ συσκάπτειν αὐτοετεί,<sup>6</sup> μηδὲ τῷ<sup>7</sup> ὕστερον, ὅπως μάλισθ' ὁ ἥλιος ξηραίνῃ τὴν κατὰ τὸ φυτὸν γῆν· ἐὰν δὲ αὐχμηρὰ<sup>8</sup> καὶ ξηρά,<sup>9</sup> δῆλον ὡς ἐναντίως· οὐ γὰρ γύρους, ἀλλὰ<sup>10</sup> πᾶσαν, εἰ δυνατὸν, ὀρυκτέον ἵν' ὡς μάλιστα συνεργασθῆῃσα δέχεται τὸ ὕδωρ. εἰ δὲ μὴ, τάφρους ὡς βαθυτάτας καὶ μεγίστας ποιῶντα<sup>11</sup> συσκάπτειν ὅτι μάλιστα

<sup>1</sup> U: ξηροτάτη καὶ θερμοτάτη Gaza, Schneider.

<sup>2</sup> aP. <sup>3</sup> Wimmer: τοῦτον τὸν α: τοῦτον UNP.

<sup>4</sup> U: ἀπ' N aP.

<sup>5</sup> u: σιδήροις U.

<sup>6</sup> Gaza (anno eodem), Schneider: αὐτὸ, ἔτι U.

<sup>7</sup> τῷ U<sup>ar</sup>: τὸ U<sup>r</sup> N aP.

shortly before the equinox,<sup>1</sup> since the slips will then be driest and warmest, but arid and hot country after the solstice,<sup>2</sup> since the more rain the slip receives the better it sprouts. One should plant all other kinds of country by figuring out the time from these two cases.

- One must also suit the working of the soil to the country, starting with the holes themselves. So in rainy country we must not dig the holes large or deep, to keep rain from collecting in large amounts and rotting the slips out (for this is why if the country is very rainy indeed the hole is made by driving an iron peg into the ground). Nor should we spade the ground into a mound round the plant in the same year nor yet in the next, to let the sun dry the earth round the slip as much as possible. But if the country has little rain and is dry we must evidently do the opposite, not digging mere holes but if possible the whole ground, so that after this working over it may best absorb the rain. Failing that, we should dig the deepest and biggest trenches we can and then spade the ground into mounds in as close a contact with the plant as we can manage, to keep it
- 12.1

<sup>1</sup> Of autumn.

<sup>2</sup> Of winter.

<sup>8</sup> u: αὐχμηρὰν UN aP. <sup>9</sup> UN: ξηρὰν aP.

<sup>10</sup> Wimmer (ἀλλ' ἅμα Schneider): ἅμα U.

<sup>11</sup> UNP: ποιῶντας a.

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πρὸς αὐτὸ τὸ φυτὸν, ὅπως ἤκιστα διαθερμαίνηται τοῦ θέρους.

12.2 ὁμοίως δὲ καὶ τὰλλα τὰ τούτοις ἀκόλουθα ποι-  
εῖν. ὡς γὰρ ἀπλῶς εἶπεῖν ἀληθὲς τὸ καὶ πρότερον  
λεχθέν, ὅτι δεῖ ταῖς ἐργασίαις τὴν μὲν ὑγρὰν ξη-  
ραίνειν, τὴν δὲ ξηρὰν ὑγραίνειν· διὸ καὶ τοῦ ἔα-  
ρος<sup>1</sup> κελεύουσιν ὡς βαθύτατα σκάπτειν, ὅπως ὅτι  
πλείστον ἐγκαταμιχθὲν πνεῦμα παρασχη<sup>2</sup> τρο-  
φήν· ὥσπερ γὰρ εἴρηται πολλάκις, οὐκ ἀπὸ τῆς  
γῆς μόνον, ἀλλὰ καὶ ἀπὸ τοῦ ἡλίου καὶ ἀπὸ τοῦ  
ἀέρος ἢ τροφή.

12.3 λαμβάνουσι δὲ καὶ κατὰ τὰς ὄρεινὰς καὶ ἀνε-  
μώδεις τὰ πρόσφορα ταῖς φυτεῖαις, οἷον τοὺς τε  
γύρους ὀρύττοντες τοῖς καθεστῶσι πνεύμασι καὶ  
τὸ φυτὸν τιθέντες τὸν αὐτὸν τρόπον, ὅπως ἢ βλά-  
στησις μὴ ἐναντία γίνηται τῷ πνεύματι, θραύ-  
εσθαι γὰρ ἐκεῖνως ἀνάγκη, μηδ' ἔμπαλιν ὑπερ-  
πεσοῦσα,<sup>3</sup> παρὰ φύσιν αὐξῆται· τούτων γὰρ τι  
πάσχουσα χείρων ἢ ἄμπελος. ὡσαύτως δὲ καὶ τὰ  
ἄλλα τὰ ἀκόλουθα πρὸς τὴν χώραν.

<sup>1</sup> u Gaza a : ἀέρος UNP.

<sup>2</sup> Gaza (praestare), Heinsius : κατάσχη U.

<sup>3</sup> U : ὑποπεσοῦσα Schneider.

DE CAUSIS PLANTARUM III

as far as possible from getting overheated in sum-  
mer.

In the same way we must also carry out all the 12.2  
operations that follow these. For in a word what  
was said before<sup>1</sup> is true, that in working the earth  
one should make wet ground dry and dry ground  
wet. This is why the experts tell us to work the  
ground as deep as we can in spring, so that as much  
*pneuma*<sup>2</sup> as possible may be mixed in with it and  
provide food, since food (as we have often said)<sup>3</sup>  
comes not only from the earth but also from the sun  
and from the air.

The experts also consider the mountainous and 12.3  
windy countries in taking the proper measures in  
planting. For example they dig the holes during the  
prevailing wind, placing the slip in the same posi-  
tion to it that it had on the vine,<sup>4</sup> so that it may not  
sprout against the prevailing wind, since in that  
case breakage is inevitable, nor yet be blown over in  
the other direction and grow unnaturally, for the  
vine affected in any of these ways is inferior. So too  
they carry out the procedures that come next with  
due regard to the country.

<sup>1</sup> CP 3 10. 1.

<sup>2</sup> That is, warm air containing water and leading to  
expansion; cf. CP 3 10. 1, where the same view is cited, but  
with "air" replacing *pneuma*.

<sup>3</sup> CP 3 2. 1; 3 4. 2, 3.

<sup>4</sup> Cf. CP 3 5. 2.

THEOPHRASTUS

τὰς μὲν οὖν φυτείας ἐν ἐκάστοις οὕτω καὶ διὰ ταῦτα ποιοῦνται.<sup>1</sup>

- 13.1 τὰς δὲ τομὰς πανταχοῦ τῶν φυτῶν βραχείας, ὡς ἂν ριζωθῶσι καὶ ἀξήθωσι· ἅμα δὲ ἡ ἀρχμηρὰ καὶ τρέφειν ἀδύνατος τὰ πολλά. κατὰ δὲ τὴν ὄρεινὴν καὶ ψυχράν, ἣ καὶ ὄλωσ ἔναυρον,<sup>2</sup> καὶ τὸ ἔαρ τέμνειν εὐλαβοῦνται, τὸ γὰρ ψύχος ἀποξηραίνει.<sup>3</sup> ὦραν δὲ τῆς τομῆς σχεδὸν τὴν αὐτὴν πᾶσι ἀποδιδόασιν, ὑπ' αὐτὴν τὴν βλάστησιν, ὅπως τὸ φυτόν, πλήρες ὄν τοῦ ὑγροῦ, πρὸς τὴν ἀφαίρεσιν ὀρμήσῃ, καὶ ὁ βλαστὸς ὅτι κάλλιστος γένηται.
- 13.2 τὴν γὰρ τομὴν ταύτην οὐ καρποῦ χάριν, ἀλλὰ βλαστοῦ γίνεσθαι.

τὴν δὲ μετοπωρινὴν καρποῦ, διόπερ ἐκείνην ποιητέον εὐθὺς μετὰ Πλειάδος δύσει· τότε γὰρ εἶναι συνεστηκότα τε μάλιστα, καὶ ἥκιστα τεμνόμενα δακρυρροεῖν καὶ ῥήγνυσθαι. μεθ' ἡλίου δὲ

<sup>1</sup> a: -τα UNP.

<sup>2</sup> Schneider (cf. HP 8 11. 6): ἔναστρον U. <sup>3</sup> ego: -ει U.

<sup>1</sup> Cf. CP 3 15. 5. <sup>2</sup> In summer.

<sup>3</sup> Cf. CP 3 13. 3 (training the vine to grow evenly around the stock makes it bear better fruit).

DE CAUSIS PLANTARUM III

So the planting of slips in the various regions is carried out as described and for the reasons given.

*The Young Vine: Cutting Back*

The slip is everywhere cut short to let it root and grow<sup>1</sup>; then too when there is no rain<sup>2</sup> the earth is unable to feed the greater part of the shoots. In uplands and cold country, and in general where there is much breeze, cutting back is avoided even in spring, since the cold (they say) dries the slips out. But the authorities give the same season (one may say) for all countries, just at the time of sprouting, so that the slip, full of its fluid, may in its impulse to grow take the direction given by the removal, and the resulting shoot may be the finest possible. For this cutting back (they say) is not for fruit but for sprouts. 13.1 13.2

*The Young Vine: Training*

Cutting in autumn, on the other hand, is (they say) for fruit,<sup>3</sup> which is why it must be carried out directly after the setting of the Pleiades, since then the young vines are firmest<sup>4</sup> and least apt to bleed and crack<sup>5</sup> when cut, whereas after the solstice<sup>6</sup>

<sup>4</sup> That is, least fluid and watery, since the rains have not yet begun.

<sup>5</sup> Cf. CP 3 7. 10 for other trees. <sup>6</sup> Of winter.

τροπὰς καὶ μετὰ ζεφύρου πνοῶς ἀμφοτέρα πάσχειν<sup>1</sup> ταῦτα τεμνόμενα, καὶ τό τε φυτὸν πονεῖν,<sup>2</sup> καὶ τὸν βλαστὸν ἐξ ἄκρου φύεσθαι πρὸς τῆ τομῆ, διὰ τὸ τὴν τροφήν τὴν μὲν ἐξερρηκέναι, τὴν δ' ἐν τοῖς ἄκροις καταλελειφθαι.

13.3 τέμνειν δὲ τὰ μὲν ἐν τῇ χέρσῳ φυτευόμενα τῷ τρίτῳ ἔτει, θάττον γὰρ παραγίνεσθαι διὰ τὸ νεορογοτάτην εἶναι τὴν γῆν καὶ ἀκάρπωτον · τὰ δ' ἐν τῇ γεωργουμένῃ ὀψιαίτερον.

τὴν δ' ἄμπελον ἄγειν δεῖ κύκλῳ περὶ τὸν πυθμένα, πανταχόθεν γὰρ ὀμαλοῦς οὔσης καλλίων καὶ εὐκαρπότερα.<sup>3</sup> τοῦτο δ' οὐ χαλεπὸν, ἐάν τις καταλίπη μὴ τὰ κάλλισθ' ὠρμηκότα τῶν κλημάτων, ἀλλὰ τὰ ἄριστα πεφυκότα πρὸς τὴν ἀγωγὴν · ἀρκεῖ γὰρ εἰς ὀφθαλμὸς λειφθεῖς<sup>4</sup> εἰς τὸ δέον. ἐὰν δέ τις ἀπορῆ καὶ ταῦτα,<sup>5</sup> διὰ <τὸ><sup>6</sup> τὴν ἄμπελον ὠρμηκέναι κατὰ τὸ αὐτό, τῶν λειφθέντων κλημάτων ἀφελεῖν τοὺς ἐντὸς ὀφθαλμοῦς, ὅπως εἰς τοὺς<sup>7</sup> ἔξω ῥέουσα ἢ τροφή σχίσῃ τὴν ἄμπελον · αἰεὶ γὰρ πρὸς τὸ ζῶν καὶ τὸ δεχόμενον ἢ ἐπιρροή, διὸ (καθάπερ ἐλέχθη) ῥάδιον ποιείσθαι τὰς ἀγωγάς.

<sup>1</sup> U<sup>ar</sup> : πάσχει U<sup>r</sup> N aP.    <sup>2</sup> U<sup>ar</sup> : πονεῖ U<sup>r</sup> NP (ποιεῖ α).

<sup>3</sup> u aP : εὐκαρπότερα U N.    <sup>4</sup> aP : ληφθεῖς U (-εἰς u N).

<sup>5</sup> ego (τοῦτο Gaza, Scaliger) : ταῦτ' οὐ U.

and after the west wind begins to blow<sup>1</sup> the vines (they say) do both when cut, and not only does the plant suffer but the new shoot comes out from the tip of the stump next to the cut because some of the food has bled away and the rest is left at the tip.

In virgin soil one should cut in the third year 13.3 after planting, since here they say the vines grow up faster because the soil is the most recently worked there is and no crop has been taken out of it. But in ground under regular cultivation one should cut later.

One must train the vine to grow on all sides of the stock, since when the growth is in an even periphery the vine is finer and bears better. This is not difficult to do if one leaves not the branches that have displayed the greatest vigour but those that grow most conveniently for this training, since a single bud left in the right place is enough. If one 13.4 cannot even contrive to do this because the vine has taken a single direction in its growth, one must remove the inside buds on the branches that are spared so that the food may flow to the outside buds and make the vine fan out, since the flow is always to the part that is alive and can receive it, which is why training is easy (as we said).<sup>2</sup>

<sup>1</sup> About February 2; see the Introduction, vol. I p. li.

<sup>2</sup> CP 3 13. 3.

<sup>6</sup> Scaliger.    <sup>7</sup> U<sup>c</sup> : το U<sup>ac</sup>.

τοῦτο δὲ ἐν ταῖς ἐνίκμοις καὶ ἀγαθαῖς · ἐν δὲ ταῖς ἀρχμαύδεσι καὶ ξηραῖς ἀνάγκη τὰ βέλτιστα λιπεῖν.<sup>1</sup> ξηρὰ γὰρ οὐσα καὶ ὀλιγότροφος<sup>2</sup> οὐ βραδίως ἕτερα<sup>3</sup> προήσεται, διὸ συνακολουθητέον τῇ ὀρμηῇ · χρῆ δὲ καὶ πρὸς τὰ πνεύματα τῇ αὐτῇ τομῇ χρῆσθαι καὶ μὴ βιάζεσθαι παρὰ φύσιν.

τῶν μὲν οὖν φυτῶν τοιαύτας<sup>4</sup> καὶ διὰ ταῦτα<sup>5</sup> ποιοῦνται τὰς θεραπείας.

14.1 τῶν δ' ἀμπέλων τῶν τελέων ἤδη πρῶτον μὲν καὶ μέγιστον ἔστιν ἡ κλάσις, καλῶς γὰρ ἀμπελουργουμένη, καὶ εὐβλαστοτέρα καὶ εὐκαρποτέρα καὶ πολυχρονιωτέρα γίνεται · δεύτερον δέ, καὶ τρόπον τινὰ τοῦτω παραπλήσιον, ἡ βλαστολογία, καὶ γὰρ<sup>6</sup> ἐνταῦθα εἶδέναι δεῖ τὰ<sup>7</sup> ποῖα συμφέρει καταλιπεῖν καὶ τὰ ποῖα ἀφαιρεῖν, καὶ πρὸς τοὺς ἑτέρους<sup>8</sup> καρποὺς καὶ πρὸς τὴν ὅλην φύσιν. τὰ δ'

<sup>1</sup> N aP : λιπεῖν U : λείπειν u.

<sup>2</sup> U : ὀλιγοτρόφος Schneider.

<sup>3</sup> Gaza (*alios* [-io a misprint in G<sup>ed</sup>]), Schneider : ἑτέρας U.

<sup>4</sup> Gaza (*ad hunc modum*), Schneider : τοιαῦτα U.

<sup>5</sup> aP : ταύτας UN.

<sup>6</sup> U : καὶ γὰρ <καὶ> Gaza (*enim vero . . . etiam*), Scaliger.

<sup>7</sup> aP : τὸ UN.

<sup>8</sup> U : Gaza omits : Schneider deletes : ἐτείους Wimmer.

This applies to country that is damp and good. In country that gets little rain and that is dry we are compelled to spare the best branches, since the vine, being there dry and getting little food, does not find it easy to send out new branches, and we must acquiesce in the direction taken by the impulse in the vine. So too we must follow the direction of the wind<sup>1</sup> in cutting and not try to force the nature of things.

Such then is the care bestowed on the young plants and these are the reasons for it.

*The Full-Grown Vine: Pruning*

When the vines have reached the stage of being 14.1 full-grown the first and most important step is to prune<sup>2</sup> them, since the vine when properly dressed produces better sprouts and fruit and lives longer. The second step, and in a way a repetition<sup>3</sup> of this, is thinning,<sup>4</sup> since here too we must know what parts are best spared and what are best removed, both for the effect on the rest of the fruiting branches and on the whole nature of the tree. When

<sup>1</sup> So in planting: cf. CP 3 12. 3.

<sup>2</sup> *Klásis*, literally "breakage," as contrasted with the schooling or training of the young vine.

<sup>3</sup> Cf. CP 3 16. 1.

<sup>4</sup> *Blastologia*, literally "selecting the shoots," is the pruning away of fruiting shoots; cf. CP 3 16. 1.

ἄλλα ἤδη κοινότερα καὶ ῥάω, πάντα δ' ἔχοντα  
διάνοιαν,<sup>1</sup> ὥστε καιρὸν ζητεῖν καὶ τρόπον.

14.2 αἱ δὲ διαφοραὶ κατὰ τὰς χώρας<sup>2</sup> τῶν ἔργων  
τὰ<sup>3</sup> μὲν καὶ ἐν τοῖς ἄλλοις εἰσὶν, οὐ μὴν ἄλλα  
πλείστη γε κατὰ τὴν κλάσιν καὶ τὴν ἀμπελουρ-  
γίαν, ὑπὲρ ἧς καὶ πειρῶνται γε διαιρεῖν, ἅμα τοῖς  
τε γένεσιν ποιούμενοι καὶ ταῖς χώραις τὸν ἀφορι-  
σμόν· ὁ δ' ἀφορισμὸς ἐν δυοῖν· ἐν ποίαις ἐκά-  
στας<sup>4</sup> χώραις<sup>5</sup> δεῖ, καὶ ἐν τῷ βραχυτομεῖν ἢ  
μακροτομεῖν (ἐπεὶ τὰ<sup>6</sup> γ' εἰς τὴν ἀγωγὴν καὶ τὴν  
ὄλην τομὴν τῶν ἀμπέλων πανταχοῦ τὰ αὐτά).

14.3 σχεδὸν δ' ἐνιοί γε τὸν αὐτὸν ἀποδιδόασιν ἐπί<sup>7</sup>  
τε τῶν γενῶν καὶ τῆς ὁμοίας χώρας ἀφορισμόν·  
οἷον τὸ βραχυτομεῖν ἐν τε ταῖς καυσώδεσιν καὶ ξη-  
ραῖς, καὶ τῶν ἀμπέλων ὅσαι τοιαῦται τυγχάνου-  
σιν,<sup>8</sup> ἔγκαρπότεραι γὰρ γίνονται διὰ τὸ μᾶλλον  
δύνασθαι τρέφειν· μακροτομεῖν δὲ <ἐν><sup>9</sup> ταῖς

<sup>1</sup> U : διαφορὰς Schneider.    <sup>2</sup> Gaza, Schneider : ὥρας U.

<sup>3</sup> U : αἱ Schneider.

<sup>4</sup> ego (ἐκάστα Schneider) : ἐκάσταις U.

<sup>5</sup> Gaza, Schneider : ὥρας U.

<sup>6</sup> aP : ἔπειτα U (ἔπειτά N).    <sup>7</sup> u : ἔπει U.

<sup>8</sup> Schneider : τυγχάνουσαι U.    <sup>9</sup> Schneider.

<sup>1</sup> Cf. Plato, *Phaedrus* 272 A 4–7.    <sup>2</sup> Cf. CP 3 13. 4–5.

we come to the remaining procedures we find that they apply to other trees as well and are easier to carry out, although all involve taking thought, and so require to be done at the right time<sup>1</sup> and in the right manner.

*Pruning: Rules that  
Take the Country into Account*

The kind of country makes a difference in other 14.2  
operations too, but it makes the greatest difference  
in the pruning and dressing of the vine. About this  
operation the experts endeavour to draw distinc-  
tions by an appeal not only to the different kinds of  
vine but also to the different kinds of country; and  
the resulting rules bear on two questions: in what  
kind of country one is to apply the procedure to the  
various vines, and whether one is to cut off much or  
little of the branch. (As for the measures taken for  
training<sup>2</sup> and cutting back<sup>3</sup> the vine, these are  
everywhere the same.)

Some authorities at least give the same rule (one 14.3  
may say) for both the type of vine and the type of  
country of similar character, to wit that we should  
prune the branches short in torrid and dry country  
and with vines of this character, since the vines will  
yield more fruit because they are then better able to  
feed it; whereas we should prune the branches long

<sup>3</sup> Cf. CP 3 13. 1 (of cutting back): "But the authorities give the same season . . . for all countries . . ."



ἐναντίας, καὶ τὰς ἐναντίας, οἷον ἐν τοῖς<sup>1</sup> ἐφύ-  
γροις καὶ εὐτρεφέσι,<sup>2</sup> καὶ ὅσαι τῶν ἀμπέλων τοι-  
αῦται· φύσει τε γὰρ καρπιμωτέρας<sup>3</sup> εἶναι καὶ τὸν  
γινόμενον καρπὸν ἐν ἄκροις μᾶλλον φύεσθαι τοῖς  
κλήμασιν.

14.4 ἔνιοι δὲ καθόλου περὶ πασῶν διαιροῦσιν οὐκ εἰς  
τὰς χώρας<sup>4</sup> ἀποβλέποντες ἀλλ' εἰς αὐτὰ τὰ γένη  
καὶ τὰς διαθέσεις, κελεύοντες σκοπεῖν πρὸς τὴν  
μήτραν (ὥσπερ ἐπὶ τῶν αὐτῶν εἴπομεν) ἐν τοῖς  
ἀποτεμνομένοις τῶν νέων κλημάτων. ἐὰν μὲν  
γὰρ ἔχη πολλήν, πολλὰ καὶ βραχέα καταλιπεῖν  
ὅπως βραχέων μὲν ὄντων<sup>5</sup> δύνηται τρέφειν, ἀπὸ  
πολλῶν δὲ πολλὸς ὁ καρπὸς γίνηται· ἐὰν δὲ ὀλί-  
γην καὶ πολὺ τοῦ ἔνου κλήματος [ἔχουσαν],<sup>6</sup>  
ἐλάττω μὲν τὸ πλήθος, μείζω δὲ τὸ μέγεθος· δεῖ<sup>7</sup>  
δὲ ὅσω <ἂν><sup>8</sup> ἐλάττω τὴν μήτραν, τοσοῦτω  
μακρότερα λείπειν ἐν ἀπάσαις.

14.5 καθόλου μὲν οὖν, οὕτω τὸ μέγεθος <καὶ><sup>9</sup> τὴν

<sup>1</sup> U: ταῖς Scaliger.

<sup>2</sup> U: εὐτραφέσι u a: εὐτροφέσι NP.

<sup>3</sup> Wimmer (*humidae Gaza*: καὶ ὑγροτέρας Itali: καὶ πιστέ-  
ρας Scaliger): καὶ πιστέρας U.

<sup>4</sup> Gaza, Schneider: ὥρας U. <sup>5</sup> NaP: μενόντων U.

<sup>6</sup> ego (ἔχουσα Schneider: ἔχουσι Wimmer).

in the opposite kind of country and with vines of the  
opposite type, to wit in wet localities that are well  
supplied with food and with vines of this character,  
since these vines are not only naturally more fruit-  
ful but the fruit also tends to grow closer to the tip of  
the branch.

*Pruning: Rules that  
Take no Account of the Country*

Some authorities on the other hand make a gen- 14.4  
eral distinction applying to all vines, taking no  
account of types of country, but merely of the variety  
or state of the vine itself, and tell us to decide by  
examining the pith (just as we said<sup>1</sup> was done in  
distinguishing the same two types) in cross-sections  
of the younger branches: if the vine has a great deal  
of pith, we are to prune so as to leave many short  
branches, short so that the vine may be able to feed  
the fruit, and many so that much fruit may come  
from them; but if we find that the vine has little pith  
and a great deal of last year's wood, we are to reduce  
the number of branches but increase their length,  
and in all vines the smaller we find the pith, the  
longer we must leave the branch.

The general rule then (they say) is so to adjust 14.5

<sup>1</sup> CP 3 11. 1.

<sup>7</sup> U: δεῖ Schneider.

<sup>8</sup> ego.

<sup>9</sup> Itali.

βραχύτητα τῶν κλημάτων καθ' ἑκάστην ποιέσθαι πρὸς τὴν μήτραν τὴν ἐν τοῖς ἀποτόμοις, ὅπως ἴση τὸ πλάτος ἢ τῷ<sup>1</sup> περιειληφότι κλήματι · τῆς γὰρ ἀμπέλου τεμνομένης ἐξ ἴσου πρὸς τε τὴν ἕξω τὴν ἑαυτῆς καὶ πρὸς τὴν τοῦ καρποῦ φοράν, πολυχρόνιον ἔσσεσθαι καὶ ἀγαθὴν διὰ τέλους · ἐὰν δὲ ἡ μήτρα πλεον μέρος κατέχη τῆς τομῆς, καρπὸν μὲν γίνεσθαι πολὺν, τὰ δὲ κλήματα ἀμενηνά,<sup>2</sup> διὰ τὴν τῆς τροφῆς ἀσθένειαν · ἐὰν δὲ αὖ τὸ<sup>3</sup> κλήμα τὸ ἐν τῇ τομῇ δυνατὸν ἢ καὶ νεανικόν, καρπὸν ὀλίγον ἀπὸ μικρᾶς τῆς μήτρας · γίνεσθαι γὰρ τὸν μὲν βότρυν ἀπὸ τῆς μήτρας, τὸ δὲ κλήμα ἀπὸ τοῦ περιειληφότος κλήματος, δηλοῦν δὲ τὴν ἀμπελον αὐτὴν · τὰ γὰρ ἐκ τῶν ἔνων νέα<sup>4</sup> βλαστήματα πάντα ἄκαρπα γίνεσθαι διὰ τὴν μικρότητα τῆς μήτρας, καὶ τὰς νέας τῶν παλαιῶν ἀφορωτέρας διὰ τὴν αὐτὴν αἰτίαν, ὡς ἀπὸ τῆς μήτρας τῆς τε σαρκὸς καὶ τοῦ γιγάρτου<sup>5</sup> γνωμμένων.<sup>6</sup> ὅπερ οὐδ' ὑπολαμβάνουσιν, οὐδ' ἔοικεν, εἰ-

<sup>1</sup> τῷ u : τὸ U.

<sup>2</sup> u aP : ἀμενήν ᾗ U : ἀμενήν N.

<sup>3</sup> u P (αὐτο U) : αὐτὸ N : τὸ a.

<sup>4</sup> U<sup>r</sup> : νέων U<sup>ar</sup> N aP.

<sup>5</sup> Gaza (*vinaceum*), Moldenhawer : τοῦτι γὰρ τοῦ U.

<sup>6</sup> ego : -νου U.

the length or shortness of the branches in each vine to the amount of pith appearing in the cross-section that the width of the pith is the same as that of the surrounding wood<sup>1</sup>; for when the vine is pruned with equal regard both for its own condition<sup>2</sup> and for the production of fruit, it will have a long life and will bear well throughout; if on the other hand the pith occupies more of the section than the wood, the fruit will be abundant, but the branches will turn out puny because of the weakness of their food supply; and if again the wood in the section is powerful and sturdy, there will be little fruit from the pith, which is then too small. For the grape cluster (they say) comes from the pith, whereas the branch comes from the surrounding wood; and the vine itself is the proof. For the new shoots from last year's branches are all without fruit because of the smallness of the pith, and young vines are less fruitful than the old for the same reason. This<sup>3</sup> implies that both flesh and stone come from the pith. But this is no view that people hold, and it is also unlikely, since on

14.6

<sup>1</sup> If the rim of wood has half the width of the core there will be three times as much wood as core. To produce an equal amount of wood and core the diameter of the core must be to the diameter of the branch as one to the square root of two.

<sup>2</sup> The good condition of the vine (as distinguished from its fruit) depends on the amount of wood in the branches.

<sup>3</sup> To say that the grape-cluster comes from the pith.

14.7 περ ἔξαιρεθείσης, ἣ μὲν σὰρξ γίνεται, τὸ δὲ γίγαρ-  
τον οὐ γίνεται (πλήν εἰ ἄρα τῆς<sup>1</sup> ἐνδοτάτω  
[τῆς]<sup>2</sup> μήτρας ἐξαιρουμένης). τοῦτο μὲν οὖν ἐπι-  
σκεπτέον· εἰ δ' ὅλως αἱ μείζους ἔχουσαι τὰς μή-  
τρας εὐκαρπότεραι καὶ πολυκαρπότεραι τυγχά-  
νουσιν, οὐδὲν ἂν διαφέροι πρὸς τὰ νῦν.

κοινοτάτην μὲν δὴ<sup>3</sup> ταύτην εἶναι πάσαις· ὅσαι  
δὲ κλήματα μὲν πολλὰ φύουσιν, καρπὸν δ' ὀλίγον,  
τούτων τὰ μὲν ἐξ ἄκρας τῆς πρῶρας<sup>4</sup> ὡς μακρό-  
τατα λείπειν, τὰ δὲ πρὸς αὐτὸ τὸ στέλεχος βρα-  
χεία, ὅπως ἀπὸ μὲν τῆς βραχείας τομῆς ἡ ἄμπελος  
αὐξῆται, ἀπὸ δὲ τῶν ἐξ ἄκρου κλημάτων ὁ καρπὸς  
ἀπὸ μεγάλης τῆς μήτρας <ῆ> πολὺς.<sup>5</sup>

14.8 ὅταν δὲ βλαστάνῃ περιαιρεῖν τὰ ἄλλα πάντα,  
πλήν ὅσα καρπὸν ἔχει, τούτων<sup>6</sup> ἐπικινίξειν τὰς  
κορυφὰς ἐν αὐταῖς ταῖς οἰνάνθαις, ἵνα μήθ' ἡ ἄμ-  
πελος εἰς τοῦτο τὸ κλημα ἀφιῆ τὴν αὐξήσιν ὅπερ  
ἀποτέμνεται, ἣ τε περιοῦσα τροφή, συνειληθείσα  
ἐπὶ ταῖς οἰνάνθαις, αὐξή τὸν βότρυν· αἰεὶ γὰρ δεῖ<sup>7</sup>  
τοῦτο ζητεῖν ἐκ τῆς τομῆς, ὅπως ἡ τε ἄμπελος

<sup>1</sup> ego : τοῦ U<sup>ar</sup> : τὸ U<sup>r</sup>. <sup>2</sup> ego.

<sup>3</sup> v, Gaza : δεῖ U N aP.

<sup>4</sup> Schneider : τὰς πρῶτας U.

<sup>5</sup> ego : πολὺς <γένηται> Schneider : πολὺς <ῆ> Wimmer.

<sup>6</sup> τούτων <δ'> Wimmer. <sup>7</sup> u : δεῖ U.

removal of the pith flesh is produced but no stone<sup>1</sup>  
(unless we suppose that stonelessness results only  
when the innermost pith is removed). This point,  
then, needs investigating; as for the general ques-  
tion whether vines with a greater amount of pith  
produce better and more abundant fruit, it would  
make no difference to the matter in hand.

This, then, they say, is the method of pruning of  
widest application to all vines; as for vines that  
grow many branches but little fruit, they tell us to  
prune them so as to leave the branches growing  
from the end of the main branch as long as possible,  
but the ones growing up close to the trunk short, so  
that the vine may grow large from being pruned  
short and the fruit from the branches at the tip of  
the main one may be abundant, coming as it does  
from a large pith.<sup>2</sup>

When the vine comes out we are told (1) to  
remove all other branches, but (2) in those that  
promise fruit to pinch off the tips just above the  
flowers, so that (1) the vine may not expend its  
growth on the portion cut away and so that (2) the  
food that is thus saved may be blocked at the flowers  
and make the cluster grow. For we must always  
(they say) look to this in pruning: to strength in the

<sup>1</sup> Cf. CP 5 5. 1; 5 6. 13.

<sup>2</sup> The pith of the main branch is larger than that of the  
smaller branches.

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ισχύσει<sup>1</sup> καὶ ὁ καρπὸς ἔσται πολὺς.

αὕτη μὲν δὴ καθόλου τίς ἐστι καὶ<sup>2</sup> κοινὴ πάσαις.

15.1 ὥραν δὲ τῆς ἀμπελοργίας οἱ μὲν ταῖς χώραις μόνον διαιροῦσιν, οἱ δὲ<sup>3</sup> τῶν γενῶν ἐφάπτονται.

κελεύουσι δὲ τὰς μὲν ἐν τῇ ξηρᾷ καὶ θερμῇ πρῶτας ἀμπελοργεῖν, ὅταν τάχιστα παύσωνται φυλλοβολοῦσαι, τὰς δ' ἐν τῇ ψυχρᾷ καὶ ἐπὸμβρυ μικρὸν πρὸ τῆς βλαστήσεως· αἱ μὲν γὰρ ἐν τῇ ξηρᾷ, διασώζουσαι τὸ ὑγρὸν, αὐταὶ τε βελτίους γίνονται καὶ ὁ καρπὸς ἡδυνώτερος· αἱ δ' ἐν τῇ ψυχρᾷ, μεθεῖσαι τὸ ὕδωρ, αὐταὶ<sup>4</sup> μὲν οὐδὲν χείρους, ὁ δὲ καρπὸς ἀσηπτότερος καὶ ἡδυνώτερος· τὰς δὲ ἐν τῇ μέσῃ καὶ εὐκράτῳ κατὰ τὸ μέσον τῶν ὥρων.

15.2 ἔνιοι δὲ ὅλως πρῶτ' πάσας κελεύουσιν (ὅπερ<sup>5</sup> εἴπομεν), ὅτι παχύτερόν τε τὸ κλήμα γίνεται καὶ

<sup>1</sup> P: ἰσχύσει U (i- u: ἰσχύση N [-η a]).

<sup>2</sup> U: u erases.

<sup>3</sup> δὲ <καὶ> Gaza (*etiam*), Schneider.

<sup>4</sup> Gaza (*ipsae*), Schneider: αὐταὶ U.

<sup>5</sup> U: ὡσπερ Schneider.

<sup>1</sup> These authorities are not discussed until CP 3 15. 4.

<sup>2</sup> Since the Attic year begins at the summer solstice autumn is early and spring late.

DE CAUSIS PLANTARUM III

vine and abundance in the fruit.

This, then, is pruning of a universal sort and applies to all vines.

*Pruning: The Seasons*

As for the season of dressing the vines, (1) some 15.1 distinguish them by the countries alone, (2) others<sup>1</sup> touch on the varieties.

(1) We are told to dress vines early<sup>2</sup> in dry and hot country, as soon as they are done with shedding the leaves, but in cold and rainy country to dress the vines shortly before they sprout. For in dry country the vines thus keep their fluid<sup>3</sup> and become better themselves and their fruit yields pleasanter wine; whereas in cold country the vines themselves are none the worse for losing their water and the fruit is less apt to decompose and makes pleasanter wine. In intermediate and well-tempered country we should dress the vines at a point intermediate between the two seasons.

Some however recommend this early<sup>4</sup> dressing 15.2 for all vines without distinction (a point mentioned before)<sup>5</sup> because (1) the branch gets thicker<sup>6</sup> and

<sup>3</sup> By not bleeding (as a result of pruning) until the fruit has been produced.

<sup>4</sup> In autumn. <sup>5</sup> CP 3 13. 2.

<sup>6</sup> Because in winter the growth does not pass to leaves or fruit.

ἀμβλώπες<sup>1</sup> οὐκ ἔσονται, καὶ ἐν εὐδία συμβήσεται τὰς τομὰς ἐπιξηραίνεσθαι, πάντα δὲ ταῦτα συμφέρει· χειμῶνος μὲν γὰρ οἱ πολλοὶ τῶν ὀφθαλμῶν ἀπόλλυνται ῥίγει, καὶ ἡ τομὴ βία ξηρανομένη ῥήγνυται, τοῦ δ' ἔαρος ῥεῖ τό τε δάκρυον, καὶ ἀμβλώπες<sup>2</sup> ἐπιγίνονται πολλοί.

15.3 καίτοι τινὲς οὐ διὰ ταῦθ' ὑπολαμβάνουσιν, ἀλλ' ὡς τίκτους τὴν ἀμπελον εὐθὺς ὅταν τρυγηθῆ, καὶ τότε γινόμενον τὸν καρπὸν (οὐ γὰρ οἶόν θ' ἅμα δύο γόνους ἔχει), οὐκ ὀρθῶς λέγοντες· γίνεσθαι γὰρ θέρουσ τὸν καρπὸν, ὅταν ἦ πολὺ τὸ ὑγρόν, ἐκ τούτου γὰρ τὴν γένεσιν εἶναι. τεκμήριον δέ· ἐὰν γάρ<sup>3</sup> τις ἐργάσῃται τὰς τοῦ χειμῶνος ἀργὰς<sup>4</sup> ἀρχόμενου τοῦ θέρουσ, εὐθὺς τὰ κλήματα πυκνόφθαλ-

<sup>1</sup> ego : ἀμβλωπὲς UN aP : ἀμβλωπείς u.

<sup>2</sup> ego : ἀμβλωπὲς U : ἀμβλωπείς u.

<sup>3</sup> Heinsius : δε U.

<sup>4</sup> Itali : ὄργας U.

<sup>1</sup> The word *amblóps* ("that fail to bear properly") is probably connected with *amblyós* ("blunt," "dim" of vision). The metaphor was suggested by *ophthalmós* ("eye"), the word for bud. It is conceivable that the word *amblóps* was also interpreted as connected with *amblóō*, "to miscarry."

<sup>2</sup> That is, weather that is not, like that of winter, wet and cold.

the vine will thus have no shoots that fail to bear properly,<sup>1</sup> and because (2) the cut will dry in fair weather.<sup>2</sup> All of this is good: thus if the vine is dressed in winter most of the new buds perish of cold and the cut is forcibly dried<sup>3</sup> and cracks open; again when the vine is dressed in spring the cuts bleed and many buds are put out that fail to bear properly.

Some persons nevertheless do not take these to be the reasons for dressing the vine early, but suppose that the reason is that the vine is in the process of parturition directly it is harvested and the fruit is then in the process of being produced (since it is impossible, they urge, for the vine to have two broods at the same time).<sup>4</sup> But they are mistaken (it is argued) since the fruit is generated in summer, when the fluid in the plant is abundant,<sup>5</sup> for it is from the fluid that the fruit is produced, and here is proof: if at the beginning of summer you till vines that have been left untilled through the winter, the branches at once become dense with buds owing to

15.3

<sup>3</sup> By the cold; for its drying effect *cf.* CP 2 8. 1-2.

<sup>4</sup> That is, the new fruit cannot be produced until the old fruit is removed. The pruning therefore must be carried out in autumn, when the new fruit is on the way, so as to benefit it at once.

<sup>5</sup> The fluid has come from the rains of winter and spring and has not been dried out by the rainless summer.

μα<sup>1</sup> γίνεσθαι διὰ τὸ πλῆθος τοῦ ὑγροῦ, τοῦτο δὲ τὴν ἐργασίαν ποιεῖν ὅτι πληροῖ, τὸν δ' ἥλιον θερμαίνοντα πηγνύναι, καὶ πυκνοτέρους τοὺς ὀφθαλμοὺς γίνεσθαι καὶ βότρυς πλείους.

15.4 οἱ δέ, ταῦτα<sup>2</sup> κελεύοντες, ἄλλως πως τὰς αἰτίας λέγουσιν· φασὶ<sup>3</sup> γὰρ τοῦτο δεῖν ἐν τῇ θερμῇ καὶ λεπτῇ, καὶ διὰ τοῦτο πρῶτ' δρᾶν,<sup>4</sup> ὅπως τὸ ὕδωρ εἰς τὰ καιριώτατα τῶν κλημάτων ἔλθῃ, καὶ ἔχῃ τροφήν ἐν τῷ θέρει· τὰς δ' ἐν τοῖς ἐφύδροις, ἢ ὅσα τῶν γενῶν ὑβριστικά, τοῦ ἤρος, ὅπως διεσκεδασμένου ἢ τὸ ὑγρὸν,<sup>5</sup> καὶ τμηθείσης ἐν ὥρᾳ, τοῦτ' ἀπορρυῇ· διὰ γὰρ τὸ πλῆθος οὐ πεττούσας τοῦθ',<sup>6</sup> ὑβρίζειν ἄλλα<sup>7</sup> καὶ ἐκκληματοῦσθαι.<sup>8</sup> φυτοῖς δ' οἷσι τοῖς τοιοῦτοις καὶ ἐπισπείρειν ἐπὶ τὰ ἀνθηρα<sup>9</sup> δεῖν<sup>10</sup> κριθᾶς καὶ κυάμους, ἐπειδὴ ταῦτα ξηραντικώτατα<sup>11</sup> πάντων.

<sup>1</sup> u : πυκνοφθαλμία U.

<sup>2</sup> U : ταῦτὰ Schneider.

<sup>3</sup> aP : φησί U N.

<sup>4</sup> ego (ποιεῖν Wimmer : καὶ Schneider) : καν U.

<sup>5</sup> ego (διεσκεδασμένου τοῦ ὑγροῦ Schneider) : διέσκεδασμένη τὸ ὑγρὸν U (διεσκεδασμένη τὸ ὑγρὸν u N) : διεσκεδασμένου τὸ ὑγρὸν aP.

<sup>6</sup> U : τόθ' Heinsius.

<sup>7</sup> ego (ἄλλως Wimmer) : ἄλλα U : ἀλλὰ u.

<sup>8</sup> Schneider : ἐγκληματοῦσθαι U.

<sup>9</sup> Schneider : ἀνθηρά U.

the great amount of fluid in them, and for this the tillage is responsible, since it fills them with it; the sun on the other hand warms the fluid by its heat and makes it firm, and the buds acquire more consistency and the clusters become more numerous.

(2) Others make the recommendation<sup>1</sup> but give the reasons somewhat differently. They say that it is in hot and thin country that we must dress the vine early,<sup>2</sup> and do it early on this account: so that the rain<sup>3</sup> may get to the branches that matter most<sup>4</sup> and these may have it as food in summer<sup>5</sup>; but to dress vines in regions with surface water, or the varieties apt to luxuriate, in spring, so that the fluid will have become dispersed throughout the vine,<sup>6</sup> and the fluid so dispersed may bleed away with the vernal pruning, since it is owing to the great amount of this fluid that the vines fail to concoct it and get out of hand in various ways, among them running to branch. When such varieties are slips one should sow on the borders barley and beans, these having the greatest drying power of all plants.<sup>7</sup>

15.4

<sup>1</sup> CP 3 15. 2-3 (to prune in autumn): <sup>2</sup> In autumn.

<sup>3</sup> Of winter. <sup>4</sup> The rest are pruned away.

<sup>5</sup> The following summer, when the vine bears.

<sup>6</sup> Instead of remaining in the roots, as in winter.

<sup>7</sup> CP 2 18. 1.

<sup>10</sup> U<sup>ar</sup> : δεῖ U<sup>r</sup> N aP.

<sup>11</sup> U<sup>cc</sup> (ὦ from ἀ).

- 15.5 αἱ μὲν οὖν αἰτίαι σχεδὸν αὐται παρ' ἐκάστων.  
ἀκριβεστάτη δὲ ἡ ἐν ἀμφοῖν διαίρεσις, ἐν τε ταῖς χώραις καὶ τοῖς γένεσι, καὶ πρὸς τὰς ὥρας καὶ πρὸς τὸ βραχυτομεῖν ἢ μακροτομεῖν · ἔνια γὰρ οὐ φέρουσιν ἄν<sup>1</sup> βραχυτομηθῶσι,<sup>2</sup> ἀλλ' εἰς τὴν βλάστησιν τρέπονται, καθάπερ ἡ Ἀφυταῖος καλουμένη, καὶ ἐν Ἀκάνθῳ δὲ ἐπὶ τέτταρας ὀφθαλμοὺς ἐλαχίστους τέμνουσιν · αἱ δὲ μακροτομούμεναι ταχὺ καταγηράσκουσιν διὰ τὴν πολυκαρπίαν. νέας δ' οὖν οὐσας ἀναγκαῖον βραχυτομεῖν, ὅπως καὶ ῥιζωθῶσι καὶ ἀξηθῶσι.  
καὶ περὶ μὲν ἀμπελοουργίας ἐκ τούτων ἄν τις θεωρήσειεν.

- 16.1 ἐπεὶ δ' ὅμοιον τῷ τοιούτῳ, καὶ ὡσπερ δεύτερον, ἡ βλαστολογία, δεῖ καὶ<sup>3</sup> ταύτην εὐθὺ ποιεῖσθαι καὶ βλαστολογεῖν ὅταν διαφαίνωσι τὸν καρπὸν · μετὰ δὲ ταῦτα εὐθὺ τὸ δεύτερον σκάπτειν, ὅπως ὁ

<sup>1</sup> ego: φέρουσι καν U.

<sup>2</sup> U: βραχὺ τμηθῶσι u.

<sup>3</sup> a: δεῖσθαι U N P.

<sup>1</sup> CP 3 14. 2-3 15. 4.

So these (one may say) are the reasons given by 15.5 the various schools.<sup>1</sup>

The most exact distinction is the twofold one of both country and kind, both for determining the seasons and for determining whether to prune short or long. For some kinds will not bear if pruned short, but run to vegetative growth, like the so-called vine of Aphytis<sup>2</sup>; so at Acanthus<sup>3</sup> too the growers always prune so as to leave at least four buds. On the other hand when the branches are pruned long the vine soon ages from abundant bearing. With young vines in any case we are compelled to prune short, so that the vines may both root and grow.<sup>4</sup>

These points, then, may serve for the study of vine-dressing.

#### *The Remaining Operations*

Since thinning the shoots<sup>5</sup> is similar and (as it 16.1 were) a second dressing, this operation too must be carried out with no delay as soon as the vines show promise of fruit. Right after this we must spade<sup>6</sup> for the second time, to let both the fruit and the

<sup>2</sup> A city in the Chalcidice.

<sup>3</sup> Doubtless the city in the Chalcidice.

<sup>4</sup> Cf. CP 3 13. 1.

<sup>5</sup> *Blastologia* ("thinning"), literally "selecting shoots," is the removal of flower clusters at various stages before the formation of the grapes.

<sup>6</sup> For the first spading cf. CP 3 12. 2.

τε καρπὸς καὶ ὁ βλαστὸς, νέος ὢν καὶ ἐν ὄρμῃ τοῦ βλαστάνειν, ὠραίαν λάβη τὴν σκαπάνην· ἔπειτα πάλιν βλαστολογεῖν πρὸ τοῦ ἀνθεῖν, συμβαίνει γὰρ ἐν τούτῳ τὸ βοστρύχιον<sup>1</sup> αὔξασθαι, διὰ τὸ μήπω συνεστάναι τὰς ῥάγας· ὅταν δὲ ἀπανθήσῃ, τὸ μὲν συνέστηκεν, αἱ δὲ συνίστανται καὶ αὔξονται.

16.2 τὸ δ' ὄλον ἀκμαῖα<sup>2</sup> μάλιστ' ἀποδίδοσθαι ζητεῖ τῶν ἔργων ἢ τε βλαστολογία καὶ ὁ σκαφητὸς ὁ μέσος, τῇ γὰρ ἀμπέλω τότε συμβαίνει πρὸς αὔξησην ὄρμῶν τῶν τε παρόντων καρπῶν, καὶ τῶν βλαστῶν ἐν οἷς ἄρχεται γονεύειν τὸν εἰς νέωτα καρπὸν. ἐὰν οὖν ὁ καρπὸς<sup>3</sup> μὴ παρεθῇ, καλῶς γονεύσει. βλαστάνει δὲ μέχρι που<sup>4</sup> Κυνὸς ἐπιτολῆς, ὅταν δὲ ἐπιτείλῃ, παύεται τὰ μέλλοντα καλῶς ἐγκύμονα γίνεσθαι· θερμαίνοντος γὰρ τοῦ ἡλίου τὸ προηγούμενον τῶν βλαστῶν ἀπαλὸν ἀποσκληρύνεται καὶ παύεται· πεπαυμένης δὲ τῆς αὐξήσεως, φύσει ἔχει<sup>5</sup> συνίστασθαι τὴν ὑγρότητα

<sup>1</sup> Gaza (*pendula racemi*), Scaliger: στρύχιον U.

<sup>2</sup> Itali after Gaza (ἀκμαῖα u): ἀκμαῖα U (-a miswritten N) aP.

<sup>3</sup> U: σκαφητὸς Gaza (*fodiendi cura*), Itali: καιρὸς Wimmer.

<sup>4</sup> ego: τοῦ UN: τῆς aP.

<sup>5</sup> ἔχει U: ἔχει u: ἔχει τὸ Wimmer.

shoot,<sup>1</sup> when it is young and in the process of coming out, profit in time from the spading. Next we must thin again before the vine blooms, since it happens that at this time the "ringlet"<sup>2</sup> is in the process of growth, since the grapes are not yet formed, but after the flower is shed the formation of the ringlet is completed and the grapes are now in the process of formation and growth.

In general the measures that most require timely application are the thinning and the second of the three spadings,<sup>3</sup> since it happens that then the vine feels the impulse to grow both the fruit already present and the shoots in which it is beginning to generate the fruit of the following year. So if the fruit is attended to when it is still forming the vine will generate properly. It keeps adding to the growth of the shoots until about the rising of Sirius, but after that the parts that are to have a good pregnancy stop growing, since with the heat of the sun the delicate end of the shoot gets hardened and stops, and once the growth ceases the fluid of the shoot (it is said) tends naturally to become set, and

<sup>1</sup> That is, the shoot which will bear next year (*cf. CP 3 16. 2*).

<sup>2</sup> The inflorescence.

<sup>3</sup> For the first spading *cf. CP 3 12. 2*; for the second *cf. CP 3 16. 1*; for the third spading (the "dusting") *cf. CP 3 16. 3*.



τοῦ βλαστοῦ, καὶ ἐκ ταύτης φύεσθαι τὸν καρπὸν.  
 ὅσα δ' ἐν παλινοσκίοις ἢ ἐνύδροις<sup>1</sup> ἐστί, κρατεῖ τοῦ  
 16.3 ἡλίου καὶ πλείω χρόνον αὐξεται. καιρὸν δέ τινα  
 ζητεῖ καὶ ἡ διαστολή καὶ ἡ κόλουσις, οὐ μὴν ἀση-  
 μόν γ' ὁμοίως οὐδὲ χαλεπὸν καταμαθεῖν.

τὴν δ' ὑποκόμισιν, τὸ μὲν ἐν τοῖς πρώτοις και-  
 ροῖς, ὅταν ἀρχωνται περκάζειν οἱ βότρυες, μὴ ἔαν  
 ἄχρι οὗ πεπανθῶσιν, ὀρθῶς ἔχει· κωλύουσι γὰρ  
 τὴν ὀρμὴν τῆς πέψεως, ἀντιπῶντες ἑτέρα κινή-  
 σει (διὸ καὶ οὐδὲ τὴν πῶαν οἴονται<sup>2</sup> δεῖν ἐκτίλ-  
 λειν)· ὡς <δ'><sup>3</sup> ὄλωσ ἀχρεῖον καὶ βλάπτου, οὐκ  
 ὀρθῶς· ἢ τε γὰρ χρεια μαρτυρεῖ καὶ τὸ ἐφ'<sup>4</sup> ἐτέ-  
 ρων γινόμενον· οἱ γὰρ σίκυοι δοκοῦσι τρέφεσθαι  
 τούτω καὶ ἀπαλώτεροι γίνεσθαι κατακρυπτόμενοι  
 τῷ κονιορτῷ, διὸ καὶ Μεγαρεῖς<sup>5</sup> κρύπτουσι.

16.4 θαυμάζεται δ' εἰ ξηρὸς ὢν τρέφει· τὸ δ' αἴτιον

<sup>1</sup> U: ἐφύδροις Schneider.

<sup>2</sup> u: οἴοντε U: οἴον τι N aP.

<sup>3</sup> Heinsius after Gaza.

<sup>4</sup> N aP: ἐφ' U.

<sup>5</sup> u aP: μεγάρεις U: μεγάρης N.

<sup>1</sup> The same as training, for which see CP 3 13. 1–4.

<sup>2</sup> The same as pruning: cf. CP 3 14. 1–3 15. 5.

<sup>3</sup> The same as the third spading; for the three cf. CP 3  
 16. 2. Cf. HP 2 7. 5, cited in note 2 on CP 3 10. 1.

from this fluid comes the fruit. Vines however in  
 shady or well-watered land prevail over the sun  
 and keep growing longer. Spreading the vine<sup>1</sup> and  
 16.3 removal of parts<sup>2</sup> also require timing, but here  
 there is no such absence of guidance and no such  
 difficulty in determining the right moment.

As for dusting<sup>3</sup> the fruit, we get one good piece of  
 advice and one bad. The good advice is not to  
 neglect it at first, when the clusters are beginning to  
 turn dark, and wait until they are ripe; for the  
 notion behind the advice is to slow down the move-  
 ment toward concoction by opposing to this move-  
 ment another (which is why the experts would not  
 even have the weeds pulled up).<sup>4</sup> The bad advice is  
 to dismiss dusting as quite useless and in fact harm-  
 ful,<sup>5</sup> since its usefulness is attested by growers'  
 resorting to it and by results in other plants: so  
 gourds are considered to be fed by dust and become  
 tenderer when covered with it, which is why the  
 Megarians hoe dust over them.<sup>6</sup>

That dust, which is dry, should feed a plant, is 16.4

<sup>4</sup> Presumably the delay in concoction allows more fluid  
 to collect in the fruit.

<sup>5</sup> Cf. HP 2 7. 5: "But some deny that one should dust the  
 vine or touch it at all when the cluster is turning dark, but  
 only (if at all) when it has become dark; and some hold that  
 one should not even touch the vine then, except to pull out  
 the weeds."

<sup>6</sup> Cf. HP 2 7. 5, cited in note 2 on CP 3 10. 1.

ἴσως ἐκ πλειόνων ἂν εἶη· καὶ τῷ κινουμένης τῆς γῆς ἀναδίδοσθαι τροφήν ἐνίκμου τινὸς ἀέρος (ὡς περ ἐπὶ τῶν αὐχμωδῶν<sup>1</sup> ἐλέχθη), καὶ τῷ προβολῆν ἅμα πρὸς τὸν ἥλιον εἶναι· καὶ ἔτι καταξηραίνόμενος<sup>2</sup> ἀπαλῆ ξηρότητι καὶ μαλακῇ μᾶλλον ἐπισπᾶται τὴν τροφήν ἐκ τῆς ἀμπέλου· πάντα γὰρ ταῦτα συνεργεῖ καὶ πρὸς εὐτροφίαν καὶ πέψιν.

ἢ δὲ τῶν σικύων κατάκρυψις<sup>3</sup> οὐκ ἄλογος· ἀναξηραίνων γὰρ ὁ ἥλιος σκληρύνει (διὸ καὶ ὑπὸ τὰ φύλλα κρύπτουσιν)· ὡστ', ἐπιβολῆν ἔχοντες καὶ βρεχόντων,<sup>4</sup> ἀμφοτέρως<sup>5</sup> εὐτραφεῖς<sup>6</sup> γίνονται καὶ ἀπαλοί.

καὶ περὶ μὲν ἀμπέλων ἰκανῶς εἰρήσθω.

17.1 πάντων δὲ ἰδιώτατον εἶναι δοκεῖ τῶν<sup>7</sup> κατὰ τὰς θεραπείας οἱ ἅλεις οἱ τοῖς φοίνιξι παραβαλλόμενοι, καὶ γὰρ πρὸς εὐβλαστίαν καὶ πρὸς εὐκαρ-

<sup>1</sup> Schneider: ἀτμοδῶν U.

<sup>2</sup> Schneider: εἴ τι καταξηραίνόμενον U.

<sup>3</sup> u: κατάκρυψις U.

<sup>4</sup> ego (βρεχόμενοι Schneider): βρεχομένων U.

<sup>5</sup> Schneider: -ων U.

<sup>6</sup> u aP (εὐτραφεῖς N): εὐτροφεῖς U.

<sup>7</sup> u: τὸν U.

<sup>1</sup> CP 3 10. 1.

wondered at. The explanation would perhaps come from several circumstances: not only is food, consisting of a kind of air with moisture in it, given to the plant when the soil is turned up (as we said<sup>1</sup> in speaking of rainless country), and not only is dust at the same time a screen against the sun, but furthermore the cluster, when dried by a delicate and gentle dryness, is better at drawing the food from the vine, since all these circumstances work together for both good feeding and concoction.

The covering of cucumbers with dust is not unreasonable. For the sun dries them out and so makes them hard, which is why growers also hide them under the leaves. So there are two ways for them to become plump and tender: you cover them or water them.<sup>2</sup>

Let this discussion suffice for the vine.

### *Salting the Date-Palm*<sup>3</sup>

Of all agricultural procedures the most unique is held to be the application of lumps of salt to the date-palm, since the procedure promotes not only 17.1

<sup>2</sup> Cf. HP 2 7. 5, cited in note 2 on CP 3 10. 1.

<sup>3</sup> Cf. CP 2 5. 3 and HP 2 6. 2 (of the date-palm): "... it likes briny ground. Hence where the ground is not briny the growers sprinkle salt round the tree. One must not do this close to the roots, but at a distance, and sprinkle about a twelfth of a medimnus."

πίαν χρήσιμον<sup>1</sup> (ἐπεὶ ὅσα γε πρὸς λατρείαν τινὰ τῶν τοιούτων ἢ φυλακὴν, οὐδὲν ἄτοπον, οἷον ἢ τέφρα ταῖς τε συκαῖς καὶ τῷ πηγάνω, ξηρὰ γάρ,<sup>2</sup> πρὸς τὸ μὴ σκωληκοῦσθαι, μηδὲ σήπεσθαι, τὰς ῥίζας · βοηθεὶ γὰρ καταξηραίνουσα).

- 17.2 περὶ δὲ τῶν ἁλῶν,<sup>3</sup> ἢ τῆς ἄλμης ἣν παρέχουσιν (οἱ μὲν γὰρ οὕτως ποιοῦσιν, οἱ δ' ἐκείνως [ποιοῦσιν]<sup>4</sup>), ἀπλή μὲν τις αἰτία, διότι φιλεῖ χωρία ἁλμυρώδη. σημεῖον δέ · ὅτι παρ' οἷς πλῆθος φοινίκων, ἐν τούτοις ἐστίν, οἷον Λιβύῃ Συρίᾳ ταῖς ἁλλαις, ὥστε καθάπερ<sup>5</sup> οἰκείαν τινὰ βοήθειαν βοηθοῦσι διὰ τῶν ἁλῶν.<sup>6</sup> ὅτι μὲν γὰρ ὁ φοῖνιξ χαίρει τῷ ἁλμῶδει, κοινὴ τις <ἄν> αἰτία λέγοιτο<sup>7</sup> περὶ πάντων ὅσα ζητεῖ τόπους διαφόρους, ἀπὸ τῶν πρώτων καὶ μεγίστων ἀρχομένοις, οἷον ἐνὺδρων χερσαίων, καὶ ὅσαι δὴ καθ' ἑκάτερα τούτων διαφοραὶ · δῆλον γὰρ ὡς τῇ κράσει πως σύμμετροί τε
- 17.3

<sup>1</sup> N aP : χρήσιμοι U.      <sup>2</sup> γάρ U : Schneider deletes.

<sup>3</sup> u : ἁλλων U N aP.      <sup>4</sup> Schneider.

<sup>5</sup> Wimmer : ὡςπερ καθάπερ U N : καθάπερ γὰρ aP.

<sup>6</sup> u N P<sup>c</sup> : ἁλλων (ἄλλων U) aP<sup>ac</sup> (?).

<sup>7</sup> Wimmer : αἰτία λέγοιτο u (no accents U) N : αἰτία λέγοιτ' ἄν aP.

<sup>1</sup> Cf. HP 2 7. 6 (treatment of running to leaf): "In the fig in addition to cutting off roots they scatter ashes round it ..."

foliage but fruitfulness. As for such measures as have a curative or preventive effect, there is nothing strange about them, for instance the application of ashes (since they are dry) to fig-trees<sup>1</sup> and rue<sup>2</sup> to keep the roots from worms and decomposition, the ashes acting against this by drying the roots.

As for the salt or brine that they apply—some do it with salt, some with brine—there is a simple reason: the date-palm likes salty ground. Proof is the presence of salty ground wherever date-palms abound, as in Libya, Syria and elsewhere<sup>3</sup>; and so when the lumps of salt are applied the help is (as it were) from home. As for the reason why the date-palm likes salinity, a general sort of reason could be given, one of common application to all plants that seek special localities, beginning with the first and largest classes, aquatic and terrestrial,<sup>4</sup> and the various subdivisions of each: the regions evidently

17.3

<sup>2</sup> Cf. CP 5 6. 10.

<sup>3</sup> Cf. HP 2 6. 2 (of the fondness of the date-palm for salty ground): "They also take as proof of its liking such ground the fact that wherever date-palms abound the ground is salt; so they say that in Babylonia it is salty where the date-palms grow, and also in Libya and Egypt and Phoenicia, and in the valley of Syria where their numbers are greatest the dates that can be kept are produced in only three districts, and these are salty . . ."; cf. also HP 4 2. 5 for the association of the tree with brine in Libya.

<sup>4</sup> For the distinction see note *a* on CP 2 3. 5.

καὶ οἰκέοι καθ' ἕκαστα τυγχάνουσιν, ὥσπερ ἐπὶ τῶν ζώων · ὁ γὰρ αὐτὸς λόγος καὶ περὶ τούτων καὶ ἡ αὐτὴ ζήτησις.

οὐ μὴν ἀλλ' εἴ γε τι καὶ περὶ τούτων ἴδιον χρῆμα εἰπεῖν, ἐν ἀμφοῖν τὴν αἰτίαν ζητητέον, ἐν τε τῷ τὴν γῆν ποιᾶν τινα ποιεῖν, καὶ ἐν τῷ τὰς ῥίζας, ἅπερ ἄμφω συμβαίνει διὰ τῶν ἁλῶν · τὴν μὲν γὰρ ποιοῦσιν κούφην καὶ χαύνην, τὰς δὲ ῥίζας εὐτραφεστέρας καὶ παχυτέρας, ὀλκοτέρας τε<sup>1</sup> ποιῶντες τῷ πόρους τινας ἀνοίγειν καὶ ἔτι τῷ<sup>2</sup> καταψύχειν, ὅπερ ἡ κόπρος οὐ ποιεῖ διὰ τὸ ἔμπυρον.

17.4 ὁ δὲ φοῖνιξ τὸν μὲν ἀέρα τὸν περιέχοντα ζητεῖ θερμόν, οὕτως γὰρ ἡ πέπανσις τοῦ καρποῦ, τὰς δὲ ῥίζας καταψύχεται, διὰ τὴν ξηρότητα, τοῦτο δὲ ποιοῦσιν οἱ ἄλλοι. ὅθεν καὶ τοῖς μὲν χρώνται Βαβυλώνιοι, τῇ κόπρω δὲ οὐ<sup>3</sup> χρώνται.

τοῦ<sup>4</sup> δὲ μόνῳ τούτῳ συμφέρειν τὴν ιδιότητα τῆς φύσεως αἰτιατέον · ὥσπερ γὰρ τὸ ξύλον, καὶ

<sup>1</sup> U: ἐλκτικωτέρας Wimmer.      <sup>2</sup> τῷ u: τὸ U.

<sup>3</sup> U<sup>css</sup>: U<sup>t</sup> omits.      <sup>4</sup> U<sup>cc</sup>: το U<sup>ac</sup>: τῷ N a(τῷ)P.

<sup>1</sup> Cf. *HP* 2 6. 3 (of the date-palm): "... as to manure there is a dispute. Some say that it does not like manure and that manure is instead extremely bad for it; others say that they employ it . . . , but that one must give it plenty of water poured over the manure, as is done in Rhodes."

by their tempering of qualities somehow happen to be just right and appropriate for the various different plants, just as they are for the different animals (for the same explanation and the same question applies to animals too).

Still if we must give some special explanation for this phenomenon as well, we must look for the reason in both things: in the imparting of a certain quality to the earth and again to the roots, and both results are effected by the salt, for it makes the earth light and loose, and the roots plumper and thicker, since it not only renders them more capable of attracting food by opening certain passages in them, but again cools them (which manure does not do because of its great heat).<sup>1</sup> And although the

17.4

date-palm likes heat in the surrounding air, since the ripening of the fruit depends on this, it likes its roots cool because of its dryness, and this is done by the salt. Hence the Babylonians use salt but no manure.<sup>2</sup>

That salt is good for this tree alone must be accounted for by its special nature; for just as its wood differs from all other wood,<sup>3</sup> so too its roots

<sup>2</sup> Manure is heating: cf. *CP* 3 6. 1.

<sup>3</sup> Through its own nature it gives an evil smoke (*HP* 5 9. 4). It was supposed to arch upward under pressure: cf. *HP* 5 6. 1; Aristotle, Fragment 229 (ed. Rose<sup>3</sup>); Plutarch, *Natural Questions*, chap. xxxii; Xenophon, *Cyropaedia*, vii. 5 11. The notion may have owed something to the Greek word for "resist" (*ἀνταθεῖν*), literally "push back."

αἱ ρίζαι διάφοροι τῶν ἄλλων, διόπερ ἀναδηχθεῖσαι<sup>1</sup> μᾶλλον ἐπισπῶνται τὴν τροφήν, καὶ αὐταὶ<sup>2</sup> ἀρκοῦνται<sup>3</sup> καὶ τὸ ὅλον δένδρον αὐξοῦσιν.

- 17.5 ποιεῖ δὲ καὶ ὡς<sup>4</sup> ἡ γεωργία τὰς ρίζας πάντων ὀλκοτέρας<sup>5</sup> (οὕτω γὰρ καὶ ἐξημεροῦνται τῶν ἀγρίων ἔνια), καὶ ἡ κόπρος δ' <ἡ><sup>6</sup> ἰσχυροτάτη τὸ αὐτὸ τοῦτο δρᾷ, καθάπερ ἡ σκυτοδεισική τὰς τῶν μυρρίνων καὶ οὖρον παραχέομενον, ἄμφω γὰρ διαδύνεται μᾶλλον (αἱ δὲ ρίζαι δέονται τῆς ἀναδηχέως καὶ τῶν ἄλλων), ὡσαύτως καὶ τῶν ροιῶν· καὶ γὰρ ταύταις παραχέουσι καὶ τὴν σκυτοδεισικήν παραβάλλουσιν, πλὴν οὐχ ὁμοίως καὶ τοῖς
- 17.6 μυρρίνοις, ἀλλ' ἦττον. αἱ δ' ὑγραὶ καὶ σαρκώδεις οὐ δέονται τῆς ἀναστομώσεως καὶ δῆξεως.

ὅλως δ' αἱ μεταβολαὶ τῶν δένδρων διὰ τὰς θεραπείας ὥστε ἐξ ὀξέων καὶ πικρῶν γλυκέα

§ 5 line 7 *Geoponica*, iii. 3. 4: τούτω τῷ μηνί (March) ταῖς ρίζαις τῶν ἀμυγδαλῶν κόπρον χοιρίαν ἐπιθήσομεν· τὰς τε γὰρ πικρὰς γλυκέας ποιεῖ καὶ μείζους καὶ τρυφεράς, ὡς Ἀριστοτέλης (*Frag.* 277 *Rose*<sup>3</sup>) φησί. Θεόφραστος δὲ οὖρον ταῖς ρίζαις ἐπιχέει φησί.

<sup>1</sup> U: ἀναδειχθῆσαι U: ἀναδειχθεῖσα N: ἀναδειχθεῖσαι aP.

<sup>2</sup> Scaliger (*sibi* Gaza): αὐταὶ U<sup>c</sup> from αὐ-.

<sup>3</sup> U: αὐξοῦνται Link.

<sup>4</sup> U: Gaza omits: ὡς <οἱ ἄλλες> Schneider.

<sup>5</sup> Schneider: ἀλκιμωτέρας U.

differ from all others, which is why they attract food better on being irritated, and so get their need of it themselves and make the whole tree grow.

*Further Cases of Improvement Through Irritation of the Roots*

Just as husbandry makes the roots of all plants 17.5 better able to attract (this being how some wild plants<sup>1</sup> are turned into cultivated ones), so again the strongest manure does the same, as when tanner's manure and urine are applied to the roots of the myrtle,<sup>2</sup> since both substances are more penetrating (but the roots of the rest require irritation too<sup>3</sup>) and so also do those of the pomegranate,<sup>4</sup> for here too urine is poured and tanner's manure applied, although not to the same extent as with the myrtle, but less. Succulent and fleshy roots on 17.6 the other hand do not require this opening of passages and irritation.

Indeed the changes by husbandry that turn a tree from sharp and bitter to sweet,<sup>5</sup> as with pome-

<sup>1</sup> Cf. *HP* 2 2. 9, 2 2. 12; *CP* 2 14. 2. At *HP* 3 16. 1–2 filbert is mentioned (which is transplanted); at *HP* 2 4. 1 wild barley and wild wheat. <sup>2</sup> Cf. *CP* 3 9. 3.

<sup>3</sup> At *CP* 3 9. 2 almond and olive are mentioned in this connexion (besides myrtle and pomegranate).

<sup>4</sup> Cf. *CP* 3 9. 3; 2 14. 2. <sup>5</sup> Cf. *CP* 3 9. 3.

<sup>6</sup> Schneider: δ' U (δ: N: δε P: δη a).

17.7 γίνεσθαι, καθάπερ αἱ τε ῥόαι καὶ αἱ ἀμυγδαλαὶ  
καὶ εἴ τι ἄλλο, τῶ<sup>1</sup> τὰς ῥίζας ἀλλοιοῦσθαι· μετα-  
βάλλουσιν οὕτω τὴν γῆν καὶ τὴν τροφήν.<sup>2</sup> ταύτη  
μὲν γὰρ<sup>3</sup> ἐπὶ<sup>4</sup> τρία ἢ τέτταρα ἔτη γίνονται,<sup>5</sup> ἐπὶ  
τοσοῦτον γὰρ ἡ θεραπεία· ῥόα δ' αἱ ῥίζαι<sup>6</sup> δια-  
μένουσιν καὶ τὸν<sup>7</sup> πλείω χρόνον. μεταβολὴ δ' εὐ-  
λόγως τῶν καρπῶν ἐκπεττομένης μᾶλλον τῆς  
τροφῆς· ἐκπέττεται δὲ τῶ τοιοῦτω,<sup>8</sup> <τῶ><sup>9</sup>  
ποιάν τινα τὴν ῥίζαν εἶναι. τὸ δ' ὄλον (ὥσπερ καὶ  
πρότερον ἐλέχθη περὶ τῶν σπερμάτων) κινουμέ-  
νης καὶ μεταβαλλούσης τῆς ἀρχῆς συμμεταβάλλει  
καὶ τὰλλα, καὶ ἡ ὅλη φύσις· αἱ τροφαὶ δὲ κινουσι  
καὶ ἐξαλλοιοῦσιν ἐὰν πλείω γίνωνται χρόνον.  
(ἐπεὶ [δὲ])<sup>10</sup> καὶ ὅσα τοῖς θερμοῖς ἀρδευόμενα  
βελτίω, καθάπερ ἡ τε μηλέα δοκεῖ ἡ ἡρωνή καὶ ὁ  
μύρρινος· καὶ γὰρ οὕτως<sup>11</sup> ἀπύρηνος, ὡς φασιν,

<sup>1</sup> τῶ υ: το U (τὸ N aP): <ὥσπερ> τῶ Schneider.

<sup>2</sup> μεταβάλλουσιν . . . τροφήν U: οὕτω καὶ τὴν γῆν καὶ τὴν τρο-  
φήν μεταβάλλει Schneider: μεταβάλλει· μεταβάλλουσι δὲ κατὰ  
τὴν γῆν καὶ τὴν τροφήν Wimmer.

<sup>3</sup> ego (γλυκέα μὲν οὖν Wimmer): αὕτη μὲν γὰρ U.

<sup>4</sup> U: μετὰ Schneider.

<sup>5</sup> UN: γίνεται aP.

<sup>6</sup> ego (*radices punicae* Gaza: ῥόας δὲ ῥίζαις Schneider):  
ῥόας δὲ πικραὶ Wimmer): ῥοαὶ δὲ ῥίζαι U.

<sup>7</sup> τῶα Wimmer: Schneider omits.

17.7 granate and almond and any other there may be,<sup>1</sup>  
are due to alteration in the quality of the roots<sup>2</sup>; and  
it is to bring this about that growers make changes  
in the soil and in the food. For the almond these  
changes last from three to four years (for the special  
tendance is kept up that long), whereas in the pome-  
granate the roots remain unaltered even longer. It  
is reasonable that the fruit should change with more  
thorough concoction of the food; and the better con-  
coction comes from this: that the root has a certain  
quality. And in general (as was said earlier<sup>3</sup> about  
seeds), when the beginning is influenced and  
changes, the rest of the plant and its entire nature  
changes along with it; and the type of food  
influences the beginning and alters its quality if  
maintained for some time. (Indeed there are trees  
that improve on being watered with warm water, as  
the spring apple<sup>4</sup> and myrtle are considered to do.  
In fact under this treatment too<sup>5</sup> the myrtle, they

<sup>1</sup> No other is elsewhere mentioned: cf. *HP* 2.2. 9, 11  
(reading at 2.2. 9 καθάπερ ἡ τε for Wimmer's ἀπαγριοῦται and  
καὶ ἀπορῆ τε of U). <sup>2</sup> Cf. *CP* 2.14. 2-3.

<sup>3</sup> *CP* 2.14. 3; 3.9. 4.

<sup>4</sup> This watering with warm water is not mentioned else-  
where in the *CP* or *HP*. Conceivably the warm springs of  
Thrace (*CP* 2.5. 1) may be meant.

<sup>5</sup> Manuring does the same: cf. *CP* 3.9. 3, 3.17. 5.

<sup>8</sup> [τοιοῦτω] Gaza, Schneider. <sup>9</sup> ego.

<sup>10</sup> Gaza, Schneider. <sup>11</sup> UN: οὕτως aP.

γίγνεται, καὶ ἐξ ἀρχῆς οὕτω συνώφθη κατὰ σύμπτωμα, πρὸς λουτρὸν<sup>1</sup> ὄντος μυρρίνου καὶ ἐξημελημένου· τούτου γὰρ ἀπυρῆνου γενομένου, λαμβάνοντες ἐφύτευον, ὅθεν τὸ γένος Ἀθήνησι γέγονεν.)

ἀλλὰ ταῦτα μὲν ἔχοντά τινα ὁμοιότητα πρὸς πίστιν εἴρηται τῶν ἐξ ἀρχῆς.

17.8 ἢ δ' ἀλυκότης τῶν ὑδάτων ὅτι καὶ τῶν λαχανωδῶν [τινα]<sup>2</sup> τισιν ἀρμόττει, καὶ διότι τῶ λίτρῳ χρῶνται πρὸς ἔνια, πρότερον εἴρηται, διὸ καὶ τοῦθ', ὡς ἔοικεν, ὡς<sup>3</sup> οἰκείου παραληπτέον· ἀπὸ γὰρ τούτων δῆλον ὅτι καὶ τῆς τροφῆς καὶ τούτων ἢ γλυκύτης. ἀλλὰ τοῖς μὲν, ἧ<sup>4</sup> πικρότης τις ἐν τοῖς χυλοῖς σύμφυτος, τῶ δὲ φοίνικι, στρυφνότης, ἦν ἐξαιρουσιν εὐθὺς οἱ ἄλλες ἐκ τῆς πρώτης ἀρχῆς.

περὶ μὲν οὖν τῶν ἄλων<sup>5</sup> ἰκανῶς εἰρήσθω.

18.1 τὸ δὲ μὴ ἐπιμένειν ἐπὶ τῷ θήλει φοίνικι τὸν

<sup>1</sup> ego: λουτρῶν U<sup>ar</sup>: -ῶι U<sup>r</sup> (-ῶ N aP). <sup>2</sup> Itali.

<sup>3</sup> ego (Gaza omits: Schneider deletes): ἔοικὸς U.

<sup>4</sup> ego (Schneider deletes): ἧ U: ἦ u. <sup>5</sup> u: ἄλων U.

<sup>1</sup> It was not manured.

<sup>2</sup> CP 3 17. 5-7. <sup>3</sup> CP 3 17. 3-4.

say, comes to have no stones. The idea of so treating it came by accident, from a myrtle facing a bath and neglected by the grower.<sup>1</sup> For when this myrtle turned out to have no stones, slips were taken from it and planted, and from these the variety at Athens has its origin.)

But all this,<sup>2</sup> bearing as it does a certain similarity to the case of the date-palm, is adduced to make the initial explanation<sup>3</sup> more convincing.

We said earlier<sup>4</sup> that salinity is also suited to 17.8 some vegetables, and that soda is used with others. And so it seems we must accept the salinity here too as appropriate to the plants, since it is evident that the sweetness of these vegetables too comes from the saline water and the food. But the sweetness comes about in the vegetables insofar as their juices have a certain native bitterness<sup>5</sup>; and in the date-palm there is a certain astringency, which the lumps remove at the start from the beginning<sup>6</sup> of the tree.

Let this suffice for the discussion of the salt.

*Another Unique Feature in the Care  
of the Date-Palm*

That the fruit does not remain on the female 18.1

<sup>4</sup> CP 2 5. 3.

<sup>5</sup> Cf. CP 2 5. 4; 6 10. 8.

<sup>6</sup> That is, the roots.

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καρπὸν, ἂν μὴ τὸ τοῦ ἄρρενος ἄνθος κατασεισῶσιν ἅμα τῷ κονιορτῷ κατ' αὐτοῦ (καὶ γὰρ τοῦτο λέγουσί τινες), ἴδιον μὲν παρὰ τὰ ἄλλα, παρόμοιον δὲ τῷ ἐρινασμῷ τῶν συκῶν. ἐξ ὧν καὶ τὸ τελειογονεῖν μηδ' αὐταρκες εἶναι τὸ θῆλυ μάλιστα ἂν τις ἐπαγάγοι, πλὴν ἐχρῆν τοῦτο μὴ ἐφ' ἑνὸς ἢ δυοῶν, ἀλλ' ἐπὶ πάντων ἢ τῶν πλείστων εἶναι· τὴν γὰρ φύσιν οὕτω κρίνομεν<sup>1</sup> τοῦ γένους. ἀποπώτατον δὲ καὶ ἐπ' αὐτῶν τούτων <τὸ> τοῦ<sup>2</sup> φοίνικος, ὁ γὰρ ἐρινασμός δοκεῖ φανεράν ἔχειν τὴν αἰτίαν. ἀλλὰ περὶ μὲν τούτων ἄλις.

18.2 ἡ δὲ τῶν ἄλλων ἰδιότης, ὅσων<sup>3</sup> ἐστίν, συμφανεστέρας ἔχει τὰς αἰτίας, οἷον ὡς τὴν ἀμυγδαλὴν,

<sup>1</sup> U<sup>r</sup> N aP : κρίνωμεν U<sup>ar</sup>.

<sup>2</sup> a : τοῦ UN : τὸ P.

<sup>3</sup> Schneider : ὅσον U.

<sup>1</sup> Cf. *HP* 2 6. 6 (of the date-palm): "... there are males and females; these differ in that the male first bears a flower on its spathe, whereas the female bears a small fruit directly."

<sup>2</sup> Cf. *HP* 2 8. 4 (of the remedy for fruit drop in the date-

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date-palm<sup>1</sup> unless you shake the flower of the male over it together with the dust<sup>2</sup> (this too<sup>3</sup> being reported by some) occurs only in the date-palm, but is similar to the caprification of fig-trees.<sup>4</sup> From these instances one would be most inclined to infer that even a female tree cannot by itself bear completely formed fruit; except that this should hold not of just one or two female trees but of all or most of them, since this is how we decide the nature of the class of females. And in the cases before us that of the date-palm is very strange indeed, since caprification is considered to have a clear explanation.<sup>5</sup>

But enough of this.

*Special Feature in the Care of Other Trees*

Where there are distinctive features in the cultivation of other trees the reasons are more obvious. 18.2

palm): "It is carried out as follows: as soon as the male tree blossoms they cut off the spathe on which the flower is with no more ado and shake the downiness and flower and dust over the fruit of the female, and if this is done the female keeps its fruit and does not drop it. It appears that in both date-palm and fig a remedy comes to the females from the male (for they call the fruit-bearer the female), but in the date-palm the remedy is a sort of sexual union, in the other it works in a different way."

<sup>3</sup> The first report told of the application of salt to the roots (*CP* 3 17. 1).

<sup>4</sup> Cf. *CP* 2 9. 15 and *HP* 2 8. 4 (cited in note 2 above).

<sup>5</sup> Cf. *CP* 2 9. 5-6.



ὅταν ἄρχηται καρποφορεῖν, οὔτε ἰδρεύουσιν οὔτε κοπρίζουσιν οὔτε διακαθαίρουσιν (εἰ μὴ τὰ αἶα μόνον), οὐδ' ἄλλο τῶν τοιούτων οὐδὲν δρῶσιν, πάντα γὰρ ἀφαιροῦσιν, ὅπως μὴ ὑπερισχύσασα ἀποβάλλῃ τοὺς καρποὺς ἐν τῷ ἄνθει,<sup>1</sup> διὸ καὶ χώραν οὐκ ἀγαθὴν ζητοῦσιν. ἐὰν δὲ μετὰ ταῦτα ἀκαρπῆ, τὰς τε ῥίζας<sup>2</sup> γυμνώσαντες παραδιδόασιν τῷ χειμῶνι, καὶ τὰς ἄλλας κολάσεις προσφέρουσι τὰς εἰρημένους.

18.3 ὁμοίως δὲ καὶ ὄσων<sup>3</sup> οἱ φλοιοὶ περιαιροῦνται, καθάπερ ἀμπέλου, κεράσου,<sup>4</sup> φιλύρας, καὶ ὄλων τῶν φλοιορραγῶν· αὐτῆ<sup>5</sup> γὰρ ἡ φύσις ἐνταῦθα ἔοικεν ἐπιδεικνύουσα τὸ συμφέρον, ἀφισταμένη καὶ ἀλλότριον ποιούσα· τὸ δ' ἀλλότριον ἅπαν βλαβερόν, ὡσπερ καὶ τὸ αἶον. καὶ τὸ ἐπὶ τῶν ἄλων<sup>6</sup> δὲ

<sup>1</sup> u: ἀνη U: ἀνθεῖν Wimmer.

<sup>2</sup> τὰς τε ῥίζας N<sup>ac</sup> aP (N<sup>cm</sup> inserts before this τὰς τε ῥίζας ζητοῦσιν. ἐὰν δὲ μετὰ ταῦτα ἀκαρπῆς): τὰς τὲ ῥίζας ζητοῦσιν. ἐὰν δὲ μετὰ ταῦτα ἀκαρπῆ τὰς τε ῥίζας U.

<sup>3</sup> u: -ον UN aP.

<sup>4</sup> Schneider (from HP 4 15. 1): κέδρου U.

<sup>5</sup> u aP: αὐτῆ U: αὐτῆ N.

<sup>6</sup> u: ἄλων U.

<sup>1</sup> Such as spading and pulling out the weeds.

<sup>2</sup> Cf. CP 2 16. 8; 3 6. 8.

<sup>3</sup> CP 1 17. 9 with note a and 1 17. 10 with note c; 2 14. 1;

So when the almond starts to bear it is neither watered nor manured nor pruned (except only for removing the deadwood) nor subjected to any other such procedure<sup>1</sup>; for all such tencance is withdrawn so that the tree may not get too strong and drop its fruit in the blossom (this moreover is why the land sought for it is not of the best).<sup>2</sup> If after this it refuses to produce fruit they lay the roots bare for the winter to have its way with them and administer the other "castigations" that we have mentioned.<sup>3</sup>

So too with the trees whose bark is stripped off, 18.3 as the vine, bird cherry, linden and in general trees that have bark which splits.<sup>4</sup> For the tree's own nature here appears to point out a good measure by divesting itself of the bark and making it an alien thing; and everything alien, like deadwood too, is harmful. Similarly with the lumps of salt: wherever

2 14. 4; 2 15. 4.

<sup>4</sup> Cf. HP 4 15. 1-2: "All trees die when the bark is removed all round . . . except perhaps cork-oak . . . Indeed the bark is also stripped from bird cherry, vine, and linden (from this ropes are made) . . . but it is not the important or inmost bark but the surface bark, which also sometimes falls off of its own accord because the other bark grows under it. Indeed some trees have bark that splits, as andrachne and plane. But, as some think, new bark grows under to replace this, whereas the outer bark dries out and splits and falls off of its own accord in many, but not so noticeably."

THEOPHRASTUS

τὸν αὐτὸν τρόπον · ὅπου τις ἰδιότης, οἰκεία πρὸς τὴν φύσιν.

καὶ περὶ μὲν δένδρων ἐκ τούτων θεωρητέον.

- 19.1 ἔχει δὲ ὁμοίως καὶ ἐπὶ τῶν στεφανωματικῶν, καὶ ὅλως τῶν φρυγανικῶν, σχεδὸν δὲ καὶ τῶν λαχανικῶν.<sup>1</sup> τὰ μὲν γάρ ἐστιν κοινὰ πᾶσιν, οἷον ὕδρευσις κόπρωσις<sup>2</sup> ἢ τοῦ ἐδάφους<sup>3</sup> ἐργασία, τὰ δὲ ἴδια καθ' ἑκάστον γένος. οἷον ἢ διακάθαρσις τοῖς φρυγανικοῖς ὁμοίως, ἐν στεφανώμασιν καὶ λαχάνοις, καὶ γὰρ ὁ ἔρπυλλος ἀθαίνεται καὶ μὴ διακαθαίρομενος καὶ τὸ σισύμβριον καὶ τᾶλλα · τὰς δὲ δὴ ῥοδωνιάς<sup>4</sup> οὐ κατακόπτουσι μόνον, ἀλλὰ καὶ ἐπικάουσι, ἀνανθεῖς γὰρ γίνονται καὶ ἐκλοχμοῦνται, μὴ τοῦτο πάσχουσαι, δι' εὐτροφίαν.
- 19.2 καὶ ἡ ῥάφανος δὲ καὶ τὸ πήγανον ἀποσκληρύνον-

<sup>1</sup> U : λαχανηρῶν Schneider.

<sup>2</sup> u (cf. HP 2 7. 1 : κόπρωσις Scaliger) : κόπρωσις UN aP.

<sup>3</sup> Wimmer : ὕδατος U.

<sup>4</sup> ego : -ίας U.

<sup>1</sup> CP 3 2. 1-3 18. 3.

<sup>2</sup> For undershrubs cf. CP 3 7. 11. Cf. also HP 2 7. 1 of trees: "In the matter of cultivation and care some procedures are common, others are confined to this or that

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there is something special to the tree, it is appropriate to the tree's nature.

The measures taken with trees, then, are to be studied in the light of the foregoing discussion.<sup>1</sup>

*Measures Taken with  
Undershrubs and Vegetables*

The case is similar with coronaries, and indeed 19.1 with undershrubs in general, and even (one might add) with plants of the vegetable kind. So some procedures apply to all, such as watering, manuring and working the soil, whereas others are special to a class. For example pruning the stems is found in coronaries and vegetables, just as it is in undershrubs,<sup>2</sup> for tufted thyme will wither when it is not also pruned, as will bergamot mint and the rest.<sup>3</sup> As for rose bushes, they are not merely pruned to the ground but also burned over,<sup>4</sup> since if this is not done they fail to flower and turn into thickets because of their rich feeding. Again cab- 19.2

tree. Spading, watering and manuring are common, and furthermore pruning the stems and removing deadwood."

<sup>3</sup> That is, the other coronaries which (like tufted thyme, bergamot mint and rose) are also undershrubs.

<sup>4</sup> Cf. HP 6 6. 6 (of the rose bush): "When burned over and cut short it bears a better flower, for when not disturbed it grows out and turns into a thicket."

ται καὶ ἀποξηραίνονται, κολουσθέντα δὲ καὶ πα-  
 λιμβλαστῆ γενόμενα, μείζω καὶ καλλίω καὶ εὐχυ-  
 λότερα· δεῖ γὰρ καὶ τῶν χυλῶν καὶ τῶν ὀσμῶν  
 ἀφαιρεῖσθαι τὸ ἄγαν δριμύ, τῇ γὰρ μεσότητι τὸ  
 ἥδυν καὶ τὸ σύμμετρον. ἐν δὲ τοῖς λαχάνοις ἀφαι-  
 ρεῖς μὲν οὐκ ἔστιν, πλὴν ὅσα κειρόμενα καλλίω,  
 19.3 καθάπερ τὸ πράσον ἢ εἴ τι<sup>1</sup> τῶν πολυβλαστῶν. ἢ  
 δὲ τῶν παραφυομένων<sup>2</sup> ἐξαιρέσεις, καὶ ἡ αὐτῶν  
 τῶν ὁμογενῶν, ὅταν ἦ πυκνά, καθαπερεὶ<sup>3</sup> διακά-  
 θαρσις γίνεται, τροφήν πλείω ποιῶσα καὶ αὔξησιν  
 τοῖς λοιποῖς.

ἔχει δὲ καὶ ἰδιότητος ἕνια, καθάπερ ἐπὶ τοῦ  
 πηγάνου πρότερον ἐλέχθη, καὶ ἐπ' ἄλλων ἐστίν.  
 ἀλλὰ ταῦτα μὲν ἐλάττω καὶ σχεδὸν φανερά.

20.1 λαιπὸν<sup>4</sup> δέ, καὶ ὡσπερ ἀντικείμενα τοῖς περὶ

<sup>1</sup> ἢ εἴ τι Wimmer (<καὶ> εἴ τι <ἄλλο> Schneider): ἦτοι U:  
 ἦ τί u N (ἦ τί P): ἦ τι a.

<sup>2</sup> Schneider: παραφυτευομένων U.

<sup>3</sup> u: καθάπερ ἢ U N aP. <sup>4</sup> U: λαιπὰ Schneider.

<sup>1</sup> Cabbage is a vegetable; rue is an undershrub (*HP* 1 3. 2) and vegetable-like (*HP* 6 1. 2).

<sup>2</sup> This is not said elsewhere in the *HP* or *CP* of rue. For cabbage cf. *HP* 7 2. 4: "But this is admitted in the case of cabbage—that if it comes up again it is better eating . . .";

bage and rue<sup>1</sup> get hard and dry, but when they have  
 grown up again after being cut down they are  
 larger, finer and juicier,<sup>2</sup> since the excess of  
 pungency must be removed from juices as well as  
 from odours, since agreeableness and the right  
 degree belongs to the mean. In the vegetables prun-  
 ing is not possible, except with those that improve  
 when cut off at the ground, as the leek and  
 any that will sprout repeatedly.<sup>3</sup> But the removal 19.3  
 of other plants growing with them, and indeed of  
 plants of the same kind when crowded together, is  
 in effect a sort of pruning, since it provides the  
 remainder with more food and lets them grow more.

With some of these plants special measures are  
 also taken, as we said earlier<sup>4</sup> of rue, and as is true  
 of others as well.

But there are fewer such special cases here, and  
 the reasons (one may say) are evident.

#### *Husbandry and Seed-Crops*

What remains are matters that are in contrast 20.1

cf. also *CP* 2 15. 6.

<sup>3</sup> Cf. *HP* 7 4. 10 (of kinds of onion): "The kind called  
*gêteion* (horn-onion) . . . is often cut down, like the leek . . .";  
 cf. also *CP* 2 15. 6.

<sup>4</sup> *CP* 3 17. 1 (ashes used with fig and rue); compare also  
 perhaps *CP* 2 5. 3 (watering with saline water improves  
 beet, rue and rocket among vegetable-like plants).

τὰ<sup>1</sup> δένδρα, τὰ περὶ τὴν ψιλὴν γεωργίαν ἐστὶν ἐνταῦθα δὲ ἢ τε τῆς γῆς κατεργασία, καὶ ἡ τῶν σπόρων ὥρα, καὶ μετὰ ταῦτα σπαρέντων κατεργασία, πρότερον δ' ἔτι<sup>2</sup> τούτων, ἢ καὶ ἅμα, τὴν οἰκείαν ἐκάστω <καὶ><sup>3</sup> σπέρμασιν<sup>4</sup> ἰδεῖν, ὥσπερ καὶ ἐπὶ τῶν δένδρων.

ἔστι δὲ καὶ κατὰ τὰς ἐργασίας τὸ οἰκεῖον, οἷον ἐπὶ τὴν μὲν θέρους μᾶλλον, τὴν<sup>5</sup> δὲ χειμῶνος, νεᾶν ἢ σκάπτειν ἢ τι τοιοῦτον ἕτερον, ἅπερ ἐπιχειροῦσι  
 20.2 τινες διαιρεῖν. δεῖ γὰρ ὡς φασὶν τὴν μὲν ἔπομβρον καὶ στερεὰν καὶ βαρεῖαν, καὶ τὴν πίειραν, θέρους ἐργάζεσθαι καὶ τοῖς ἀρότοις καὶ τῇ σκαπάνῃ, τὴν δὲ ξηρὰν καὶ μανῆν, καὶ τὴν λεπτήν καὶ κού-

<sup>1</sup> u: το U.

<sup>2</sup> u aP: δέτη U: δέ τι N.

<sup>3</sup> ego.

<sup>4</sup> U: σπέρματι u.

<sup>5</sup> τὴν . . . τὴν Wimmer: τῇ . . . τοῦ UN: τοῦ . . . τοῦ aP.

<sup>1</sup> Of the great classes of plants the husbandry of trees (CP 3 2. 6–3 18. 5), of undershrubs (with coronaries, which are partly undershrubs and partly herbaceous plants) and vegetables (CP 3 19. 1–3) has been treated. The remaining class is that of herbaceous plants (CP 3 20. 1–3 24. 4),

(as it were) to the cultivation of trees,<sup>1</sup> to wit the matters concerned with the husbandry of field crops.<sup>2</sup> Here belong the tillage of the ground, the season for the sowing and after these the care of the plants when sown—but coming before these (or else contemporary with them)<sup>3</sup> is seeing with grains too (as we saw<sup>4</sup> with trees) what country is appropriate for each sort.

The question of the appropriate country also applies to differences in tillage,<sup>5</sup> for instance whether to plough or spade or treat in some other such way one kind of country rather in summer, another in winter, distinctions that certain agriculturists endeavour to draw. So they say that country  
 20.2 that is rainy and compact and heavy, and fat soil, should be worked in summer, both by ploughing and spading, whereas dry and open-textured country,

which includes the “seeds” or grains, that is, legumes and cereals.

<sup>2</sup> “Field crops” renders *psilē geōrgia*, literally “bare farming,” that is, the farming of land that is bare (*psilē gē*; cf. CP 3 6. 5) of trees. the phrase therefore contrasts tree-farming with field-farming. Gardening and “summer seeds” are not considered.

<sup>3</sup> Certainly not *after* them.

<sup>4</sup> CP 2 4. 4–5, 7–8.

<sup>5</sup> And not simply to the land sown.

φην, καὶ<sup>1</sup> τοῦ χειμῶνος · δύναται γὰρ ἡ μὲν ξηραίνειν καὶ λεπτύνειν, ἡ δὲ χειμερινὴ παχύνειν καὶ ὑγραίνειν, ἑκατέρα<sup>2</sup> δὲ τούτων δεῖται πρὸς τὸ ἐνδεῆς τῆς φύσεως.

καὶ κοπρῖζειν πλείον μὲν τὴν λυπράν, ἔλαττον δὲ τὴν ἀγαθὴν, καὶ διὰ τὴν ἀρετὴν τῆς γῆς, καὶ διότι τῷ<sup>3</sup> διὰ τὴν κόπρον<sup>4</sup> πλείω λαμβάνειν τροφὴν λοχαῖος πίπτει.<sup>5</sup>

- 20.3 μίσγειν δὲ καὶ τὴν γῆν τὴν ἐναντίαν, οἶον τῇ βαρεῖα τὴν κούφην, καὶ τῇ κούφῃ τὴν βαρεῖαν, καὶ τὴν λεπτὴν τῇ πιεῖρα · ὡσαύτως δὲ καὶ τὴν ἐρυθρὰν καὶ τὴν λευκὴν, καὶ εἴ τις ἄλλη ἐναντιότης. οὐ γὰρ μόνον ἡ μίξις ἀποδίδωσι τὸ ἐλλείπον, ἀλλὰ καὶ ὅλως σφοδροτέρας ποιεῖ, καὶ ἐὰν <ἡ><sup>6</sup> τυχοῦσα ἡ<sup>7</sup> μίξις · οἶον ἐὰν τὴν ἀπειρηκυῖαν καὶ μὴ δυναμένην φέρειν ἑτέρα μίξις,<sup>8</sup> πάλιν φέφει καθαπερανεὶ καινὴ γεγεννημένη, καὶ ἡ καθ' αὐτὴν οὐ φέρουσα, καθάπερ ἡ ἄργιλος, ὅταν μιχθῇ, ποιεῖ φορόν ·<sup>9</sup> ὡσπερ γὰρ κόπρος ἡ ἑτέρα τῇ ἑτέρα  
20.4 γίνεται. διὸ ταύτη<sup>10</sup> ποιοῦσι<sup>11</sup> Μεγαρεῖς,<sup>12</sup> καὶ

<sup>1</sup> [καὶ] Gaza, Scaliger.    <sup>2</sup> u : ἑκάτερα (ἐ- U) N aP.

<sup>3</sup> ego : διατὸ U.

<sup>4</sup> τὴν κόπρον U : ἐκ τῆς κόπρου Schneider.

<sup>5</sup> λοχαῖος πίπτει (sc. ὁ σῖτος) ego (ἡ ὡστε πέττει Itali after Gaza : ἡ λοχαῖος πέττει Scaliger) : λεχέος πίττη U.

and soil that is lean and light, should be worked even in winter, since summer working has the effect of making the soil drier and leaner, whereas winter working makes it thicker and wetter, and each soil needs these qualities to offset what is lacking in its nature.

Again one should (they say) manure poor country more but good country less, both because the soil is excellent in good country and because the grain, by taking too much food on account of the manure, gets heavy-headed and lodges.

They also tell us to mix the soil with its opposite: 20.3 thus we should mix light soil with heavy, heavy with light, fat with lean, and so too with white and red soil and so with other opposites. For the mixture does not merely give the soils what they lack but in fact makes them more vigorous in general, even if the mixture is not with the opposite. So if one takes soil that is worn out and unable to bear and mixes it with another, it bears once more, as if it had become new again; and soil that taken alone does not bear, as clay, when mixed with such worn-out soil, makes it productive, since the one turns out to be (as it were) manure to the other. Hence the 20.4

<sup>6</sup> Schneider.    <sup>7</sup> ἡ aP : ἡ UN.

<sup>8</sup> μίξις u<sup>c</sup> (-εις u<sup>ac</sup>) a : μίξις U : μίξις NP.

<sup>9</sup> Schneider : φόρον U.    <sup>10</sup> ταυτη U : ταῦτα u.

<sup>11</sup> U<sup>c</sup> : ποιοῦσι U<sup>ac</sup> (ut vid.).    <sup>12</sup> u : μεγάρης U.

δι' ἐτῶν πέντε ἢ ἕξ σκάπτοντες βαθεῖαν, ἀναβάλ-  
λουσιν τὴν κάτωθεν ἐφ' ὅσον δικνεῖται τὸ ὕδωρ,  
ἵνα καινὴν ποιῶσιν· ἡ γὰρ τρόφιμος αἰεὶ καταρρεῖ  
ὑπὸ τοῦ ὕδατος.

σπείρειν δὲ κελεύουσι τὴν ξηρὰν καὶ τὴν θερμὴν  
<πρὸ><sup>1</sup> τῶν ὑδάτων, ὅπως λαμβάνουσα πλῆθος  
ὑδατος ἐκτρέφειν δύνηται· καὶ τὴν ἐπομβρίαν δ'  
ὡσαύτως, ἵνα τὰ σπέρματα λαμβάνωσι,<sup>2</sup> καὶ βλα-  
στούντα<sup>3</sup> καὶ ἀξηθέντα θερμῇ τῇ γῆι δυνατώτερα  
δέχεται τὸν ὕμβρον· ἐὰν δὲ μὴ, ἐν ξηρᾷ, προεργα-  
σάμενον<sup>4</sup> τὴν γῆν, ὀψὲ ποιείσθαι τὸν σπόρον.

20.5 σπείρειν δὲ δεῖ τὸν μὲν πρῶτον μανόν, τὸν δὲ  
ὄψιον πυκνόν·<sup>5</sup> ὁ μὲν γὰρ οὐκ ἔχει ρίζωσιν, ὁ δ'  
ἔχει, καὶ γίνεται πολυσχιδής.<sup>6</sup> †

ταῦτα μὲν οὖν καὶ τὰ τοιαῦτα (πλείω γάρ  
ἐστι), διακριβοῦν εἴ τις ἐθέλει τὰς ἐργασίας μάλ-  
λον· ὧν<sup>7</sup> ἕκαστα δεῖ σκοπεῖν πρὸς τὴν χώραν.  
ἐνιαί<sup>8</sup> γὰρ οὐ δέχονται τὰς ἀκριβείας, ἀλλὰ δι-

<sup>1</sup> Gaza (*ante*), Itali.

<sup>2</sup> N aP: λαμβάνουσι U: λαμβάνουσα u: Schneider deletes  
(but for the sense "take hold" cf. HP 6 2. 4, 6 2. 6).

<sup>3</sup> U: βλαστούντα u.

<sup>4</sup> Gaza, Schneider: πρὸς ἐργασάμενος U.

<sup>5</sup> u aP (ὄψιο πυκνὸν N): ὀψιόπυκνον U.

<sup>6</sup> u: -εδής U. <sup>7</sup> [ὧν] Gaza, Schneider.

<sup>8</sup> Gaza, Wimmer: ἐνια U.

Megarians act on these lines, and every four or five  
years spade deep and turn up the bottom soil as far  
down as the rain reaches, in order to make the soil  
new, since the nutritious soil is constantly carried  
down by the rainwater.

As for sowing, we are told to sow dry country and  
hot country before the rains,<sup>1</sup> so that the country,  
getting plenty of rainwater, may be able to bring up  
the plants; and similarly with rainy country, so that  
the seeds may take, and once they have sprouted  
and grown in the earth while it is warm, may  
receive the rains with greater staying power. Fail-  
ing that, one is to make one's tardy sowing<sup>2</sup>  
when the ground is dry, first working the soil over.  
In the early sowing we must sow the grain thin, in  
the late sowing thick,<sup>3</sup> since the late grain does not  
root well, whereas the early does, and comes up with  
many branchings.

These then and the like (for there are more) are  
the precepts if one wishes to enter into the  
refinements of tillage. Each must be examined with  
reference to the country, since some countries reject

<sup>1</sup> The rains that follow the setting of the Pleiades (Nov.  
6–9); cf. CP 3 23. 1.

<sup>2</sup> Cf. Hesiod, *Works and Days*, 479–90 on the conse-  
quences of missing the proper season for sowing.

<sup>3</sup> The early sowing is in autumn, the late in spring. The  
roots of grain sown in spring do not have the benefit of  
winter (cf. CP 2 1. 4).

αμάρτοι ἂν ὁ ποιῶν, ὅπερ ἔπαθέν τις ἀνελθὼν εἰς Συρακούσας ἐκ Κορίνθου τὴν ἐργασίαν τὴν ἐντεῦθεν μεταφέρειν. καὶ ὅς<sup>1</sup> τὸ χωρίον τὸ δοκοῦν ἀγαθὸν ἐκλιθολογήσας διέφθειρεν (ἐξεπήγνυτο<sup>2</sup> γὰρ ὁ σίτος οὐκ ἔχων οὐδεμίαν προβολὴν ἐξαιρεθέντων τῶν λίθων)· καὶ ὅς<sup>3</sup> ἐν Συρίᾳ, κατὰ βάθος<sup>4</sup> ἀρόσας, ἀνεξήρανε<sup>5</sup> (ὑπὸ γὰρ τοῦ θέρους διακαίοντος<sup>6</sup> ἐπὶ πλείον ὑπόπετρος οὖσα δέκακιε <διὸ><sup>7</sup> καὶ μικροῖς ἀρότροις<sup>8</sup> οἱ Σύροι χρῶνται).

[διὸ]<sup>9</sup> ταῦτα μὲν πειρατέον ἐπικρίνειν.

20.6 ὡς δὲ κοινῇ<sup>10</sup> καὶ καθόλου πᾶσι<sup>11</sup> εἰπέειν,

§5 lines 8–16 Pliny, *N. H.* 17. 30: at in Syracusano agro advena cultor elapidato solo perdidit fruges luto, donec regessit lapides. In Syria levem tenui sulco imprimunt vomerem, quia subest saxum exurens aestate semina.

<sup>1</sup> ego (οὕτως Dalecampius : γὰρ Wimmer) : ὡς U.

<sup>2</sup> U<sup>r</sup> (-ντο U<sup>ar</sup>) : ἐξεπίγνωτο N<sup>c</sup> (from -ἐ-) aP.

<sup>3</sup> ego (καὶ ὁ Schneider : καὶ τις Wimmer) : καὶ ὡς U.

<sup>4</sup> U : βάθους W. Müller.

<sup>5</sup> u : ἀρόσασαν ἐξήρανε UN aP.

<sup>6</sup> ego (διακαιομένη <ἡ γῆ> Schneider) : διακαιομένης U.

<sup>7</sup> Schneider (unde fit ut Gaza).

<sup>8</sup> aP : ἀρότροις UN.

<sup>9</sup> Schneider.

<sup>10</sup> κοινῇ u aP : -ῇ UN.

the refinements and one who applied them would fail. This was the experience of a man who returned<sup>1</sup> to Syracuse from Corinth and introduced the practices of those parts. This man ruined a farm of good repute by clearing out the stones, for the grain froze when the removal of the stones left it without protection from the cold. Another man in Syria dried his crop out by ploughing deep,<sup>2</sup> for the soil was now more deeply scorched by the summer heat, and having stones in it scorched the crop (which is why the Syrians use small ploughs).

These are refinements which we must endeavour to pass under review.

*Seed Crops: Ploughing*

But speaking on the general level and including 20.6 all sown crops, the thing of greatest importance and

<sup>1</sup> Perhaps in consequence of Timoleon's invitation to exiles and others to settle in Syracuse (Plutarch, *Timoleon*, chap. xxiii 1–3; about 343 B.C.).

<sup>2</sup> Cf. *HP* 8 6. 3 (of sown crops): "In some countries they say that it is harmful to plough deep; as in Syria, which is why they use small ploughs. Elsewhere cultivation when pushed to extremes does harm, as in Sicily, which is why many foreigners, we gather, fail there."

<sup>11</sup> Wimmer (Gaza omits : Schneider deletes) : φασίν U.

THEOPHRASTUS

μέγιστον μὲν καὶ πρῶτόν ἐστι τὴν<sup>1</sup> σπορευτὴν<sup>2</sup> χώραν κατειργάσθαι<sup>3</sup> καλῶς, εἰς διεργασμένην γὰρ καλῶς πεσὸν τὸ σπέρμα, καὶ ἐκφύεται, διημερωθείσης τῆς γῆς· εἴθ' ἢ κόπρισις ἤδη καὶ ἄλλη καὶ ἄλλη θεραπεία μετὰ ταῦτα διαβεβλαστηκότων, οἷον σκάλισις καὶ ποασμός.

- 20.7 ἡ κατεργασία δὲ<sup>4</sup> ἐν τῷ νεῶν κατ' ἀμφοτέρας τὰς ὥρας, καὶ θέρους καὶ χειμῶνος, ὅπως χειμασθῆ καὶ ἠλιωθῆ ἢ γῆ (καθάπερ καὶ ἐπὶ τῆς φυτείας ἐλέχθη)· πολλάκις γὰρ μεταβληθεῖσα, μανῆ καὶ κούφη φαί καθαρά γίνεται τῆς ὕλης, ὥστε βραδίως ἐκτρέφειν. καὶ διὰ τοῦτο<sup>5</sup> κελεύουσιν οὐδὲ τὰ χεδροπά συμβάλλειν εἰς τὰς νεοῦς<sup>6</sup> (ἐὰν μὴ τι<sup>7</sup> σφόδρα πρῶιον), ὅπως μὴ κωλύωσιν τὴν θερυνὴν νέανσιν. ἀγαθὴν δὲ οἴονται τὴν χιόνα ταῖς χειμεριναῖς νεοῖς, καὶ οὐχ ἥττον τὴν πάχυνην εἶναι,
- 20.8 διεσθίειν<sup>8</sup> γὰρ καὶ μανοῦν τὴν γῆν. καὶ ὅταν μετὰ

<sup>1</sup> Wimmer (*primum est* Gaza: πρῶτον τὸ τὴν Schneider): πρῶτον εἴ τις U: πρῶτον εἴ τι N: πρῶτον εἰ τὴν aP.

<sup>2</sup> R, Stephanus: πορευτὴν U.

<sup>3</sup> u P: κατειργασθαι U: κατειργασθαι N: πατείργασθαι a.

<sup>4</sup> ego: δε κατεργασία U.

<sup>5</sup> U: τοῦτ' οὐ? ego.

<sup>6</sup> ego: νέας U.

<sup>7</sup> Schneider: τις U.

<sup>8</sup> u aP: διαισθίειν U: διεσθίειν N.

DE CAUSIS PLANTARUM III

coming first is that the land to be sown should have been well worked,<sup>1</sup> for when the seed falls on thoroughly well-worked land it also comes up, since the soil has been thoroughly tamed. Next comes manuring and the various operations after these, when the seeds have sprouted, such as hoeing and weeding.

- The working consists in ploughing in both seasons, both in summer and in winter, so that the soil may be exposed to winter and to the sun, a point we also made<sup>2</sup> in treating the planting of trees. For by being turned up often the soil becomes open-textured, light and free of woody plants, so that it can easily bring up the crop. For the reason why we are told not even to put legumes<sup>3</sup> in the ploughed ground, unless the legume is very early,<sup>4</sup> is that they may not interfere with the summer ploughing. Snow is considered excellent for fields ploughed in winter, and hoar-frost no less, for (they say) it eats through the ground and gives it an open texture.<sup>5</sup> Again when farmers after the first
- 20.7
- 20.8

<sup>1</sup> Cf. HP 8 7. 7 (on the importance of various factors for seed crops): "The working of the land contributes also in no small measure and especially the working for the sowing, since when properly worked over the land easily brings forth the crop." <sup>2</sup> CP 3 4. 1.

<sup>3</sup> Legumes renew the soil: cf. HP 8 7. 2, 8 9. 1; CP 4 8. 1.

<sup>4</sup> That is, produces a crop soon after sowing.

<sup>5</sup> Cf. CP 5 12. 7. For snow giving an open texture cf. CP 3 23. 4.



τοὺς πρώτους ἀρότους νεάσωσιν πάλιν τοῦ ἤρος, μεταβάλλουσιν ὅπως τὴν ἀναφυομένην πόαν ἀπολέσωσιν, εἶτα θέρει ἀροῦσι, καὶ πάλιν ὅταν μέλ- λωσι σπείρειν ὑπήροσαν, ὡς δέον (καθάπερ ἐλέχθη) προκατεργάσασθαι, καὶ περὶ τούτου μάλιστα σπουδάσαι· διὸ καὶ τὴν ἀπὸ τῆς δικέλλης ἐργασίαν μᾶλλον ἐπαινοῦσιν, ἢ δ' ἀπὸ τοῦ ἀρότρου δοκεῖ πολλά παραλείπειν.<sup>1</sup> Θετταλοὶ δ' ἰσχυρότερον ἔτι τῆς δικέλλης ὄργανον ἔχουσιν, ὃ καλοῦσιν μίσχον, ὃ μᾶλλον εἰς βάθος κατιὸν πλείω γῆν περιτρέπει καὶ κατωτέρωθεν.

20.9 αὕτη μὲν οὖν τῆς χώρας ἡ κατεργασία· συμβαίνει δὲ τοῖς εἰς ταῦτα πονήσασιν ἦττον ἐν τοῖς ἄλλοις κακοπαθεῖν· ὅσοι δ' ἂν μαλακωτέρως, ἀναγκάζονται πολλάκις καὶ σκάλλειν καὶ βοτανίζειν, ἅτε πολλῆς πόας ἐκφυομένης. οὕτω<sup>2</sup> γὰρ ἀπόλλυται τὰ σπέρματα, προτερεῖ δὲ τοῦ σίτου διὰ τε τὴν ἰσχὺν καὶ τὸ προϋπάρχειν· ἐπεὶ πρότερον αὐξηθέντος τοῦ σίτου πολλὰ καταπνίγεται καὶ

<sup>1</sup> u : παραλειπεῖν U : παραπεῖν N : παραποιεῖν aP.

<sup>2</sup> Gaza, Basle ed. of 1541 : οὕτε U.

<sup>1</sup> "First ploughing" is also used of winter ploughing at *HP* 8 6. 1; at *HP* 8 1. 2 "ploughing" without qualification is

ploughing<sup>1</sup> plough again in spring they turn the earth to destroy the weeds that come up, and then plough in summer and plough lightly once more just before sowing,<sup>2</sup> with the idea (as we said)<sup>3</sup> that one must work the land before sowing and make this one's chief task. This is why the authorities prefer working the land with the mattock, and consider that working it with the plough omits a good deal. The Thessalians have a tool still more effective than the mattock, which they call "mischos," which by going deeper turns up more soil and from further down.

This then is the working of the country. Men 20.9 who have worked hard at these tasks find that they spare themselves labour in the rest, whereas those who have exerted themselves less are forced to hoe and weed again and again, since there is a plentiful growth of weeds. For this is how their seeds are destroyed before they can develop, and the seeds come out before the grain both on account of their vigour and because they are in the ground first. Whereas if the grain comes up first many of the weeds are

used of it.

<sup>2</sup> That is, the sowing at the setting of the Pleiades (Nov. 6-9); cf. *HP* 8 1. 2: "The seasons of sowing are for most of them (*sc.* field crops) two: the first and main season is that at the setting of the Pleiades . . . ; there is another at the beginning of spring after the winter solstice."

<sup>3</sup> *CP* 3 20. 6.

ἀπόλλυται, καὶ τὸ ὄλον οὐχ ὁμοίως βλάπτει τὰ σπέρματα.

- 21.1 τὰ δ' οἰκεία τῇ μὲν ἐπόμβρω καὶ ψυχρᾷ τὰ ἀνοσιμώτατα<sup>1</sup> πρὸς τὴν σιτοποιίαν, ὁμοίως καὶ πυρῶν καὶ κριθῶν καὶ τῶν ἄλλων · ἀραιὰ γὰρ ταῦτα, τὰ δ' ἅμα<sup>2</sup> πλείονος ὄμβρου δεῖται · καὶ τὰ μέλινα τῶν λευκῶν. ἐὰν δ' ἐν<sup>3</sup> ξηρᾷ καὶ ἐρυθρᾷ καὶ ἐν ψυχροῖς τόποις, παλίνοστα ·<sup>4</sup> καὶ τὰ λευκὰ μάλλον τῶν μελάνων, ὅπως ἀδρύνηται πρὸ τῆς ἀπολείψεως τῶν ὑδάτων · αὖξεται γὰρ καὶ φθάνει<sup>5</sup> τὰ λευκὰ μάλλον τῶν μελάνων. ἐν δὲ ταῖς εὐκρασίαις τὰ ἀνὰ μέσον. οἱ μὲν οὖν οὕτω διαιροῦσιν, οἱ δ' ἄλλως.
- 21.2 ὡς δ' ἀπλῶς εἰπεῖν ἡ μὲν λεπτή<sup>6</sup> κριθοφόρος ἀμείνων, ἡ δὲ πείρα πυροφόρος · αἱ μὲν γὰρ ἐλάττονος καὶ κουφοτέρας δέονται τροφῆς, οἱ<sup>7</sup> δὲ

<sup>1</sup> Schneider : ἀναστομωτατα U<sup>c</sup> from ἀναστομάτατα.

<sup>2</sup> τὰ δ' ἅμα ego (καὶ Schneider) : τα δ' ἄλλα U.

<sup>3</sup> ἐὰν δ' ἐν ego (ἐν δὲ Schneider) : ἐὰν δε U.

<sup>4</sup> U : τὰ πολύνοστα Schneider : πολύνοστα Wimmer.

<sup>5</sup> Gaza (*celerius*), Schneider : φθάνει U.

<sup>6</sup> u : λεπτῶν U. <sup>7</sup> Schneider : αἱ U.

<sup>1</sup> The volume of barley meal or wheat flour was compared to the volume of the barley corn or wheat kernel

choked and destroyed, and in general their seeds do less harm.

*Seed Crops: Varieties and Country*

The cereals that are suited to rainy and cold 21.1 country are the varieties with kernels having the lowest yield in meal,<sup>1</sup> alike in wheat, barley and the rest, since these kernels are open in texture and with this character goes a need for more rain; again the black-grained varieties require more than the white.<sup>2</sup> Whereas if one sows on dry and red ground and in cold districts the crops to sow have an equal yield in meal; and the white-grained variety is to be sown in preference to the black, so that the plant may become sturdy before the end of the rains, since the white grows and gets sturdy sooner. Where the land has an equable blend of qualities the intermediate varieties are to be sown. Some authorities, then, distinguish as above, others differently.

On the whole lean ground is a better producer of 21.2 barley, rich ground of wheat, barley requiring less

before grinding.

<sup>2</sup> Cf. HP 8 4. 2 (of barleycorns): "Further, some are white, others black with a reddish tinge, and these are considered both to yield a large amount of meal and to be stronger in resisting cold and wind, in short the weather, than the white." For wheat Theophrastus gives no such particulars about colour, but merely says that there are differences (HP 8 4. 3).

πλείονος καὶ σωματαδεστέρας.

τῶν δὲ πυρῶν ὁ μὲν τρίμηνος ἐν ταῖς<sup>1</sup> λεπτο-  
γείοις καλλίων, σύμμετρος γὰρ ἢ τροφή κούφη  
κούφοις ·<sup>2</sup> ὁ δὲ Λιβυκὸς καὶ ὁ Δρακοντίας καὶ ὁ  
στλεγγίας<sup>3</sup> καὶ ὁ Σελινούσιος ἐν ἀγαθῇ, πολύτρο-  
φοὶ γὰρ (σημεῖον δ', ὅτι κάλαμον ἔχουσι παχύν ·<sup>4</sup>  
ἀπλῶς δὲ καὶ εἴ<sup>5</sup> τις ἄλλος τοιοῦτος). εἰ δέ τις  
πολυχίτων, ὥσπερ ὁ Θράκιος, ἐν ταῖς χειμεριναῖς,  
ἀπαθῆς γὰρ ὑπὸ τοῦ ψύχους · ὁ δὲ χαῦνος καὶ μα-  
νός, ὥσπερ ὁ καχυρδίας,<sup>6</sup> ἐν ταῖς<sup>7</sup> ἐπόμβροις,  
τροφῆς γὰρ πολλῆς καὶ οὖτος δεῖται (διὸ καὶ  
παχυκάλαμος).

21.3 ὠσαύτως δὲ καὶ ἐπὶ τῶν χεδροπῶν. ἡ μὲν γὰρ  
γλίσκρα καὶ μελάγγεως ἐρέβινθον, ἡ δὲ κούφη

§2 lines 7–9 Pliny, *N. H.* 18. 64: ex omni autem genere  
grani praetulit (sc. Graecia) dracontian et stlengian  
(stelepan or istelepan MSS.) et Selinusium argumento  
crassissimi calami.

lines 13–15 Pliny, *N. H.* 18. 69: plurimis tunicis Thra-  
cium triticum vestitur ob nimia frigora illi plagae exquisi-  
tum.

<sup>1</sup> Schneider: τοῖς U.      <sup>2</sup> u: -ως (-ους?) U.

<sup>3</sup> ego (stlencias or stlentias Gaza): στρεγγίας U (at *HP* 8  
4. 3 U twice has στλεγγίς).      <sup>4</sup> U<sup>a</sup>: παχύ U.

<sup>5</sup> u: ἡ U.      <sup>6</sup> ego (so U twice at *HP* 8 4. 3): καχυρδίας U.

<sup>7</sup> Schneider: τοῖς U.

and lighter food, wheat more and heavier.

Of the varieties of wheat the three-months kind  
is finer in country with lean soil, for light food is just  
right for light wheat. But the Libyan,<sup>1</sup> Dracon-  
tias,<sup>2</sup> stlengias<sup>3</sup> and Selinuntine varieties are  
finest in good soil, since they need plenty of food  
(proof of this is their thick haulm, and this is true of  
all thick-haulmed varieties). Many-coated wheat,  
on the other hand, like the Thracian,<sup>4</sup> grows finest  
in wintry countries, since it is not affected by the  
cold; spongy and open-textured, like the cachry-  
dias,<sup>5</sup> in rainy country, since it too needs plenty of  
food (which is why it has thick haulms).

So too with legumes: viscous and black soil pro- 21.3  
duces finer chick-peas,<sup>6</sup> but light soil finer beans,

<sup>1</sup> Cf. *HP* 8 4. 3: "And some wheats have a thin, some a  
thick haulm; this too the Libyan wheat has, and the  
cachrydias has a thick one too."

<sup>2</sup> Etymology unknown; perhaps from *drákōn* (serpent),  
because it was spotted or resembled one of the plants  
called *drakóntion* ("snake-weed"), or perhaps from the  
name Dracon.

<sup>3</sup> From *stlengis* ("strigil"), no doubt because it was thick  
and curved at the end like the handle of a cane.

<sup>4</sup> Cf. *HP* 8 4. 3: "And further some wheats have few  
coats, some many, like the Thracian."

<sup>5</sup> From *káchrys* ("parched barley"), which the grain may  
have resembled.

<sup>6</sup> Cf. *HP* 8 7. 2 (of chick-pea): "In a word no ordinary soil  
can bear it, but to do so the soil must be black and fat."

κύαμον φέρει καλλίω, σύμμετρα γὰρ ἑκατέρω τὰ τῆς <γῆς>.<sup>1</sup>

καὶ ἐπὶ τῶν ἄλλων δὲ τὸν αὐτὸν τρόπον, ἀεὶ πρὸς τὰ τῆς τροφῆς ἀνακτέον, συμπαραλαμβάνοντα καὶ τὰ<sup>2</sup> τοῦ ἀέρος. ἡ γὰρ εὖειλος (καὶ ἀπλῶς ἢ εὐδιεινή) τὰ ἀσθενέστερα συμφέρει<sup>3</sup> μᾶλλον, ἢ δ' ἐναντία τὰ ἰσχυρά. καὶ ἡ ὕφαμμος<sup>4</sup> δὲ καὶ μηλώδης<sup>5</sup> τὰ ὀλιγότροφα καὶ ξηρά, καθάπερ τὴν Ἀχιλλήϊδα,<sup>6</sup> καὶ γὰρ λευκαίνει, μᾶλλον ἐκπέττουσα τὰς τροφάς· καὶ φέρει δὲ καὶ τεράμωνα καὶ<sup>7</sup> ξηρὰ καὶ τὰ πρόσσειλα, πέττει γὰρ ὁ ἥλιος μᾶλλον, ἐν δὲ ταῖς<sup>8</sup> εὐγείοις καὶ πίοσιν οὐχ ὁμοίως.

21.4 πυρὸς δὲ κριθῆς ἐν τοῖς<sup>9</sup> ὀμβρώδεσιν εὐθενεῖ μᾶλλον, καὶ τὸ ὄλον δὲ πρὸς τὰς ἐπομβρίας ἰσχυρότατος. φέρει δὲ καὶ ἐν τοῖς ἀκόπροις μᾶλλον· αἴτιον δὲ ὅτι θερμὸς ὢν ἐκπέττει δύναται μᾶλλον

<sup>1</sup> ego (*utrique . . . alimentum offertur* Gaza : ἑκατέρω τὰ τῆς <τροφῆς> Heinsius) : ἑκατερωτάτης U.

<sup>2</sup> U<sup>c</sup> : τὰς U<sup>ac</sup> N aP.

<sup>3</sup> U : φέρει Scaliger : ἐκφέρει Wimmer.

<sup>4</sup> Scaliger : ἀνύφαμμος U<sup>c</sup> (φα U<sup>cm</sup> with an index over the right leg of the first μ) : ἀνύμμος U<sup>t</sup>.

<sup>5</sup> ego (Schneider deletes or reads καὶ <οὐ> πηλώδης : καὶ ἀλμώδης Hindenlang) : καὶ πηλώδης U.

<sup>6</sup> U<sup>c</sup> († ss.). <sup>7</sup> UN : τὰ aP.

since the provision in the soil is right for each.

So too with the rest: we must always account for the country by the food, also including with the food the character of the air. For country that is sunny (in short that has fair weather) tends more to bring with it the weaker plants, whereas the opposite sort of country favours the strong. Again country with sand below and yellow does better with plants that take little food and are dry, like the Achilles barley,<sup>1</sup> which indeed turns white, concocting its food more thoroughly. Again places too that are in the sun bear grains that are tractable and dry, since the sunlight concocts them better, whereas this happens less in rich and fat land.

Wheat does better than barley in rainy regions 21.4 and is in short most resistant to rains. It also bears better than barley on land that is not manured. The reason is that wheat is hot and so better able than barley to concoct its food thoroughly and does not

<sup>1</sup> For this barley cf. *HP* 8 4. 2; *HP* 8 10. 2; *CP* 3 22. 2 (where both a white and a black variety are mentioned). Cf. Galen, *Linguarum seu Dictionum Exoletarum Hippocratis Explicatio* (vol. xix, p. 87 Kühn): "Achilles barley <Hippocrates, *Diseases III*, 17 (Loeb vol. V, p. 58)>: plump and large barley, named it is said from one Achilles, a farmer of Brauron (? Βαβρωνίου)."

<sup>8</sup> Schneider : τοῖς U.

<sup>9</sup> U : ταῖς Schneider.

καὶ κόπρον οὐχ ὁμοίως ἐπιζητεῖ διὰ τὸ ἔχειν ἐν  
 ἑαυτῷ ὃ ἔδει ἐκ τῆς κόπρου γίνεσθαι, καὶ τὸ ὄλον  
 ἰσχυρότερός ἐστι καὶ πρωῖσπορεῖται καὶ ἐν τοῖς  
 ψυχροῖς καταβάλλεται μᾶλλον. ἡ δὲ ἰσχύς θερμό-  
 τητι καὶ τῷ μᾶλλον πολυχίτωννα εἶναι· διὸ καὶ ἡ  
 διὰ χρόνου γεωργουμένη γῆ πυρὸς φέρει μᾶλλον  
 ἢ<sup>1</sup> κριθάς· κατακρατεῖ γὰρ τῆς τροφῆς ἰσχυροτέ-  
 ρας οὕσης ὁ πυρὸς μᾶλλον, ἐπεὶ οὐχ<sup>2</sup> ὁμοίως ἐθέ-  
 λει<sup>3</sup> φέρειν μὴ ἐμπρησθείσης<sup>4</sup> τῆς ὑλης· οὕτως  
 21.5 δ' ὡσπερ μανοῦται καὶ κοπρίζεται.<sup>5</sup> ὡς δὲ ἀπλῶς  
 εἰπεῖν ἐν τρισὶ<sup>6</sup> ταῦτα<sup>7</sup> μεγίσταις καὶ κοινοτά-  
 ταις ἐστὶ διαφοραῖς· ἐν τῇ τῆς χώρας φύσει,  
 <καὶ><sup>8</sup> τῇ τῶν σπερμάτων ἰσχύϊ καὶ ἀσθενείᾳ,  
 καὶ ἐν τῇ τοῦ ἀέρος κράσει, διὸ σκεπτέον ταῦτα.  
 χειμῶνες δὲ ἐπιγινόμενοι πανταχοῦ μὲν χρῆσι-

<sup>1</sup> u : καὶ U N aP.

<sup>2</sup> ego (ἐνιαχοῦ δ' οὐχ Wimmer) : ἐπέχει δ' οὐ U.

<sup>3</sup> <δ'> ἐθέλει Schneider.

<sup>4</sup> Schneider : ἐμπρησθείσης U.

<sup>5</sup> δ' . . . κοπρίζεται U : γὰρ μ. καὶ ὡσπερ κ. <ἡ γῆ> Schnei-  
 der. <sup>6</sup> U : πᾶσι N : πάσαις aP.

<sup>7</sup> ego : ταύταις U. <sup>8</sup> ego.

<sup>1</sup> That is, heat.

<sup>2</sup> That is, in autumn instead of spring. Barley is in fact  
 sown earlier than wheat (HP 8 1. 3).

seek manure to the same extent because it possesses  
 within itself the thing<sup>1</sup> that the manure was to pro-  
 vide; in a word it is stronger and is sown in the early  
 season<sup>2</sup> and in cold regions more than barley.<sup>3</sup> The  
 strength lies in its heat and in its having coats<sup>4</sup>;  
 and this is why ground worked after lying fallow for  
 some time is a better producer of wheat than of bar-  
 ley,<sup>5</sup> since wheat masters the food, which here is  
 stronger, better. (Indeed such ground refuses to  
 bear so well if the woody plants have not been burnt  
 over; but when this is done the soil is as it were  
 loosened and manured.)<sup>6</sup> All this<sup>7</sup> in a word comes  
 21.5 under three greatest and most universal variables:  
 the nature of the land, the strength or weakness of  
 the plants, and the tempering of the air, which is  
 why these are the points to study.

Ensuing cold weather is everywhere beneficial,

<sup>3</sup> Cf. HP 8 6. 4: "... in wintry country they (sc. the agri-  
 culturists) tell us to sow wheat rather than barley, and in  
 general cereals rather than legumes in land cultivated  
 after a long interval, these too bearing wheat better than  
 barley. Wheat can also resist rainy weather better than  
 barley, and bears better in unmanured land."

<sup>4</sup> Cf. HP 8 4. 1: "Then too wheat is in a number of coats  
 but barley is naked, for barley has the most naked seed of  
 the cereals."

<sup>5</sup> Cf. note 3 above.

<sup>6</sup> The burning, like manuring (cf. CP 3 6. 1), produces  
 openness of texture and heat.

<sup>7</sup> The question of what grains do better in what country.

μοι, ρίζονται γὰρ καὶ καρκινούται μᾶλλον, ὥστ' εἰς τὸ ἕαρ σύμμετρον ἀποδίδεται μέγεθος.<sup>1</sup> μάλιστα δ' ἐν ταῖς ἀγαθαῖς χώραις, τὰ γὰρ νότια καὶ ὅταν εὐδία ταχὺ ἀναδιδόσιν καὶ ποιούσι λοχαῖον<sup>2</sup> καὶ τοῦ ἤρος<sup>3</sup> ἐρυσιβώδη.

τὰ δὲ πυκνόςπορα πρότερον ἀποχεῖται τῶν μανουσπόρων ὅτι τὰ μὲν ρίζονται καὶ εἰς τὰ κάτω σχίζεται διὰ τὸ ἔχειν τόπον, τὸ δ'<sup>4</sup> εὐθὺς εἰς τὸ ἄνω τρέχει.

22.1 χρῆ δὴ<sup>5</sup> καὶ τὰ οἰκεία σπέρματα πρὸς εὐφορίαν καὶ τὰ νοσήματα τὰ συμβαίνοντα λαμβάνειν, οἷον ἐρυσίβας, ἐπεὶ <καὶ><sup>6</sup> ἐν τοῖς κοίλοις καὶ ἀπνόοις γίνεται<sup>7</sup> τὰ μὴ ἐρυσιβούμενα· τοιαῦτα δὲ τὰ ἐπικληῖ τῷ στάχυϊ καὶ μὴ ὀρθά. διὰ τοῦτο δὲ καὶ τὸ ἐπικύπτειν συμφέρει τὸν στάχυν, ὅπως ἀπορρήγῃ καὶ μὴ ἐμμένῃ τὸ ὕδωρ καὶ ἡ δρόσος·<sup>8</sup> ἀποκλίνουσι δὲ οἱ μακροὶ στάχυες μᾶλλον, οἱ δὲ πλατεῖς καὶ βραχεῖς ὀρθότεροι, διὸ καὶ ἐρυσιβοῦνται. ταῦτα δὲ

<sup>1</sup> <τὸ> μέγεθος Schneider (cf. CP 3 23. 5).

<sup>2</sup> ego: λοχαῖαν U.

<sup>3</sup> ego ([τοῦ] πρὸς Scaliger: καρπὸν Wimmer): τοῦ πρὸς U.

<sup>4</sup> U (τὸδ' N aP): τὰ δ' u. <sup>5</sup> U: δὲ N aP. <sup>6</sup> ego.

<sup>7</sup> γίνεται <τὰ ἐρυσιβούμενα, ἐν δὲ τοῖς εὐπνόοις> Wimmer c.

<sup>8</sup> ἡ δρόσος u: ἰδρόσος U.

for the grain then gets better rooted and tillered,<sup>1</sup> so that in spring it grows to no more than the right height. The cold is most useful in good country, for southerly winds, even with clear skies, make the grain shoot up too rapidly and become lodged and get rust in spring.

Thick-sown grain heads earlier than thin-sown, since thin-sown goes to root and branches out downwards below ground, because it has the room, whereas the thick-sown runs upward at once.

*Seed Crops: Diseases (1) Rust*

So it is also the appropriate *grain* that we must 22.1 choose to obtain a good crop and to avoid the diseases that occur, such as rust, since even in hollow and windless places we have types that do not rust.<sup>2</sup> Of this sort is grain with ears that incline and do not stand erect. The reason why it is also<sup>3</sup> good that the ear should bend is that the ear should let the rain and dew flow off and not remain on it. Long ears do more bending, but broad and short ears stand straighter and so get rust. These are the

<sup>1</sup> Cf. CP 1 12. 3.

<sup>2</sup> Cf. HP 8 10. 2 (on rust): "And the situation and nature of the field makes no small difference, for fields exposed to the wind and elevated get no rust, or do not get so much, but instead those that lie in hollows and have no wind."

<sup>3</sup> It is also good for the ear to stand well off from the leaf: cf. the last sentence of this section.

χρήσιμα,<sup>1</sup> καὶ ὧν ὁ στάχυς ἀπήρηται πολὺ τῶν φύλλων· ἐν γὰρ τοῖς φύλλοις ἐμμένει μᾶλλον ἢ ὑγρότης, ὥστε πλησίον μὲν ὄντος<sup>2</sup> εὐθὺς ἀπτεται, 22.2 πόρρω δ' οὐχ<sup>3</sup> ὁμοίως. διὸ καὶ ἡ μὲν Ἀχιλλεῖς<sup>4</sup> κριθή, καὶ λευκή καὶ μέλαινα, ἐρυσιβώδης, ὀρθοὶ γὰρ οἱ στάχυες, ἡ δ' ἑτεόκριθος ἀσφαλής, ἀπονεύει γάρ. τὰ δὲ προσήνεμα τῶν χωρίων ἦττον ἀπερυσιβοῦνται,<sup>5</sup> διὰ γὰρ τὴν κίνησιν ἀποσείεται καὶ ἀποπίπτει τὸ ὑγρόν. ἐπεὶ καὶ ὅταν ὕσαντος πνεῦμα ἐπιγένηται, καὶ πάλιν ἐπιλαμβάνη νύξ, ἦττον· τὸ μὲν γὰρ διέσεισεν, ὁ δ' ἥλιος, εὐθὺς ἐπιγενόμενος, οὐκ ἐποίησεν σήψιν, ἀλλὰ ἀνεξήρανεν πρότερον. ἡ δ' ἐρυσίβη σαπρότης τις, οὐδὲν δὲ σαπρὸν ἄνευ θερμότητος ἀλλοτρίας. μάλιστα δὲ ἐρυσιβοῦται σίτος ταῖς πανσελήνοις, διὰ τὸ<sup>6</sup> καὶ τὴν σελήνην τῇ θερμότητι σήπειν τῆς νυκτός.

<sup>1</sup> U : *Iuvat* Gaza : Schneider deletes : ταῦτα διωγραυόμενα Wimmer.

<sup>2</sup> μὲν ὄντος Gaza, Heinsius : μένοντες U : μὲν ὄντες u.

<sup>3</sup> u : ὄχ' U.

<sup>4</sup> U<sup>c</sup> : ἀχιλλεῖς U<sup>ac</sup>.

<sup>5</sup> ego : γὰρ (γὰρ N) ἐρυσιβοῦνται U N : ἐρυσιβοῦνται aP.

<sup>6</sup> Dalecampius : διὸ U.

<sup>1</sup> Cf. *HP* 8 4. 2 (of barleys): "... the ears are in some well away from the leaf and in some close to it, as in the so-

grains to use, and also those grains where the ear stands well off from the leaves, for the leaf is where the water remains longer, so that when the leaf is close to the ear the disease attacks the ear at once, but when the leaf stands off at a distance the disease is not so catching. This is why the Achilles 22.2 barley,<sup>1</sup> both the white and the black, is apt to rust, since the ears are erect, whereas the eteocritchos<sup>2</sup> barley is safe, since the ear bends. Fields in the wind are less subject to rust,<sup>3</sup> for the water is shaken off by the buffeting. So when rain is followed by wind and then by night there is less rust, for the wind shakes off some of the water, and the sun does not produce decomposition by coming out at once, but first dries the rest of the water up<sup>4</sup>; and rust is a kind of decomposition, and nothing is decomposed without foreign heat.<sup>5</sup> Grain is most apt to rust at the full moon,<sup>6</sup> since the moon too produces decomposition by its heat during the night.

called Achilles barley"; *HP* 8 10. 2 (of aptness to rust): "... cereals are more apt to rust than pulses, and of cereals barley more than wheat, and of barley some kinds more than others, and most of all (one might say) Achilles barley."

<sup>2</sup> Literally "true-barley"; the name occurs only here.

<sup>3</sup> Cf. *HP* 8 10. 2 (cited in note 2 on *CP* 3 22. 1).

<sup>4</sup> In the milder heat of dawn.

<sup>5</sup> And not the natural heat of the plant.

<sup>6</sup> Cf. *HP* 8 10. 2: "... rust occurs most of all when the moon is full."

ἀσθενέστερα δὲ καὶ ἐπικηρότερα<sup>1</sup> πάνθ' ὡς  
ἀπλῶς εἰπεῖν τὰ λευκὰ τῶν μελάνων καὶ ἐπὶ τῶν  
φυτῶν ἔστιν καὶ ἐπὶ τῶν ζώων.

ὅτι μὲν οὖν οἰκεία τὰ σπέρματα ταῖς χώραις  
ληπτέον, φανερόν ἐκ πολλῶν.

22.3 νοσήματα δὲ γίνεται πᾶσι τοῖς σπέρμασι (ὡς  
ἀπλῶς εἰπεῖν) διὰ τὴν ἀσυμμετρίαν τῆς τροφῆς  
τε καὶ τοῦ περιέχοντος ἀέρος, ὅταν ἢ μὲν πλείων,  
ἢ δὲ ἐλάττων, ὁ δὲ κάτομβρος ἢ<sup>2</sup> κατάξηρος ἄγαν  
ἢ<sup>3</sup> καὶ μὴ κατὰ καιρὸν ἀνυγραινόμενος τύχη·  
τότε γὰρ καὶ οἱ σκώληκες ἐγγίνονται τοῖς ἄχροις  
καὶ τοῖς λαθύροις καὶ τοῖς πίσσις, καὶ αἱ κάμπαι  
τοῖς ἔρεβίνθοις, ὅταν οἱ μὲν ἀναξηρανθῶσι καὶ<sup>4</sup>  
μεταξὺ ἐγγίνονται θερμημερίαι, τῶν δ' ἔρεβίνθων  
ὅταν ἢ ἄλμη κατακλυσθῇ καὶ ἀναγλυκανθῶσι·  
πανταχοῦ γὰρ ἢ φύσις ζωογονεῖ μίξαμένη πως

§ 3 lines 7–8 Athenaeus epitome, ii. 45 (55 E-F): Θεόφρα-  
στος δὲ ἰστορεῖ ἐν αἰτίοις φυσικοῖς . . . γίνεσθαι δὲ λέγει κάμπας ἐν  
τοῖς ἔρεβίνθοις ὁ αὐτὸς ἐν τῷ τρίτῳ τῆς αὐτῆς πραγματείας.

<sup>1</sup> Gaza, Wimmer : -ότατα . . . -ότατα U.

<sup>2</sup> u aP : η U : ἦ N.

<sup>3</sup> Gaza (vel), Scaliger : εἰ U.

<sup>4</sup> U : priusquam fuerint resiccata Gaza : <ἀνυγρανθῶσι καὶ  
πρὶν ἢ> ἀναξηρανθῶσι Schneider : ἀνυγρανθῶσι καὶ Wimmer.

Speaking broadly all white varieties are weaker and  
more delicate both in plants and in animals.<sup>1</sup>

So it is evident from many considerations that we  
must take grain that is appropriate to the country.

*Seed Crops: Diseases (2) Engendering Grubs*

Diseases arise in practically all seed crops from 22.3  
the absence of due measure in the food and in the  
surrounding air—when the food happens to be  
either too much or too little, and the weather either  
too rainy or too dry or else precipitation does not  
occur at the right time. For these are the occasions  
when the grubs are produced in vetchlings, chick-  
lings and peas, and the caterpillars in chickpeas<sup>2</sup>;  
when the fluid in the former is made dry<sup>3</sup> and warm  
days intervene,<sup>4</sup> and when the brine is washed off  
from the chickpeas and they are made sweet. For  
everywhere nature generates animals by taking  
fluid and mixing it in a certain fashion with heat,

<sup>1</sup> Cf. Aristotle, *History of Animals*, iii. 21 (523 a 10–11):  
“ . . . dark women have more wholesome milk than light.”  
We have found no better parallel.

<sup>2</sup> Cf. *HP* 8 10. 5: “Grubs are produced in vetchlings,  
chicklings and peas when the plants have been soaked and  
hot days occur, just as the caterpillars in chickpeas.”

<sup>3</sup> The wetting provides the superfluous fluid; the drying  
solidifies it with the help of heat into a grub.

<sup>4</sup> Between the wetting (implied by the drying) and the  
subsequent drying.



τὴν ὑγρότητα τῷ θερμῷ,<sup>1</sup> καθάπερ ὕλην δ' οὖσαν  
τὴν ὑγρότητα τῷ θερμῷ πρὸς τὴν πέψιν.<sup>2</sup>

22.4 ὁ καὶ ἐπὶ τῶν πυρῶν συμβαίνει κατὰ τοὺς σκώ-  
ληκας· γίνονται γὰρ ἐν ταῖς ῥίζαις ὅταν νότια  
πλείω<sup>3</sup> μετὰ τοὺς σπόρους<sup>4</sup> ἐπιγένηται· τότε  
γάρ, ἀνυγραινομένης τῆς ῥίζης καὶ τοῦ ἀέρος  
ὄντος θερμοῦ, ζωοποιεῖ πως ἡ θερμότης συσσή-  
πουσα τὴν ῥίζαν, ὁ δὲ γενόμενος εὐθὺς κατεσθίει·  
πέφυκε γὰρ ἐκ τῶν αὐτῶν ἐκάστοις ἡ γένεσις καὶ  
ἡ τροφή.

(ἄτερος δ' ὅταν ἀποχυθῆναι<sup>5</sup> διὰ τὸν αὐχμὸν  
μὴ δύνηται· <τότε γὰρ> τὸ<sup>6</sup> ἐγκατακλειόμενον  
ὑγρὸν ὑπὸ τοῦ θερμοῦ σήψεως γινομένης ἐξωποί-  
ησεν, εἴθ' ὁμοίως ἡ τροφή διὰ τοῦ αὐτοῦ. ταῦτ' ὁ δ'<sup>22.5</sup>

§ 4 lines 1–6 Pliny, *N. H.* 18. 151: nascuntur et vermiculi  
in radice, cum sementem imbribus secutis inclusit repen-  
tinus calor umorem.

<sup>1</sup> ego: τῆ ὑγρότητι τὸ θερμόν U. <sup>2</sup> U: σήψιν Heinsius.

<sup>3</sup> u N: νοτία πλείων U: νοτία πλείων aP.

<sup>4</sup> u: τοουσπόρους U: τοὺς πόρους N aP.

<sup>5</sup> Schneider (cf. *HP* 8 10. 4): ἐπιχυθῆναι U.

<sup>6</sup> Gaza (τὸ <γὰρ> Schneider).

<sup>1</sup> Heat and water are the source of all life (Aristotle, *On  
the Generation of Animals*, iii. 11 [762 a 18–21]). Heat con-  
cocts the water both in spontaneous generation (*ibid.*, 762

the fluid serving as it were as matter for the heat to  
concoct.<sup>1</sup>

This also happens in wheat when the grubs are 22.4  
produced.<sup>2</sup> For the grubs are formed in the roots  
when a good deal of south wind follows the sowing.  
For then, with the root getting soaked and the  
weather being warm, the heat in some way gen-  
erates animals as it helps<sup>3</sup> to decompose the root,  
and the grub, as soon as produced, proceeds to  
devour the root, since all things naturally feed on  
the sources that produced them.<sup>4</sup>

(The other wheat grub is produced when the  
wheat is unable to head because of the dry weather,  
since then the fluid shut in by the heat generates  
animals as decomposition occurs; next these grubs  
too proceed to get their food from the part that  
brought them forth.<sup>5</sup> The same process as this 22.5

a 13–15) and in the other kinds (*ibid.*, 762 b 6–16).

<sup>2</sup> For the two kinds of grubs that infest wheat cf. *HP* 8  
10. 4: "Wheat is also destroyed by the grubs. Some as soon  
as the wheat starts to grow devour the roots, others des-  
troy it when the wheat suffers from dry weather and is  
unable to head; for the grub is then produced in it and eats  
the haulm as this is played out. It eats the haulm as far as  
the ear and then perishes when it has consumed all its  
food."

<sup>3</sup> That is, helps the fluid.

<sup>4</sup> Cf. *CP* 2 9. 5, 6 (of the gall-insects of the fig); *CP* 5 10.  
5; 6 4. 4.

<sup>5</sup> Here the haulm.

ἔοικε τούτῳ<sup>1</sup> καὶ ἐπὶ τῶν μηλεῶν<sup>2</sup> καὶ ὄλως ἐπὶ τῶν δένδρων συμβαίνειν ὅσα σκωληκοῦται διψήσαντα· διὰ γὰρ τὸ ὀλίγον εἶναι τὸ ὕδωρ<sup>3</sup> καὶ μένειν<sup>4</sup> ἐν τῷ δένδρῳ <τὸ ὑγρὸν θερμαινόμενον>,<sup>5</sup> σήψιν ἐποίησεν, ἐξ ὧν ὁ σκώληξ [ὑγρῶ θερμαινόμενον]. σημεῖον [ἐποίησεν ἐξ ὧν ὁ σκωλιξ]<sup>6</sup> <δέ>,<sup>7</sup> ὅταν ἄφθονος ἢ τροφή γίνηται· τότε γὰρ καὶ ἡ ἐπιρροή πρὸς τὰ ἄνω διαδίδεται, καὶ πλείων<sup>8</sup> οὐσα κατακρατεῖ καὶ οὐ σήπεται.)

παραπλήσιον δὲ τὸ συμβαῖνόν ἐστι καὶ τῇ ἀμπέλῳ· καὶ γὰρ ἐν ταύτῃ τοῖς νοτίοις οἱ<sup>9</sup> ἴπες<sup>10</sup> γίνονται μᾶλλον, ἅτε διυγραινόμενης καὶ τοῦ ἀέρος γονεύοντος· εἴτ' εὐθύς ἐξεσθίουσι<sup>11</sup> τὸ ὁμογενές.

22.6 ὡσαύτως δὲ καὶ ἐπὶ τῶν ἐλαιῶν<sup>12</sup> αἱ κάμπαι, καὶ ἐφ' ὧν ἄλλα ἐγγίνεταί ζωα περὶ τὴν βλάστησιν ἢ τὴν ἀνθησιν ἢ καὶ ὕστερον· πάντα γὰρ ἐκ παραπλησίας αἰτίας ἐστὶ συνιστάμενα. τῇ δ' ἀμ-

<sup>1</sup> τούτῳ u : τούτο U : τουτὶ NP : a omits.

<sup>2</sup> ego : μηλεῶν U.

<sup>3</sup> U : ὑγρὸν Wimmer.

<sup>4</sup> u N aP : μενη U.

<sup>5</sup> ego (<διαθερμαινόμενον> Schneider).

<sup>6</sup> σκωληξ . . . σκωλιξ U (deletions by Wimmer) : σκώληξ N aP.

<sup>7</sup> Wimmer.

<sup>8</sup> u : πλείων U. <sup>9</sup> aP : αἱ U (αἱ u N).

appears to occur also in apple-trees and indeed in all trees that get grubs after suffering from drought. For because there is little rain-water and fluid remains in the body of the tree<sup>1</sup> and is heated, it causes decomposition, and the grub results. Proof of this is what happens when the food becomes plentiful, for then the influx is not only passed to the upper parts, but is also greater and masters the heat and undergoes no decomposition.)

What happens to the vine is also close to this, for here too the production of bud-worms is greater when south winds prevail, since the vine is then full of fluid and the weather generative,<sup>2</sup> and the creatures produced proceed at once to eat out what is of the same substance as themselves.

So too in the olive the bend-worms are engendered,<sup>3</sup> and so too with the trees where other creatures are produced at the time of sprouting or flowering or later; for all are formed from a similar cause. This formation happens chiefly in the vine

<sup>1</sup> That is, it does not produce foliage or fruit.

<sup>2</sup> That is, warm.

<sup>3</sup> Cf. HP 4 14. 9: "At Miletus bend-worms eat the olives at the time of blossom, some the leaves and others the flowers. The two groups differ in kind and lay the trees bare. They occur if there are south winds and clear skies, but if hot weather follows they burst."

<sup>10</sup> Scaliger (ἴπες u aP) : ἴπε U : ἴπαι N.

<sup>11</sup> aP<sup>c?</sup> : -εθ/- UN P<sup>ac</sup> (?). <sup>12</sup> u aP : -αίων UN.

πέλω μάλιστα τοῦτο συμβαίνει διότι φύσει ὑγρόν ἐστιν, καὶ ἡ ὑγρότης αὐτῆς ἄχυλος καὶ ὑδατώδης · εὐπαθεστάτη γὰρ ἡ τοιαύτη. ἐνιαχοῦ δὲ οὐ γίνονται τὸ ὄλον ἴπες,<sup>1</sup> ὅταν εὐπνοὺς τε καὶ μὴ ἔνυγρος μῆδ' <sup>2</sup> εὐτροφος ὁ τόπος ὑπάρχη.

καὶ περὶ μὲν νοσημάτων ἐν τοῖς ὕστερον ἐπὶ πλέον ῥητέον.

23.1 σπείρειν<sup>3</sup> δὲ κελεύουσιν οἱ μὲν πρὸ Πλειάδος · ξηρὰν γὰρ ἀνικμὸν τε οὖσαν διαφυλάττειν τὸ σπέρμα τὴν γῆν · οἱ δ' ἄμα Πλειάσει δυομέναις, ὥσπερ καὶ Κλειδημος <sup>4</sup> ἐπιγίνεσθαι γὰρ ὕδατα, καὶ πολλά, τῇ ἑβδόμῃ μετὰ τὴν δύσιν. ἄριστον δὲ ἴσως καὶ ἀσφαλέστατον εἰς ὀργώσαν ἐπειδὰν ἐμβληθῇ,<sup>5</sup> διευλαβούμενον ὅπως μῆτ' ἐμβληθῇ πηλῶ μῆτ' <εἰς><sup>6</sup> ἡμβραχῆ καὶ ἡμίειλον,<sup>7</sup> ἦν δὲ καλοῦσί τινες ἀμφίεργον · ἡ μὲν γὰρ ὑγρὰ καὶ πηλώδης διαχεῖ καὶ ἐγκαλακτοῖ, καὶ ἐὰν ξηρανθῇ

§1 line 4 and §2 lines 3–9 Cleidemus, Fragment 5, Diels-Kranz, *Die Fragmenteder Vorsokratiker*, vol. ii<sup>8</sup>, p. 50.

<sup>1</sup> Schneider: ἴπες U. <sup>2</sup> aP: ἡ δ' U: ἡ δ' u: ἡ δ' N.

<sup>3</sup> u: ἐπιρρεῖν U N aP. <sup>4</sup> aP: κλήδημος U: κλήδμος N.

<sup>5</sup> ἐπειδ' ἂν ἐμβληθῇ U: ἐμβάλλειν (*semen committere* Gaza) Schneider: τὴν γῆν ἐμβληθῆναι Wimmer.

<sup>6</sup> Wimmer. <sup>7</sup> U: ἡμβραχεῖ καὶ ἡμῆ<λω> Heinsius.

because it is naturally fluid, and its fluid is without savour and watery, for fluid of this character is the most easily affected. But in some places no budworms are produced at all, when the region is a well-ventilated one and not well-watered or a provider of abundant food.

But diseases will be discussed more fully later.<sup>1</sup>

*Seed Crops: The Seasons of Sowing*

Some authorities tell us to sow before the rising 23.1 of the Pleiades, for when the soil is dry and lacks moisture it preserves the seed. Others tell us to sow at the setting of the Pleiades, like Cleidemus, for rains, and heavy ones, come on the seventh day after the setting. But perhaps the best and safest maxim is to see to it that when the seed is sown the earth shall be in heat, taking care that the sowing shall not have been made in mud or in soil half-wet and half-sunned, which some call *amphiergos*,<sup>2</sup> since wet and muddy ground dissolves the seeds and makes them milky,<sup>3</sup> and when it dries seals them in

<sup>1</sup> CP 5 8. 1–5 10. 5.

<sup>2</sup> “Worked both ways”; the word is not elsewhere attested.

<sup>3</sup> Cf. HP 8 6. 1: “It is considered that sowing in the early season (sc. at the setting of the Pleiades) is on the whole better, and that the worst sowing is that in half-wet ground, for the seeds perish and turn milky.”

23.2 συναλείφει καὶ οὐ διαδίδωσιν, ἡ δὲ ἡμιβραχῆς<sup>1</sup>  
κατασῆπει· τοσοῦτον γὰρ ἔχει τὸ θερμὸν καὶ τὸ  
ὑγρὸν ὥστε κινήσῃ μὲν, μὴ ἐκβιάσασθαι δὲ μηδὲ  
ἐκβλαστῆν. ἡ<sup>2</sup> καὶ χεῖριστος οὗτος<sup>3</sup> τῶν σπόρων.  
ὁ γὰρ ἐν ξηρᾷ σπόρος<sup>4</sup> γινόμενος καθ' ὥραν ἔτους  
οὐκ ἀπόλλυσιν τὸ σπέρμα· τοὺς δὲ περὶ τροπᾶς  
σπόρους Κλειδημὸς φησὶν ἐπισφαλεῖς εἶναι· διε-  
ρὰν γὰρ οὔσαν καὶ βαρεῖαν τὴν γῆν ἀτμιδάδῃ γί-  
νεσθαι, καὶ ἔοικέναι ἐρίοις κακῶς ἑξαμμένοις·<sup>5</sup>  
ἔτι δ' οὐ δύνασθαι τὰς ἀτμίδας ἔλκειν, οὐδὲ δια-  
πέμπειν, ἅτε θερμὸν οὐκ ἔχουσαν ἰκανόν, καὶ ἐπα-  
λείφῃν ἔλαττον. ἀλλὰ τὰ ὄψια δεῖ σπεῖρειν ὑπὸ  
τροπᾶς.

23.3 συμφέροι δὲ σπειρομένοις καὶ σπαρέϊσιν εὐδίας  
ἐπιγενέσθαι<sup>6</sup> πλείους ἡμέρας, ὅπως διαβλάστω-

§ 2 lines 4–6 *Georonica*, iii. 1. 7: τῷ αὐτῷ μηνί (January)  
σπεῖρειν οὐ χρή, ἀραιὰ γὰρ καὶ βαρεῖα οὔσα ἡ γῆ ἀτμιδῆς γίνεται,  
καὶ ἔοικεν ἐρίοις ἑξαμμένοις κακῶς.

<sup>1</sup> N a (-ὸς P) : ἡμιβραχῆς U (ἡμιβραχῆς u).

<sup>2</sup> Gaza (*quatobrem* : διὸ Heinsius : Wimmer deletes) : ἡ  
U (ἡ u N) : εἰ aP.

<sup>3</sup> u : ὀδτως U.

<sup>4</sup> Heinsius after Gaza : σπορᾶ U.

<sup>5</sup> Schneider : ἐξεσμενοῖς U. <sup>6</sup> UN : ἐπιγίνεσθαι aP.

and allows no passage, and on the other hand half-  
wet ground decomposes them, for it has just enough  
heat and fluid to set them growing but not enough to  
let the plant force its way through or come up. This  
23.2 makes it the worst of the sowings.<sup>1</sup> For sowing on  
dry soil in the spring does not destroy the seed,  
whereas sowing at the winter solstice is called risky  
by Cleidemus, who says that the soil, which is  
soaked and heavy, gets filled with vapour and  
resembles badly carded wool<sup>2</sup>; and that it further-  
more is unable to absorb or diffuse the pockets of  
vapour since it does not possess enough heat, and  
does not form a crust over the seed to the same  
extent. Late grains however must be sown at the  
winter solstice.<sup>3</sup>

#### Seed Crops:

##### *The Best Weather During and After Sowing*

During sowing and just after it several days of  
23.3 fair weather are good, to let the seeds sprout<sup>4</sup>; after

<sup>1</sup> Cf. *HP* 8 6. 1, quoted in preceding note.

<sup>2</sup> It is lumpy, just as poorly carded wool has snarls in it.

<sup>3</sup> This is the late sowing of *HP* 8 1. 2, "at the beginning  
of spring after the winter solstice." The "late" grains are  
those that are sown in the "late" sowing, and are listed in  
*HP* 8 1. 4.

<sup>4</sup> Cf. *HP* 8 1. 5: wheat and barley come up on about the  
seventh day after sowing; most legumes on the fourth or  
fifth.

σιν,<sup>1</sup> μετὰ δὲ ταῦτα ψύχη βόρεια καὶ μέτρια [λεπτὰ]<sup>2</sup> χειμῶνος, ἰσχυρῶς ἐρριζωμένων ἤδη καὶ ταρρουμένων ·<sup>3</sup> ἀνθέξουσι γὰρ μᾶλλον, ἐπεὶ πιλούμενά<sup>4</sup> γε βελτίω καὶ ἐγκαρπότερα, τῆς γὰρ ρίζης ἰσχυρούσης, ἣ τε τροφή πλείων καὶ ἡ αὔξις μετὰ ταῦτα θάπτων ·<sup>5</sup> τὰ γὰρ εὐθύς ἀνατρέχοντα λεπτὰ καὶ ἀσθενῆ γίνεται, καὶ ἄμα, πρὸ τῆς<sup>6</sup> ὥρας κύσασκόμενα καὶ ἀποχεόμενα, φθείρεται. τὸ γὰρ ὄλον ἢ πάρωρος εὐτροφία σφαιερά (διὸ καὶ ἐπιπέμουσιν,<sup>7</sup> οἳ δὲ κείρουσιν).

23.4 ἀγαθὸν δὲ καὶ ἡ χιών, ὅτι ἀναζυμοῖ<sup>8</sup> καὶ μανοῖ τὴν γῆν · καὶ τροφήν τε παρέχει, καὶ ἐγκατακλείουσα τὸ θερμὸν αὔξει<sup>9</sup> τε καὶ ἰσχύειν ποιεῖ τὴν ρίζαν. ἡ<sup>10</sup> καὶ τὸ ἀπορούμενον οὐκ ἀφανές, διὰ τί <καὶ><sup>11</sup> αἱ ψυχεῖναι χῶραι καὶ αἱ θερμαὶ σιτοφόροι (καθάπερ ἡ Θράκη καὶ ὁ Πόντος,<sup>12</sup> καὶ ἡ Λιβύη καὶ ἡ Αἴγυπτος) · πρὸς γὰρ τοῖς ἄλλοις ποιεῖ τι ὁ χειμῶν καὶ τὰ καύματα (καθάπερ ἐν ταῖς κατερ-

<sup>1</sup> ego: διαβλαστώσιν (-σι U<sup>r</sup>) U<sup>ar</sup>.

<sup>2</sup> Gaza (a variant of μέτρια?).

<sup>3</sup> καὶ τ. Wimmer: καταρρουμένων U.

<sup>4</sup> ἐπεὶ π. (a omits -α) P: ἐπιπλουμένη U: ἐπιπλούμενά u (-α N). <sup>5</sup> a: θάπτων U N P. <sup>6</sup> u: πρωτῆς U.

<sup>7</sup> ego: ἐπιπέμουσιν U. <sup>8</sup> Schneider: ἔτ' ἀν ζυμοῖ U.

<sup>9</sup> Schneider: -ειν U. <sup>10</sup> ἡ aP: ἡ U: ἡ u N.

<sup>11</sup> ego. <sup>12</sup> Gaza: ποταμὸς U.

that, in winter, northerly and moderate cold weather, when the grain has already become strongly rooted and tillered, for it will then better resist the cold (indeed when the cold compresses it the grain is finer and yields a bigger crop). For when the root is strong there is more food, and the growth, which comes later, is more rapid; for plants that spring up at once turn out to be thin and weak, and then too, since they begin to be pregnant with their crop and to head before the spring season, are killed by the weather. In a word good feeding at the wrong season is hazardous (which is why people graze the plants and others cut them down).<sup>1</sup>

Snow too is beneficial, because it ferments<sup>2</sup> the soil and gives it an open texture; again it furnishes food and by shutting in the heat makes the root grow and gives it strength. This shows the solution of the puzzle: why is it that both cold countries (as Thrace and Pontus)<sup>3</sup> and hot (as Libya<sup>4</sup> and Egypt) are producers of grain? For besides their other effects the winter and the hot weather (as we said<sup>5</sup>

<sup>1</sup> Cf. HP 8 7. 4: "In fertile countries, to prevent running to leaf, people graze the grain and cut it down, as in Thesaly. . . . In Babylonia . . . they cut it down twice and the third time turn the sheep loose in it. . . ."

<sup>2</sup> Cf. Theophrastus, *On Fire*, 2. 18.

<sup>3</sup> The Crimea and the Ukraine.

<sup>4</sup> Carthage.

<sup>5</sup> CP 3 20. 7.

γασίαις ἐλέχθη τῆς γῆς). οὐδὲν δὲ ἔλαττον, ἀλλὰ πάντων μέγιστον, ὃ ἀῆρ ὃ περιέχων αὐτάς, πρὸς εὐκαιρίας ὑδάτων καὶ<sup>1</sup> χειμῶνων καὶ πνευμάτων. ὅποια γὰρ ἂν ᾗ ταῦτα, καὶ τὰ σπέρματα οὕτως ἐκτελεῖται, ὃ καὶ ἡ παροιμία καλῶς “ἔτος φέρει, οὐτι ἄρουρα.”

23.5 μέγα δὲ καὶ ἡ θέσις τῆς χώρας ἡ<sup>2</sup> πρὸς τὰ πνεύματα καὶ τὸν ἥλιον, ὡσπερ καὶ ἐπὶ τῶν δένδρων ἐλέχθη· πολλαὶ γὰρ οὖσαι λεπταὶ καὶ φαῦλοι τελεσφόροι γίνονται διὰ τὸ πρὸς ταῦτα κεῖσθαι καλῶς. ὡς δ' ἀπλῶς εἰπεῖν ἡ ἀγαθὴ χώρα καὶ χειμῶνων δεῖται πολλῶν· ἂν<sup>3</sup> γὰρ εὐδαίαι καὶ τὰ νότια ἐνισχύωσιν λοχαίους<sup>4</sup> ποιούσιν ὡς ἐπὶ τὸ πολὺ καὶ ἐρυσιβώδεις, ὃ δὲ χειμῶν, πιλώσας καὶ καρκινώσας τὰς ρίζας, σύμμετρον εἰς τὸ ἔαρ ποιεῖ

<sup>1</sup> U: καὶ βία N: καὶ βίας aP. (The variants are due to misreading U<sup>m</sup>.) <sup>2</sup> u: ἡ U. <sup>3</sup> a: αἱ (αἱ U) u NP.

<sup>4</sup> Schneider: λεχεύς U: λεχαίους u.

<sup>1</sup> Cf. HP 8 7. 6: “The greatest contribution to growth and feeding is made by the blend of qualities in the air, and in general by the way the year turns out; for when rain, clear weather and cold occur at the right time all the seeds bear well and yield abundant crops, even if they are in sandy and lean land, which is why people do not put the matter

in discussing the working of the ground) do something to the soil; but the air surrounding these countries does something that is in no way less, but most important of all, in bringing about rains and cold and winds at the right time; for as these go, so goes the final development of the seed, and the proverb also puts this well: “The harvest is the year’s and not the field’s.”<sup>1</sup>

*Seed Crops: The Lie of the Land*

The lie of the land to wind and sun is also of great 23.5 importance (as we said<sup>2</sup> in discussing trees), for many a lean and poor soil brings the seeds to fruition because it is well situated with regard to these.<sup>3</sup> Good land, to put it broadly, also requires plenty of storm and cold, since if fair weather and south winds prevail they for the most part cause the grain to lodge and get rust. Cold weather on the other hand compresses the plants and tillers the roots, and so gives them the right size when spring

badly in the proverb: “The harvest is the year’s and not the field’s.”

<sup>2</sup> CP 2 3. 1–3, 3 6. 9 (for wind), 2 4. 8 (for sun).

<sup>3</sup> Cf. HP 8 7. 6: “Countries too also differ greatly, not only by being fat or lean and rainy or dry, but also by the surrounding air and the winds; for some which are lean and poor bring the grain to maturity because they are well situated with regard to the winds from the sea.”

τὸ μέγεθος, ὅλως δὲ καὶ τὴν χώραν, ἂν εἰργασμένην<sup>1</sup> λάβῃ, μανοῖ. διὰ ταύτην δὲ τὴν αἰτίαν καὶ εἰς τὸ ἔαρ αἱ αὐξήσεις ταχεῖαι γίνονται καὶ <αἱ><sup>2</sup> ἐκφύσεις καὶ <αἱ><sup>2</sup> τελειώσεις, ὥστε δοκεῖν μὴ κατὰ λόγον ἐπιλείπεσθαι τῶν ἐν ταῖς ἀλεωναῖς, ἀλλὰ καὶ προτερεῖν, ὥσπερ καὶ τὰ περὶ Ἑλλησποντον· ἰσχυρᾶς <γὰρ><sup>3</sup> τῆς ὀρμῆς γενομένης διὰ τὸν ἀθροισμὸν, καὶ τοῦ ἀέρος ὑπηρετούντος,<sup>4</sup> ταχεῖαι καὶ <αἱ><sup>5</sup> ἐπιδόσεις καὶ αἱ τελειώσεις γίνονται.

ταῦτα μὲν οὖν ἐν ταῖς τῆς χώρας<sup>6</sup> διαφοραῖς ἔστι.

- 24.1 τὰ δὲ σπέρματα, καθάπερ ἐπὶ τῶν γύρων,<sup>7</sup> ἐκ τῶν ὁμοίων καὶ<sup>8</sup> τῶν χειρόνων ληπτέον, ὅπως δὴ<sup>9</sup> μηδεμία μεταβολὴ <καὶ><sup>10</sup> ἐπὶ τὸ βέλτιον γίνηται. καίτοι φασὶν ἐκ τῆς ἀγαθῆς ἰσχυρότερα εἶναι, διὸ καὶ ἐπὶ δύο ἔτη διαμένει τὴν δύναμιν. εἰ δὲ τοῦτο ἀληθές, ὅμοιον ἂν εἶη καὶ τὸ ἐπὶ τῶν

<sup>1</sup> ἂν εἰργ. u aP : ἀνεργασμένην U N.

<sup>2</sup> Schneider.

<sup>3</sup> Gaza, Schneider. <sup>4</sup> a : ὑπηρετούντος U (ἰ- NP).

<sup>5</sup> aP. <sup>6</sup> τῆς χώρας u aP : τῆς χώρας U : χώρας N.

<sup>7</sup> ego (δένδρων Schneider) : πυρῶν U.

<sup>8</sup> U : <ῆ> καὶ Schneider : ῆ Wimmer.

<sup>9</sup> U : ῆ Schneider. <sup>10</sup> ego (<ῆ> Schneider).

comes round; and as for the land, if it finds the land already tilled, cold weather generally gives it an open texture. For this reason when spring comes round growth is rapid, and so too is heading and maturing, so that it is considered that grain in cold country is not as far behind grain in warm country as would correspond to the later spring, but is in fact in advance of it, as with Hellespontine grain.<sup>1</sup> For when the impulse to grow has become strong because of the accumulated food, and the weather furthers it, the grain both develops and ripens rapidly.

These matters, then, depend on the differences of country.

#### *Seed Crops: Choice and Treatment of the Seed*

The seed (as with the planting in the holes)<sup>2</sup> 24.1 should be taken from land as good or land that is inferior, so that there will be no change or a change for the better. Yet we are told that seed from good land is stronger (which is why its power remains for two years).<sup>3</sup> If this is true, the rule would be like

<sup>1</sup> Cf. HP 8 2. 10: "For the grain at Athens is some thirty days (or a little more) earlier than the grain at the Hellespont. Now if it is also sown earlier, the shift would be of the dates; but if it is sown at the same time, the period would evidently be longer." <sup>2</sup> CP 3 5. 2.

<sup>3</sup> Foreign grain is assimilated in the third year: CP 1 9. 3, 2 13. 3, 4 1. 6.

φυτευμάτων, τὸ<sup>1</sup> τὰ κάλλιστα καὶ ἰσχυρότατα λαμβάνειν, ὥστ' ἀμφοτέρως ἂν ἔχοι λόγον.

- 24.2 χρῆ δὲ καὶ ταῖς τοῦ ἀέρος ἀνωμαλίαις προσέχειν · οὔτε γὰρ τὰ ἐκ τῶν εὐείλων καὶ πρώτων<sup>2</sup> εἰς τοὺς ὀψίους καὶ δυσχειμέρους, οὔτε τὰ ἐκ τούτων εἰς ἐκείνους ἁρμόττειν ·<sup>3</sup> τὰ μὲν γὰρ προτερεῖν δοκεῖ, τὰ δ' ὑστερεῖν, ὥστε τὰ μὲν ὑπὸ χειμῶνος, τὰ δ' ὑπ' αὐχμῶν ἀπόλλυται καὶ ἀνδρίας (ὄψια γὰρ ὄντα βραδέως τε κύσκειται καὶ ἀποτίκει, διὸ καὶ ὑστερεῖ). ταῦτό δὲ τοῦτο συμβαίνει καὶ ἐπὶ τῶν σπερμάτων ὅσα περ<sup>4</sup> εὐβλαστῆ καὶ
- 24.3 ταχὺ παραγίνεται, καθάπερ τὰ τρίμηνα, ἃ<sup>5</sup> σπαρέντα<sup>6</sup> πρώια προτερεῖ καιρῶν,<sup>7</sup> εἰ μὴ<sup>8</sup> τοιοῦτόν ἐστιν ὡς προλαβεῖν<sup>9</sup> τοῦ χειμῶνος<sup>10</sup> πρὸς τὴν ῥίζωσιν, ὥσπερ καὶ τὸν κύαμον διὰ τοῦτο πρώισπο-

<sup>1</sup> u : τῶ U.

<sup>2</sup> U : πρώτων Wimmer.

<sup>3</sup> u N a (â-U) : -ει P.

<sup>4</sup> Wimmer (ἴσα Schneider) : ἴσα γὰρ U.

<sup>5</sup> ego (*trimenstria*: *haec* Gaza : *τριμηναῖα* Lobeck [Phrynichus, p. 549]) : *τριμηναῖα* U<sup>c</sup> (from -αῖα).

<sup>6</sup> σπαρέντα <γὰρ> Schneider.

<sup>7</sup> U : καιρὸν u.

<sup>8</sup> μὴ <τι> Gaza, Schneider.

<sup>9</sup> ego (*sit*: *ut* . . . *anticipare debeat* Gaza : *ἔστω δ* πρ. <δεῖ> Schneider : *ὥστε* πρ. Wimmer) : *ἔστω δ* πρ. U.

<sup>10</sup> U : τοὺς χειμῶνας Schneider (*cf.* CP 2 12. 5).

that about cuttings: to take the finest and strongest,<sup>1</sup> so that either choice would be reasonable.

We must also attend to differences in the air of the localities concerned. So we are advised that it is neither suitable to sow seed from a sunny and early-producing region in one that produces late and has a harsh winter, nor to sow seed taken from the latter region in the former. For seeds taken from the former are considered to come out too early, those from the latter too late, and so the former are killed by cold, the latter by dry weather and lack of rain, since being late sprouters they are slow to head and bear, which makes them too late.<sup>2</sup> The same happens with those grains that sprout well and come up rapidly (like the three-months varieties).<sup>3</sup> These when sown early<sup>4</sup> develop too soon, unless the plant needs to get rooted before winter sets in, just as they sow bean early for this

<sup>1</sup> CP 3 5. 1.

<sup>2</sup> *Cf.* HP 8 8. 1: "Different kinds of seeds also suit the natures of different countries . . . It is good to make the change from warm localities to those slightly less warm, and so with cold localities. Seeds taken from localities with harsh winters are in early producing localities late in heading, and so are destroyed by rainless weather (unless rain falls late and saves them)."

<sup>3</sup> For three-months wheat and barley (sown in spring) *cf.* CP 4 11. 1.

<sup>4</sup> At the setting of the Pleiades.



ροῦσιν, καὶ ἄμα διὰ τὸ φιλεῖν ἀνθοῦντα βρέχεσθαι, καὶ ἀνανθεῖν<sup>1</sup> πολὺν χρόνον· ὄψις γὰρ σπειρόμενος οὐκ ἂν βρέχοιτο. τὸ δὲ ὕδωρ ἐν τῷ ἀνθεῖν τούτῳ<sup>2</sup> μὲν συμφέρει<sup>3</sup> διὰ τὴν μανότητα, τῷ σίτῳ δὲ ἀσύμφορον διὰ τὴν λεχθεῖσαν πρότερον αἰτίας· τοῖς δὲ ἄλλοις χεδροποῖς ἀβλαβὲς πλὴν ἐρεβίνθῳ, τοῦτον δὲ ἀπολλύει·<sup>4</sup> καταπλυθείσης γὰρ τῆς ἄλμης, ὡσπερ συμφύτου τινὸς στερόμενος, σφακελίζει τε καὶ ὑπὸ καμπῶν κατεσθίεται (ζωογονεῖται γὰρ, ὡσπερ εἶρηται).

24.4 βραχέντος δὲ οἴνω τοῦ σπέρματος ἦττον δοκεῖ νοσεῖν, ὅπερ οὐκ ἄλογον, ἔχοντί<sup>5</sup> τινα δριμύτητα, διατηροῦσι γὰρ αὐταί. τὸ γὰρ ὄλον, ἐάν τις ἀλλοι-

§ 4 line 1 Pliny, *N. H.* 18. 157 (of seed crops): vino ante semina perfusa minus aegrotare existimant.

line 1 *Geoponica*, ii 18. 6: Ἀπουλήσιος δὲ φησι τὰ οἴνω ἐπιρρανθέντα σπέρματα ἔλαττον νοσήσειν.

<sup>1</sup> U: ἀνανθεῖν Wimmer.

<sup>2</sup> τούτῳ u aP: τοῦτο U N.

<sup>3</sup> U: συμφέρει u.

<sup>4</sup> Schneider: ἀπολλύει U.

<sup>5</sup> ego: -τα U.

<sup>1</sup> Cf. *HP* 8 1. 3 (of seed crops sown early): "Of legumes bean and birds' pease are (one may say) the ones that are most of all sown early, for on account of their weakness these like to anticipate the cold weather in getting rooted."

reason<sup>1</sup> and then too because it likes rain when it flowers and puts out flowers over a considerable time,<sup>2</sup> for if sown late it would get no rain. Rain at flowering time (we are told) is good for bean because of its open texture, but it is bad for cereals for the reason mentioned earlier.<sup>3</sup> It is harmless to the other legumes with the exception of chickpea, which it destroys, since chickpea, as if deprived of something belonging to its nature when the brine is washed off, gets necrosis and is devoured by bend-worms<sup>4</sup> (animals being produced in it as we mentioned).<sup>5</sup>

If the seed has been wet with wine the plant is considered to suffer less from disease. This is not unreasonable, since the wine has a certain pungency, and pungencies are preservative. For in 24.4

<sup>2</sup> Cf. *HP* 8 2. 5: "But in legumes flowering lasts a long time, longer in vetch and chickpea than in the others, but longest of all of these and with the greatest difference from other seed crops in bean, for they say that it blooms for forty days . . ."; *HP* 8 6. 5: "Bean is fondest of water when it blooms, which is why people are unwilling to sow it late, because (as we said) it blooms for a long time . . ."

<sup>3</sup> *CP* 2 2. 2; cf. *HP* 8 6. 5 (of rain): ". . . but it is harmful to wheat, barley and the other cereals when they are in bloom, since it destroys the flowers . . ."

<sup>4</sup> Cf. *CP* 3 22. 3; *HP* 8 6. 5 (on rain): "For pulse it is harmless, except for chickpea, for when their brine is washed off these are destroyed by necrosis and by being devoured by bend-worms . . ." <sup>5</sup> *CP* 3 22. 3.

ώσας καταβάλλη τὸ σπέρμα (καθάπερ πρότερον ἐλέχθη) μεταβάλλειν καὶ <τὰ><sup>1</sup> φυτὰ καὶ τοὺς καρποὺς οὐκ ἄλογον· ὅσα γὰρ ἡ ἀρχή, τοιαῦτα καὶ τὰ ἀπὸ τῆς ἀρχῆς. ἔτι<sup>2</sup> δ' ὀρώμεν ὅτι καὶ ταῖς τροφαῖς ἀλλοιούμενα μεταβάλλει καὶ ὅλα γένη τῶν δένδρων (ὥσπερ ἐξ ἀγρίων ἡμερα γινόμενα καὶ ἐκ μελάνων λευκά), καὶ κατὰ τοὺς καρποὺς ὁμοίως· ὥστε καὶ πρὶν πεσεῖν, αὐτὸ ποιόν τι γινόμενον,<sup>3</sup> οὐκ ἄτοπον ἀλλοιοῦν καὶ τὴν ῥίζαν εὐθύς, καὶ τὸν καυλόν, καὶ ἔσχατον τὸν καρπὸν.

ἀπηνηθηκόσι<sup>4</sup> δ' οὐ συμφέρει κατὰ μικρὸν ἐφύειν,<sup>5</sup> οὐδ' ἡλίους ἐπιλαμβάνειν, ἀλλὰ ψύχην γίνεσθαι καὶ ἐπινεφεῖν,<sup>6</sup> ὅπως μὴ ἐπικαθήμενον τὸ ὕδωρ ἐπιλαβὼν ὁ ἥλιος ἐρυσιβώση<sup>7</sup> σῆψιν<sup>8</sup> ποιήσας· διὸ καὶ αἱ δροσοβόλοι χῶραι καὶ ἔγκοιλοι καὶ ἀπνεύματοι μάλιστα ἐρυσιβώδεις.<sup>9</sup>

<sup>1</sup> v<sup>ac</sup>, Schneider.

<sup>2</sup> u: εἴ τι U.

<sup>3</sup> aP: -αι UN.

<sup>4</sup> Schneider: -κός U.

<sup>5</sup> Schneider (*irrotari* Gaza): ἐκφύειν U.

<sup>6</sup> Schneider: ἐπινεφεῖν U (-νέφειν N aP: -νίφειν u).

<sup>7</sup> N aP (-ὠση u): ἐρυσιβώσι U.

<sup>8</sup> Scaliger: ψήλην U: ψήλην u.

<sup>9</sup> subscription: θεοφράστου περι φυτῶν ἱστορίας τὸ γ' U.

general, if one alters the seed before sowing (as we said before),<sup>1</sup> it is not unreasonable that both the plant and the crop should change, for as goes the beginning, so goes what comes from the beginning. Again we observe that not only the entire kind of a tree is altered and changed by the food (as when the tree becomes a cultivated one instead of wild<sup>2</sup> and white instead of black),<sup>3</sup> but that this happens similarly with seed crops, so that it is not strange that when the seed before sowing acquires a certain character itself, it should also change the character of the root to begin with, then of the stem, and last of the fruit.

After the flower is shed it is not advantageous for short rains to follow, succeeded by sunshine, but rather for there to be cold weather<sup>4</sup> and an overcast sky, so that the sun may not catch the rainwater while it is still on the plant and cause rust by bringing about decomposition. This is why countries with a fall of dew and that lie in a hollow and have no wind are especially liable to rust.<sup>5</sup>

<sup>1</sup> CP 3 9. 4.

<sup>2</sup> Cf. CP 2 14. 1.

<sup>3</sup> Cf. CP 2 13. 2.

<sup>4</sup> Cold has a drying effect.

<sup>5</sup> Cf. HP 8 10. 2, cited in note 2 on CP 3 22. 1.

1.1 ἐπειδὴ πλείους αἱ γενέσεις τῶν φυτῶν, τούτων δὲ κοινοτάτη πᾶσιν ἢ ἀπὸ σπέρματος (ἢ ὅσα ἔχει σπέρμα καὶ καρπὸν), ἀπορήσειεν ἄν τις διὰ τί ποτε οὐκ ἀνὰ λόγον<sup>2</sup> ἢ ἰσχὺς ἐκάστοις ἐστὶ τῶν σπερμάτων, ἀλλ' ἀσθενέστερα<sup>3</sup> <τὰ><sup>4</sup> τῶν ἰσχυροτέρων, οἷον τὰ τῶν δένδρων τῶν ἐπετείων. ἀμφοτέρως γὰρ φαίνεται τὸ ὁμολογούμενον· καὶ εἰ ἀπὸ ἀσθενεστέρων σπερμάτων ἰσχυρότερα <τὰ><sup>5</sup> γινόμενα, τὰ γὰρ σπέρματα γεννᾷ τὰ δένδρα. τῆς δὲ ἀσθενείας καὶ τῆς ἰσχύος ἐκεῖνα σημεῖα· τὰ μὲν γὰρ ἐπέτεια, ὅταν σπαρῆ, διαμένει τὰ αὐτὰ καὶ ἕξομοιοῖ τοὺς καρπούς, τὰ δὲ τῶν δένδρων μεταβάλλει καὶ χεῖρω ποιεῖ· καὶ τὰ μὲν ταχέειν

<sup>1</sup> το δ̄ U<sup>m</sup>.      <sup>2</sup> Wimmer: ἀνάλογον U.

<sup>3</sup> u N: -εστερα U: -εστέρα aP.

<sup>4</sup> ego (quae a validioribus prodeant Gaza).

<sup>5</sup> Schneider.

*A Difficulty: The Weaker Seeds Produce  
and Are Produced by the Stronger Plants*

1.1 Since of the several modes of generation in plants the one most common to all (or common to all that have seed and fruit) is generation from seed,<sup>1</sup> one might raise a difficulty: why the strength of the seed does not answer to the strength of the various plants, but the weaker seeds come from the stronger plants, to wit, the seeds of trees are weaker than those of annuals. (For put it either way, and the fact is admitted: you can also say that the weaker seed produces the stronger plant, since the seed generates the tree.) Proof of this weakness and strength is the following: when annuals are sown, the plant produced is the same as its parent and produces the fruit that its parent produced, whereas the seeds of trees change the character of the fruit produced and make an inferior tree<sup>2</sup>; again, the seeds of annuals grow up and mature quickly,

<sup>1</sup> Cf. CP 1 1. 1.

<sup>2</sup> Cf. CP 1 9. 1; HP 2 2. 4-6.

1.2 ἀποδίδωσιν τὴν τελείωσιν, τὰ δὲ χρόνιον καὶ βρα-  
δεῖαν. καὶ ἀνάπαλιν δὲ λαμβανομένων · ἰσχυρό-  
τερα γὰρ ὄντα τὰ δένδρα βραδύτερον ἐκπέττει  
τοὺς καρπούς.

ἔτι δὲ τὰ μὲν ἐν κελύφεσι δερματικοῖς καὶ ξυ-  
λώδεσιν, τὰ δ' αὐτὰ πάλιν ἐν περικαρπίοις σαρκώ-  
δεσιν (οἷον τὸ τῆς ἐλάας καὶ τὸ τῆς κοκκυμη-  
λέας, καὶ τὰ τῆς ἀμπέλου καὶ ἀπίου καὶ μηλέας),  
ἕνια δὲ ἐν ξυλώδεσιν ἅμα καὶ σαρκώδεσιν καὶ  
ἄλλως,<sup>1</sup> ὅσα κάρυον ἐντὸς ἔχει τὴν σάρκα.<sup>2</sup> τὰ δὲ  
τοῦ σίτου γυμνά, καὶ μάλιστα τοῦ πυροῦ καὶ τῆς  
κριθῆς, εἰ δὲ μὴ, χιτώσι γε περιέχεται λεπτοῖς.  
αἰεὶ δὲ τὸ ἀσθενέστερον ἢ φύσις εἰς πλείω τίθεται  
φυλακὴν.

αἱ μὲν οὖν ἀπορίαι σχεδὸν αἱ αὐταί.

1.3 δεῖ δὲ λαβεῖν πρὸς αὐτὰς ἀρχὴν τήνδε · τὸ

<sup>1</sup> ego: ὄλωσ U.    <sup>2</sup> ego: τῆς σαρκὸς U.

<sup>1</sup> That is, trees take longer to produce mature seed. Cf. Aristotle, *On the Generation of Animals*, i. 18 (724 b 19–20): "Seed and fruit differ in being prior or posterior: a fruit by being from something else, a seed by something else's being from it, since both are the same thing."

<sup>2</sup> Cf. *HP* 1 11. 3: "No tree seed is naked, but is either enclosed in flesh or in a hull, some of the seeds in leathery hulls, as acorn and sweet chestnut, some of the seeds in

whereas the maturing of trees from seed is late and slow. So too when we take plant and seed the other way: trees, the stronger plant, take longer to complete the concoction of their fruit.<sup>1</sup> 1.2

Again, the seeds of trees are (1) in some cases enclosed in a leathery or woody cover, the cover itself in turn being enclosed in a fleshy pericarpion (for example the seed of olive and plum and the seeds of vine, pear and apple), and (2) in other cases the seed has the combination of woody and fleshy enclosure in a different arrangement, when the seed has the flesh inside in the form of a nut.<sup>2</sup> Whereas the seeds of cereals are naked, and most of all the seeds of wheat and barley (or if not naked, the seeds are enclosed only in thin coats). But the nature of a plant always surrounds the weaker thing with the greater protection.

So the difficulties are (one may say) the same.<sup>3</sup>

### The Solution

To meet these difficulties we must start from the 1.3

woody hulls, as almond and filbert . . . Of the seeds themselves (*sc.* as opposed to the hull), in some plants they are flesh from the start (*sc.* as you pass from outside inward), as with nut-like and acorn-like seeds, but in others the fleshy part is contained in a stone, as with the olive, bay and others."

<sup>3</sup> Whether one takes the seed as product or source of the plant.

σπέρμα μὴ μόνον ἔχειν δύναμιν [τοῦ] τῷ<sup>1</sup> ποιεῖν ἀλλὰ καὶ τῷ<sup>2</sup> πάσχειν, ὡσπερ<sup>3</sup> καὶ κατὰ πάντων τῶν τῆς φύσεως ἀληθές· καὶ κατ' αὐτὴν δὲ τὴν γένεσιν ἀμφοῖν εἶναι τὴν ἐνέργειαν, καὶ τρόπον τινα οὐχ ἦττον τῷ<sup>4</sup> πάσχειν, τότε γὰρ καὶ ἡ ἐν τοῖς σπέρμασιν κινεῖται δύναμις οἷον διαθερμαινομένων. διὸ καὶ οὐ πάντα βλαστάνει κατὰ τὴν αὐτὴν αἰτίαν,<sup>5</sup> ἀλλ' ὅταν ἡ αἰτία<sup>6</sup> τοῦ ἀέρος κατάσχη κρᾶσις.

ὑποκειμένου δὲ τούτου, φανερόν ὡς οὐκ ἰσχύος, ἀλλ' ἀσθενείας μᾶλλον ἢ ταχυβλαστία· τὸ γὰρ ἀσθενὲς εὐπαθέστερον (διὸ καὶ τὰ [εὐπαθέστερα]<sup>7</sup> ἐπέτεια<sup>8</sup> ταχυβλαστότερα, καὶ ἅμα τὸ γυμνὸν<sup>9</sup> αὐτοῖς<sup>10</sup> ὡσπερ ἕτερον εἰς τὸ παθεῖν).

1.4 ὁ δ' αὐτὸς λόγος καὶ περὶ τῆς τελειώσεως· τὰ <γὰρ><sup>11</sup> ἀσθενέστερα ῥᾶον ἐκτελειώσασθαι καὶ τῷ περιέχοντι καὶ ταῖς ἐν αὐτοῖς<sup>12</sup> ἀρχαῖς. ὁ καὶ περὶ

<sup>1</sup> ego : τοῦτο U : τοῦ u.

<sup>2</sup> ego : τοῦ U.

<sup>3</sup> U : ὅπερ u.

<sup>4</sup> U : τοῦ Gaza, Schneider.

<sup>5</sup> U : ὡσαν Schneider.

<sup>6</sup> U : οἰκεία Gaza (aptus), Itali.

<sup>7</sup> ego.

<sup>8</sup> u (N aP omit διὸ . . . ἕτερον by homoioteleuton) : ἐπέτεια U.

following principle: that the seed has not only a capacity by way of action, but also a capacity by way of being acted upon, as is also true of all performances of the nature of a plant; and that moreover in the very generation of a plant the operation is realized in both ways, and no less (in a fashion) by being acted upon, since at that time among other things the capacity in the seeds is brought into play as the seeds are (as it were) warmed through. This is why all seeds do not sprout in response to the same cause, but only when the tempering of the air that causes this warming prevails.<sup>1</sup>

Now that this point has been laid down, it is evident that rapid sprouting is not a matter of strength but rather of weakness; for it is the weak thing that is readier to be acted upon<sup>2</sup> (which is why annuals are the more rapid sprouters; then too their nakedness is as it were a second factor contributing to their being acted upon).

The same holds for seed production: the weaker 1.4 seeds are easier to mature<sup>3</sup> both for the air and for the starting-points in the plants themselves. This

<sup>1</sup> Cf. CP 1 10. 5-6.

<sup>2</sup> Cf. CP 1 10. 2.

<sup>3</sup> Cf. CP 2 11. 7.

<sup>10</sup> Wimmer : ἀρχαῖς U.

<sup>11</sup> Gaza (enim vero).

<sup>12</sup> Gaza (eis), Scaliger : ἀρχαῖς U.

ζώων ἐστίν· αἰεὶ γὰρ τὰ ἰσχυρότερα χρονιωτέρας ὡς ἐπίπαν ποιεῖται καὶ τὰς κηύσεις καὶ <τὰς><sup>1</sup> τροφάς. ἄμα δ' ὡσπερ ἐναντίως<sup>2</sup> τὰ μὲν αὐτοῦ τοῦ χιτῶνος<sup>3</sup> [σπερματος]<sup>4</sup> γεννητικά, σῶμά τε<sup>5</sup> οὐδὲν <οὐ><sup>4</sup> μικρὸν ὑπόκειται· τὰ δὲ ἐν ὄγκοις μείζουσιν, οἷ καταναλίσκουσιν<sup>6</sup> εἰς ἑαυτοὺς<sup>7</sup> τὰς τροφάς, ὥστε<sup>8</sup> τὰ μὲν ὀλιγόκαρπα, τὰ δὲ ὄλως ἄκαρπα ποιεῖν, ὡς ἐπὶ τῶν ζώων συμβαίνει τῶν ἐκπαχυνομένων καὶ εὐτροφούντων.

1.5 τοῦ μὲν οὖν θάττον ἐκτελεοῦν<sup>9</sup> οὐχ ἢ ἰσχύς, ἀλλὰ ταῦτα τὰ αἷτια, διὸ καὶ πολυγονώτερα.

καίτοι τάχ' ἂν τις ἀντίποι περὶ τοῦ πλήθους, φάσκων πλείω τὰ ἀπὸ τῶν δένδρων εἶναι· πολλὰ γὰρ ἕκαστον ἔχει<sup>10</sup> τῶν περικαρπίων, τὸ δὲ

<sup>1</sup> aP.

<sup>2</sup> ego: ἐάν U.

<sup>3</sup> ego: χιμῶνος U.

<sup>4</sup> ego.

<sup>5</sup> ego: σωματα U.

<sup>6</sup> u: -ωσω U.

<sup>7</sup> u: ἐαυτὰς UN aP.

<sup>8</sup> Gaza (ut), Itali: ὡσπερ U.

<sup>9</sup> U<sup>c</sup>: ἐκτελοῦν

<sup>10</sup> U: ἔχει u. U<sup>ac</sup>.

<sup>1</sup> The pericarpia, hulls and stones.

holds of animals too: it is always the stronger ones that for the most part take a longer time not only for gestation but also for feeding the young. Then too the production is as it were of two opposite sorts: the annual seeds generate only a tunic, and nothing under the tunic is anything but small in body; whereas the seeds of trees are contained in adjuncts of larger bulk,<sup>1</sup> and these expend on themselves the food for the seeds, so that this makes some trees bear but little fruit<sup>2</sup> and other none at all,<sup>3</sup> as happens with animals that get fat and feed well.<sup>4</sup>

To conclude: the more rapid maturing of seed is not due to strength, but to these reasons, which is why annuals are more prolific. 1.5

Yet one might deny this point about their prolific character and say that trees produce more seeds, since each pericarpion has many seeds,<sup>5</sup> and the

<sup>2</sup> That is, seed.

<sup>3</sup> Cf. CP 1 15. 3.

<sup>4</sup> Cf. Aristotle, *On the Generation of Animals*, i. 18 (725 b 29–34) [of animals and plants]: "... for some have much, some little, and some no seed at all not through weakness, but in some through the opposite; for it is expended on the body, as with some men: for being in a robust state and getting fleshy or too fat they expend seed less and desire intercourse less." Cf. also *ibid.* ii. 7 (746 b 24–29).

<sup>5</sup> This holds of vine, pear and apple, but not of olive, plum, date or the nuts (cf. CP 4 1. 2).

δένδρον ἀφ' ἑνὸς γεγενῆσθαι σπέρματος.

ἀλλὰ ταῦτα μὲν τὰ ἐλαφρότερα, καὶ οἷον ἀπηρη-  
τημένα ἂν φανείη · τὸ δὲ μὴ δύνασθαι τηρεῖν τὰ<sup>1</sup>  
γένη, μῆδ' ἐξομοιοῦν, ἐν<sup>2</sup> ἀμφοῖν ἂν ἔχοι τὸ αἴ-  
τιον, καὶ τῷ πλείω χρόνον<sup>3</sup> ὄντα<sup>4</sup> κατὰ γῆς μάλ-  
λον κατακρατεῖσθαι, καὶ τῷ τοὺς σωματικούς  
1.6 ὄγκους ἀποσπᾶν.<sup>5</sup> ὁ γὰρ καὶ τῆς ἀκαρπίας αἴτιον,  
καὶ τῆς κακοκαρπίας εὐλόγως, φανερόν δὲ μάλισ-  
τα ἐκ τῶν ἀμυγδαλῶν, εἴπερ ἀφαιρουμένης τῆς  
ὕγρότητος καὶ τῆς εὐτροφίας μεταβάλλουσιν.

τὰ δ' ἐπέτεια βραχύν τινα χρόνον ἐν τῇ γῇ γί-  
νεται καὶ ὀλίγην ἔλκει τροφήν, διὸ καὶ οὐκ ἐξίστα-  
ται μιᾷ σπορᾷ τῶν γενῶν ἀλλὰ τῇ τρίτῃ,<sup>6</sup> τότε  
γὰρ ποιεῖται τὰς μεταβολὰς · ὥσθ' ὅπερ ἐκείνους  
διὰ τὸ πλήθος τῆς τροφῆς εὐθύς, τοῦτο τοῖς σπέρ-  
μασιν χρονισθεῖσι κατὰ λόγον · πλὴν ὅτι τὰ μὲν

<sup>1</sup> U : Scaliger deletes : τὰχ' Schneider.

<sup>2</sup> Wimmer (*de Gaza* : ἀπ' Schneider) : ἐπ U.

<sup>3</sup> u NP : χρόνωι U (-ω a).

<sup>4</sup> ego : τὰ U.

<sup>5</sup> U : ἀντισπᾶν (*attrahat* Gaza) Schneider.

<sup>6</sup> Gaza (*sed tercio* [sc. satu]), Dalecampius (ἀλλ' εἰ τῇ τρί-  
τῃ Wimmer) : ἀλλ' ὁ τῆς τρίτης U : ἀλλ' ὅτι τρίτη u : ἀλλ' ὁ τῆς  
τρίτης N : ἀλλὰ τῆς τρίτης aP.

<sup>1</sup> Unlike some vegetables, where several seeds are sown

tree was produced from a single seed.<sup>1</sup>

But these are the slighter parts of the difficulty, and would appear as it were peripheral. The main part of it is this: that the seeds of trees are unable to maintain their kind and unable to produce fruit like the parent; and the reason would lie in two circumstances: that they remain longer in the ground and so are mastered to a greater degree,<sup>2</sup> and that the great bulk of the pericarpion diverts the food.<sup>3</sup> For the reason for bearing no fruit at all is also, as 1.6 we should expect, the reason for bearing inferior fruit.<sup>4</sup> That this is so is clearest in the case of almond-trees, where mutation follows as the fluidity and good feeding are eliminated.<sup>5</sup>

Seeds of annuals on the other hand remain but a short time in the ground and draw but little food, and for this reason do not depart from their kind in a single sowing, but in the third,<sup>6</sup> for it is then that they change over. And so it is reasonable that what happens to tree seeds directly, because of their great intake of food, should happen to annual seeds after an interval. But there is this difference: tree

together and said to produce a single plant (*cf. CP* 5 6. 9).

<sup>2</sup> This applies to the seed as producer of the tree.

<sup>3</sup> This applies to the tree as producer of the seed.

<sup>4</sup> The seed in the ground is overpowered by the fluid there. *Cf. CP* 1 17. 9-10.

<sup>5</sup> *Cf. CP* 1 17. 9-10.

<sup>6</sup> *Cf. HP* 8 8. 1, *CP* 1 9. 3, 2 13. 3.

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εἰς τὸ χειρὸν αἰεὶ μεταβάλλει, τὰ δὲ καὶ ἐπὶ τὸ βέλτιον, ἐὰν ἡ χώρα τοιάδε καὶ ὁ ἀήρ. ἀλλὰ δὴ τοῦτο μὲν ἔτερον.

1.7 εἰς ἄλλο δ' ὅλως ἐξίσταται γένος μάλιστα τῶν σπερμάτων τὰ ἰσχυρότερα, καθάπερ ὁ πυρὸς καὶ ἡ κριθή· μόνα γὰρ ἐξαιροῦνται, μᾶλλον δ' ὁ<sup>1</sup> πυρὸς, ἰσχυρότερον ὢν·<sup>2</sup> ὥστε καὶ τοῦτο ὁμολογούμενον τῷ<sup>3</sup> πλείω τροφήν ἔλκειν. ὁ γὰρ θέρμος ὥσπερ ἀπεπτόν τι τὸ ὅλον.

2.1 τὰ μὲν οὖν κατὰ τὴν βλάστησιν ἐν τούτοις ἂν εἶη.

πρὸς δὲ τὴν ἔξω διαμονὴν φυτευομένων,<sup>4</sup> ἄλλοις μὲν ἄλλως συμβαίνει κατὰ τοῦ χρόνου. οὐ μὴν ἀλλ' οὐδ' ἄλογον ἔνια προτερεῖν τῶν δενδρικῶν εἰς τὴν φθοράν, οἷον ὅσα ἐν περικαρπίοις ἐστὶ

<sup>1</sup> u: δὴ U.

<sup>2</sup> u: ὢν U.

<sup>3</sup> τῷ U (τῷ NP): τὸ u a.

<sup>4</sup> U: Gaza omits: τῶν σπερμάτων Schneider: φυλαττομένων Wimmer.

<sup>1</sup> It was held that imported seed changed to the native variety. From this Theophrastus infers that if the native variety was better the change was an improvement, and due to the change of country and climate.

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seeds always change for the worse, whereas the seeds of annuals also change for the better, if the country and weather have the right character.<sup>1</sup> But improvement is another matter.

Among seed crops the change to a quite different 1.7 plant occurs chiefly in the stronger ones, as wheat and barley, for they alone turn into darnel,<sup>2</sup> and wheat, the stronger of the two, does so more. So here too is a case that agrees with the explanation of degeneration as due to taking in too much food. As for lupine,<sup>3</sup> it is (so to speak) a thing not concocted at all.

And so matters concerned with the sprouting of 2.1 the seeds would have their explanation in the points mentioned.

*Survival of the Seed: Trees*

The survival of the seed outside the ground for purposes of propagation varies in length of time for the seeds of different plants. Nevertheless it is not unreasonable that some tree seeds should perish earlier than annual seeds, such as all that are contained in fleshy pericarpia when these (for instance)

<sup>2</sup> Cf. HP 2 4. 2; 8 5. 1; 8 8. 3.

<sup>3</sup> Lupine, which like wheat and barley is very strong (cf. HP 8 11. 8), nevertheless never changes over to another plant. Its powers of concoction are not overwhelmed by too much food, since it has no such powers to speak of.



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σαρκώδεσιν,<sup>1</sup> οἷον<sup>2</sup> ὅταν χωρισθῆ ἢ<sup>3</sup> σαπῆ, γυμνούμενα γὰρ ἀναξηραίνεται καὶ θνήσκει· τὰ δὲ ἐν δερματικοῖς καὶ μὴ χωριζόμενα, καὶ γὰρ ὑγρότερα καὶ παρεισδέχεται τὸν ἀέρα. μάλιστα δὲ διαμένει τὰ ἐν ξυλώδεσιν, καὶ τούτων ὅσα πυκνὸν τε<sup>4</sup> τὸ κέλυφος ἔχει, καὶ αὐτὰ λιπαρά, καθάπερ τὰ κάρυα τὰ Ἡρακλεωτικά, πλὴν ἐκπικροῦται.<sup>5</sup> τὰ δ' ἀμύγδαλα ἐλάττω χρόνον, ἐλάχιστον<sup>6</sup> δὲ τὰ βασιλικά, [μόνον]<sup>7</sup> μανότατον γὰρ τὸ περίξ καὶ ἤκιστα συμφυές. διαμένει δὲ καὶ τὸ τῆς ἐλάας καὶ εἴ τι ἄλλο τοιοῦτον. τῶν δ' ἐν σαρκώδεσι περικαρπίοις χρονιώτατον τὸ τοῦ φοίνικος, ἄτε ξηρότατον ὄν καὶ πυκνόν.

2.2 τὰ μὲν οὖν τῶν δένδρων διὰ ταύτας τὰς αἰτίας τὰ μὲν μᾶλλον, τὰ δ' ἥττον διαμένει.

σχεδὸν δὲ καὶ τὰ<sup>8</sup> τῶν σιτωδῶν διὰ παραπλησίαις αἰτίας· ἢ γὰρ τῶ περιέχεσθαι πλείοσι χιτώσιν ἢ διαμονῇ, καθάπερ ὁ κέγχρος, ἢ τῶ λίπος

<sup>1</sup> u : σαρκώδεις U.      <sup>2</sup> [οἷον] Wimmer.

<sup>3</sup> u (ἢ U) : καὶ Wimmer.

<sup>4</sup> Schneider : τι U.

<sup>5</sup> u : ἐκ πικροῦ U.

<sup>6</sup> U<sup>c</sup> : ἐλάχιστοῦν U<sup>ac</sup>.

<sup>7</sup> ego : μένει Wimmer.      <sup>8</sup> U<sup>c</sup> : ὄντα U<sup>ac</sup>.

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become detached from the seed or decompose, since the seed on being exposed dries out and dies. The seeds in leathery pericarpia perish even when not detached, since the pericarpia are less rigid than woody ones and admit the air. Seeds in woody pericarpia survive best, and of these all that have a close-textured husk and are themselves oily, as filberts (except that they turn bitter). But almonds last a shorter time, and walnuts the shortest time of all, since the covering is of very open texture and least of all coalesces into a single shell. Olive seeds and the like<sup>1</sup> also survive, but of seeds in a fleshy pericarpion the longest lasting is the date seed, since it is extremely dry and of close texture.<sup>2</sup>

In trees, then, some seeds last longer, some less, 2.2 for these reasons.

*Survival of the Seed: Seed Crops*

So too (one might say) the survival of the seeds of seed crops is due to similar reasons: either the seeds are wrapped in a number of coats, as millet,<sup>3</sup> or are

<sup>1</sup> Where the germ is in a woody "stone," and this is in a fleshy pericarpion: cf. CP 41. 2.

<sup>2</sup> Cf. CP 41. 2 with note 1.

<sup>3</sup> Cf. HP 811. 1: "The seeds of seed crops do not have the same power of sprouting and of keeping. For some sprout and mature very rapidly and keep very well, as Italian millet and millet . . ."

ἔχειν, ὡσπερ τὸ σήσαμον, ἢ τῷ δριμύτητά<sup>1</sup> τινα καὶ πικρότητα χυλοῦ, καθάπερ ὁ θέρμος καὶ ὁ ἐρέβινθος καὶ ὁ ὄροβος· μόνα γὰρ δὴ καὶ οὐ ζῶονται τῶν χεδροπῶν ὁ θέρμος καὶ ὁ ἐρέβινθος,<sup>2</sup> ἀλλ' ὅ γε ἐρέβινθος μέλας γίνεται διαφθειρόμενος. ὁ δὲ πυρὸς μᾶλλον τῆς κριθῆς καὶ τῶν χεδροπῶν, διὰ τὸ θερμότερον εἶναι καὶ χιτῶνας ἔχειν πλείους· ἢ γὰρ αὐτὴ κριθή, καθάπερ γυμνόν· τὰ δὲ χεδροπὰ παχέα μὲν τοῖς κελύφεισι, ἀλλὰ μανά, καὶ γλυκύτερά τινα ἔχοντα φαίνεται· οὐχ ἦττον αἷτια ταῦτα τῆς φθορᾶς, διὸ καὶ ὁ κύσμος καὶ ὁ ὄχρος τάχιστα κόπτεται. τάχα δ' ἀληθέστερον εἰπεῖν ὡς κατὰ τὰς χώρας· ἐν Ἀπολλωνίᾳ γοῦν τῇ περὶ τὸν Ἰόνιον πολλὰ φασιν ἔτη διαμένειν τοὺς κυάμους, πολλὰ δὲ καὶ περὶ Κύζικον.

ἀλλὰ περὶ μὲν τῆς τούτων διαμονῆς, καὶ τὸ ὅλον τῆς φύσεως, τάχ' ἂν ἐν τοῖς ὕστερον ἐπὶ

§ 2 lines 7–10 Athenaeus epitome ii. 45 (55 E): Θεόφραστος δὲ ἱστορεῖ ἐν αἰτίοις φυτικοῖς ὅτι θέρμος καὶ ὄροβος καὶ ἐρέβινθος μόνα οὐ ζῶονται τῶν χεδροπῶν διὰ τὴν δριμύτητα καὶ πικρότητα. ὁ δ' ἐρέβινθος, φησί, μέλας γίνεται διαφθειρόμενος.

<sup>1</sup> U<sup>c</sup>: δριμύτατον U<sup>ac</sup>.

<sup>2</sup> u: ἐρέβινθος U.

oily, as sesame, or have a certain pungency and bitterness of flavour, as lupine, chickpea and vetch,<sup>1</sup> for alone among legumes lupine and chickpea survive without breeding animals<sup>2</sup>; instead when chickpea perishes it turns black. Wheat lasts better than barley and legumes because it is hotter and has more coats; barley on the other hand is practically naked, and legumes, although thickly wrapped in their pods, are nevertheless of open texture and are observed to possess a certain sweetness, and open texture and sweetness are no less responsible for destruction than other causes, which is why bean and birds' pease get wormy soonest. Perhaps it is truer to say that survival goes with the country: thus at Apollonia on the Ionian Sea it is said that beans keep for many years, and also at Cyzicus.<sup>3</sup>

The survival of seed crops and their nature in general will perhaps be discussed later at greater

<sup>1</sup> Cf. HP 8 11. 2.

<sup>2</sup> Cf. HP 8 11. 2: "In seed crops as they perish peculiar animals are bred . . . except for chickpea, for this alone breeds none." Cf. also HP 8 11. 6 for chickpea, lupine, vetch and millet as long-lasting seeds.

<sup>3</sup> Cf. HP 8 11. 3: "Country and air make a difference in whether seed crop seeds get worm-eaten or not. Thus at Apollonia on the Ionian Sea they assert that bean does not get worm-eaten at all, and is therefore stored for keeping; and it also keeps for a considerable time in Cyzicus."

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πλέον ῥηθείη · πρὸς δὲ τὰ τῶν δένδρων συγκρινόμενα, ταύτας<sup>1</sup> ἔχει τὰς διαφοράς.

3.1 ἐν δὲ τοῖς τῶν λαχανωδῶν<sup>2</sup> τὰ μὲν ἄλλα τὴν ἐξομοίωσιν ἀποδίδωσιν (ράφανος γὰρ<sup>3</sup> καὶ ἄλλ' ἄττα δοκεῖ παραλλάττειν, ἃ<sup>4</sup> καὶ δενδρικότερα), τὰς δ' ἐκφύσεις πλέον ἀλλήλων ἔτι<sup>5</sup> ταῦτα παραλλάττει<sup>6</sup> τῶν σιτηρῶν · τὰ μὲν γὰρ τριταῖα διαβλαστάνει, καθάπερ ὄκιμον σίκυος κολοκύνθη, τὰ δὲ πεμπταῖα ἢ ἑκταῖα, τὰ δὲ πεντεκαίδεκαταῖα, καθάπερ πρᾶσον, τὸ δὲ σέλινον τεσσαρακοσταῖον, ἐνιαχοῦ δὲ πεντηκοσταῖον,<sup>7</sup> δυσφύεστατον γὰρ τοῦτο πάντων. δυσφύες δὲ καὶ τὸ κορίαννον,<sup>8</sup>

<sup>1</sup> u : ταστας U.

<sup>2</sup> U<sup>cc</sup> : λαχανῶν U<sup>ac</sup>.

<sup>3</sup> U : Gaza omits : δὲ Schneider.

<sup>4</sup> ego (παραλλάττειν Wimmer) : γὰρ ἀλλάττειν ἃ U.

<sup>5</sup> Itali : ἔτι U.

<sup>6</sup> Gaza, Scaliger : -ειν U.

<sup>7</sup> aP (σ smudged) : -κοτ- U N.

<sup>8</sup> τὸ κορίαννον u : τορίαννον U (τὸ ῥιανόν N aP).

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length<sup>1</sup>; meanwhile the seeds as compared with those of trees show these differences.

*Vegetable Seeds: Sprouting*

3.1 Among the seeds of vegetables the rest breed true (I say "the rest" since cabbage<sup>2</sup> and certain other vegetables are considered to vary, and these are precisely the vegetables with the greatest resemblance to trees)<sup>3</sup>; but in the time taken for coming up these differ among themselves even more than grains.<sup>4</sup> For some come up on the third day after sowing, as basil, cucumber and gourd; some on the fifth or sixth, some on the fifteenth, as leek; whereas celery comes up on the fortieth day and in some places on the fiftieth, since it is the slowest of all to grow. Coriander is also slow, for the seed does not sprout

<sup>1</sup> CP 4 15. 3-4 16. 2 (for survival); CP 4 7. 4-7 (for nature).

<sup>2</sup> It was often planted from side-growths: cf. HP 7 2. 1; CP 1 4. 2.

<sup>3</sup> Cf. HP 1 3. 4: "Thus of undershrubs and vegetables some turn out to have a single trunk and as it were the nature of a tree, as cabbage [so Gaza; ῥάφανός U] and rue, and for this reason some persons call such vegetables 'tree-vegetables';..."

<sup>4</sup> Cf. HP 8 1. 5 (wheat and barley come up on the seventh day, pulses [except bean] on the fourth or fifth; bean on the fifteenth or even on the twentieth).

3.2 οὐ γὰρ βλαστάνει μὴ ἐριχθέν·<sup>1</sup> αἰτία δ' ἡ σκληρότης, ὡσπερ γὰρ ξυλωδές ἐστι τὸ περιέχον. ἡ δὲ τῶν τευτλίων ἀνωμαλία, τῷ<sup>2</sup> τὰ μὲν ὕστερον μηνί<sup>3</sup> βλαστάνειν,<sup>4</sup> τὰ δὲ δυοῖν, τὰ δὲ πλείοσιν, τὰ δὲ καὶ ἐνιαυτῷ, σημαίνειν ἔοικεν τῶν σπερμάτων αὐτῶν ἀτεραμνότητά τινα πρὸς τὴν βλάστην.<sup>5</sup>

τὰ δὲ θερινὰ σπειρόμενα<sup>6</sup> δῆλον ὡς δι' ἀσθένειαν· διὸ ταχύ τε παραγίνεται καὶ ταύτην τὴν ὥραν φύεται, φέρειν οὐ δυνάμενα τὸν χειμῶνα,

<sup>1</sup> ego (cf. *HP* 7 1. 3 ἐλιχθῆ U) : ἐρεχθέν U.

<sup>2</sup> τῷ U<sup>r</sup> (τῶ N aP) : τῶν U<sup>ar</sup>.

<sup>3</sup> Gaza (*mense*), Schneider : μὴ U N<sup>c</sup> (N<sup>ac</sup> omits) : μηνὸς u aP.

<sup>4</sup> ego (ἐκβλαστάνειν Wimmer) : ἐπιβλαστάνειν U.

<sup>5</sup> U N : βλάστησιν aP.

<sup>6</sup> u : σπειρόμενα U.

<sup>1</sup> Cf. *HP* 7 1. 3: "Not all herbaceous plants come out of the seed in the same time . . . The quickest to do so are basil, blite and rocket, and, among those sown for winter, radish, for they come up more or less on the third day. Lettuce comes up on the fourth or fifth; cucumber and gourd in about five or six days, some say seven, cucumber coming up earlier and faster; purslane in more; dill on the fourth day, cress and mustard on the fifth, beet in summer on the sixth, in winter on the tenth; orach on the

3.2 unless it is bruised.<sup>1</sup> The reason is its hardness, for the casing is like wood. On the other hand the irregularity in beets, some coming up a month later than the rest, some two, some several months, and some even a year,<sup>2</sup> appears to indicate a certain intractability to sprouting on the part of the seeds themselves.

Seeds sown in the summer crop<sup>3</sup> are evidently sown at this time because of weakness, which is why they come up rapidly and grow in that season, since they are unable to endure winter, some of them

eighth, cabbage on the tenth. Leek and horn-onion differ in the time taken, leek coming up on the nineteenth day and in some places on the twentieth, horn-onion on the tenth or twelfth. Coriander is slow, for fresh seed will not sprout unless it is bruised [reading ἐριχθῆ for ἐλιχθῆ U]. Savory and marjoram take longer than thirty days, and celery is slowest of all: those who give the shorter period say it comes up on the fortieth, whereas others say the fiftieth. . ."

<sup>2</sup> Cf. *HP* 7 1. 6: "They say that there is a peculiarity in beet: not all the seed comes up at once, but some comes up much later, and some in the next year and the third, which is why little comes up from much seed."

<sup>3</sup> Cf. *HP* 7 1. 1-2 (the three seasons of sowing vegetables are [1] that of the winter crop or first crop, sown after the summer solstice in Metagitnion [August], [2] that of the second crop, sown after the winter solstice in Gamelion [January], and [3] that of the summer crop, sown in Munychion [April]): "in this crop is sown cucumber, gourd, blite, basil and purslane."

τὰ μὲν<sup>1</sup> ὄντα ξηρά, καθάπερ καὶ τὸ ὄκιμον, τὰ δὲ ὑγρὰ καὶ ψυχρά, καθάπερ ὁ σίκυος καὶ ἡ ἀνδράχνη.<sup>2</sup>

θαυμαστὸν δ' ἂν δόξειεν τὸ τοῦ ἀβροτόνου<sup>3</sup> μάλιστα διότι θερμὸν ὄν τὴν ἀλέαν διώκει· αἰτία δὲ ἡ ἀσθενεία· πρὸς ἄμφω γὰρ ἀσθενεῖ,<sup>4</sup> καὶ πρὸς τοὺς χειμῶνας καὶ πρὸς τὰ καύματα.

3.3 τὸ δ' ὄλον οὐκ ἔοικεν<sup>5</sup> ἢ θερμότης μάλιστα εὐβλαστεῖν, εἶπερ θερμὰ τὰ δριμέα· καὶ γὰρ τὸ πράσον καὶ τὸ γήτειον καὶ ἔτι μᾶλλον ἢ θύμβρα καὶ ἡ ὀρίγανος δυσβλαστῆ· δεῖ γὰρ ἔχειν τινὰ ὑγρότητα, καὶ οὐχ ἦττον, ἀλλὰ μᾶλλον ἴσως, εὐκρασίαν τὸ εὐβλαστὲς πρὸς τὸ ποιεῖν καὶ πάσχειν. ὅλως δ' (ὡς γένει<sup>6</sup> λαβεῖν) ξηρότατα τῶν σπερμάτων τὰ στεφανωματικά<sup>7</sup> καὶ τὰ τῶν λαχάνων, ὅθεν καὶ τάχιστα τὰς ἰκμάδας ἔλκει, διὸ καὶ κρεμαννύουσιν αὐτὰ καὶ οὐ φαίνουσιν τὰ οἰκήματα, οὐδ' ὕδωρ εἰσφέρουσιν ἀπλῶς.<sup>8</sup>

<sup>1</sup> Itali (Gaza omits): μὴ U.

<sup>2</sup> aP: ἀνδραχίνη U N.

<sup>3</sup> U<sup>r</sup> N aP: ἀμροτόμου U<sup>ar</sup>.

<sup>4</sup> u: ἀσθενῆ U.

<sup>5</sup> U: οὐ ποιεῖ Wimmer (but cf. εὐβλαστῆς of ἀήρ CP 2 3. 3).

<sup>6</sup> <ἐν> γένει u.

<sup>7</sup> Basle ed. of 1541: στεφανωτικά U.

<sup>8</sup> U: ὅλως Wimmer.

being dry (as basil among others), some fluid and cold (as cucumber and purslane).

The case of tree-wormwood<sup>1</sup> would appear most surprising, because the plant is hot and yet seeks warmth. The reason is its weakness, for the plant is too weak not only for cold weather but for hot.

In fact it does not appear that heat is the greatest 3.3 factor in quick emergence, if we take pungent plants to be hot, since leek, horn-onion, and still more savory and marjoram are slow. For to come up rapidly a seed must possess a certain fluidity, and no less than this, or rather perhaps even more, it must have a certain good tempering that fits it to act and to be acted upon. In general the driest seeds as a class are those of coronary plants and vegetables, which is why they are the quickest to attract moisture, and for this reason they are hung up away from the ground and the rooms are not sprinkled or any water brought into them at all.<sup>2</sup>

<sup>1</sup> Cf. HP 6 7. 3: "Tree-wormwood sprouts better from seed than from a root or a side-growth, but it grows with difficulty even from seed. They root the slip in pots first, like the gardens of Adonis, in summer, for it is very sensitive to cold and in a word delicate even in a spot where the sun reaches it very bright, but when it has taken and grown it is tall and strong and tree-like . . ." The comparison with the gardens of Adonis indicates that the pots were indoors; hence the plant can be said not to endure hot weather.

<sup>2</sup> Cf. CP 1 7. 2.

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3.4 ἡ δὲ διαμονὴ θησαυριζομένων<sup>1</sup> πρὸς τε τοὺς σπόρους<sup>2</sup> καὶ πρὸς τὰς ἄλλας χρείας παραπλησία<sup>3</sup> καὶ τοῖς σιτηροῖς· γόνιμα μὲν εἰς τετραετίαν<sup>4</sup> μάλιστα, χρήσιμα δὲ πρὸς τὰλλα πλείω χρόνον, ὥσπερ ὁ σίτος εἰς τροφήν. καὶ τοῦτο δὲ καὶ<sup>5</sup> κατὰ λόγον, ὥσπερ καὶ τοῖς ὠοῖς<sup>6</sup> πρῶτον ἀπολιπεῖν<sup>7</sup> τὴν τῆς γονῆς.<sup>8</sup> καὶ γὰρ ἐν τούτοις ἡ ἀρχὴ τοῦ γεννᾶν, ὅπερ ἂν τις ὡς σπέρμα θεΐη, τὸ δὲ λοιπὸν ὡς τροφήν καὶ ὕλην προσηρητημένην,<sup>9</sup> ἀλλὰ τὸ ὅλον καλεῖται σπέρμα· διὸ καὶ ζῆν αὐτὰ φασι καὶ μὴ ξῆν ὅταν διαμένῃ ταύτῃ ἢ φθαρῇ<sup>10</sup> (καθάπερ καὶ τὰ ὠά<sup>11</sup>)· συμβαίνει δὲ καὶ τοῦτο

<sup>1</sup> Wimmer: -νη U.

<sup>2</sup> u: σπόρους U.

<sup>3</sup> u: -ήσια UN aP.

<sup>4</sup> U<sup>cc</sup> (from τεσ-).

<sup>5</sup> UN: aP omit.

<sup>6</sup> ego: ζῶοις U.

<sup>7</sup> U: -λείπειν Schneider.

<sup>8</sup> γονῆς <δύναμιν> Schneider (vis generandi Gaza).

<sup>9</sup> N aP: -στηρ- U.

<sup>10</sup> Schneider: φθαρείη U.

<sup>11</sup> Gaza (ova): ἰα U.

<sup>1</sup> Cf. HP 8 11. 5: "For coming up and for sowing in general the best (sc. seeds in cereals) are considered to be

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*Vegetable Seeds: Survival*

The survival of the seeds when stored for sowing 3.4 and for other uses is similar to that of cereals,<sup>1</sup> the seeds remaining fertile for about three years<sup>2</sup> and good for other purposes still longer, as cereals are good for food. This is reasonable in the seeds too, just as it is reasonable in eggs that their use for propagation should leave them first.<sup>3</sup> For in seeds too there is the starting-point of generation, which one would count as the true "seed," accounting the rest as food and matter attached to this.<sup>4</sup> The whole complex, however, is termed "seed," which is why people speak of the seeds as "living" or "not living" when they survive or perish in this respect (just as they say this of eggs)<sup>5</sup>; and this occurs not only in

those of last year. Those of two and of three years ago are inferior, and those older than this are (one may say) infertile, though good enough for food."

<sup>2</sup> Cf. HP 7 5. 5 (of vegetable seeds): "None keeps longer than four years so as still to be good for sowing."

<sup>3</sup> Cf. Aristotle, *On the Generation of Animals*, ii. 5 (741 b 19-22): "... it happens in all cases that what is produced last fails first, and what is produced first fails last, as if nature were taking the home lap and being resolved back to the starting-point from which it began."

<sup>4</sup> Cf. CP 1 7. 1.

<sup>5</sup> Cf. Aristotle, *On the Generation of Animals*, ii. 5 (741 a 19-20) [fertile eggs can be said to live because an actualized animal being could have come from them].

καὶ τοῖς βαλανώδεσιν καὶ τοῖς ἄλλοις.

εἰς βλάστησιν δὲ τὰ ἕνα τῶν νέων οὐκ ἄλογον εἶναι βελτίω, ξυνεστηκότα τε καὶ οἶον αὐτὰ αὐτῶν ὄντα μᾶλλον· πρόσεστι γὰρ τις καὶ τούτων<sup>1</sup> πέψις,<sup>2</sup> ἀποπνεύσαντος τοῦ ἀλλοτρίου, χρονιζομένων<sup>3</sup> δὲ πάλιν γῆρας καὶ φθίσις.<sup>4</sup>

3.5 περὶ δὲ τοῦ ἐκκαυλεῖν τάχιστα μὲν τὰ ἀπὸ τῶν ἀκμαζόντων, ὡς ἰσχυροτάτων (τελέωσις γὰρ τις ἢ ἐκκαύλησις, εἴπερ ὁ καρπὸς τέλος) οὐκ ἄλογον· δευτέρα<sup>5</sup> δὲ ἢ ἐκ τῶν παλαιότερων, καὶ γὰρ ἐκ

<sup>1</sup> U: τοῦτοις Schneider.

<sup>2</sup> U<sup>r</sup> N aP: πέψις U<sup>ar</sup>.

<sup>3</sup> Schneider: -νου U.

<sup>4</sup> U<sup>c</sup>: -ν U<sup>ac</sup>.

<sup>5</sup> u P: δευτερα U: δεύτερα N a.

<sup>1</sup> Acorn-like seeds resemble certain eggs in having a shell and in being rounded at one end and tapering at the other.

<sup>2</sup> For the phrase cf. CP 3 4. 4; 3 7. 10.

<sup>3</sup> Cf. CP 2 8. 3.

<sup>4</sup> Cf. HP 7 3. 1, 7 3. 4 (of vegetables): "Those from older seeds send up a stem sooner, but soonest to do so are plants from seeds in their prime, for seeds too have their prime."

acorn-like seeds but also in the rest.<sup>1</sup>

*Vegetable Seeds: Rapidity of Germination*

It is not unreasonable that, for purposes of sprouting, last year's seeds should be better than this year's, since they are firmer and (as it were) more their own selves.<sup>2</sup> For even in the kept seed there is a certain concoction when the foreign ingredient has evaporated off<sup>3</sup>; but when the seed is kept still longer we have instead old age and death.

As for plants coming from seeds in their prime 3.5 being the quickest to send up a stem,<sup>4</sup> there is nothing unreasonable here, these seeds being at their strongest (since to develop a stem is a kind of achievement of the goal, if the fruit<sup>5</sup> is taken as the goal).<sup>6</sup> Second in rapidity is the production of a stem from older seeds,<sup>7</sup> since the power proceeding

<sup>5</sup> "Fruit" (*karpós*) is often used of a fruiting stem or stalk.

<sup>6</sup> In most vegetables the leaves, and not the seed or fruit, are the end so far as human consumption is concerned.

<sup>7</sup> Cf. HP 7 1. 6 (of herbaceous plants): "A difference in rapidity of sprouting is also made by the age of the seeds. Some come up more rapidly from young seed, as leek, horn-onion, cucumber and gourd . . . ; others from old seed, as celery, beet, cress, savory, coriander and marjoram (that is, if again [reading *ad* for *od* of U] the plant does not come up more rapidly from seed that is young, as we said)."

τούτων οἶον καθαρωτέρα τις καὶ πλείων ἢ δύναμις, ἐν δὲ τοῖς νέοις ἀναμεμιγμένη,<sup>1</sup> καὶ τὸ πλεον εἰς τὴν τροφήν ἄγουσα, καθάπερ ἐν τοῖς ἄλλοις· αἰεὶ γὰρ ὀψιαίτερα τὰ πολύτροφα· διὸ καὶ εἰ μὴ τὰ ἀπὸ τῶν ἀκμαζόντων ἐκκαυλεῖ πρώτα, ἀλλὰ τὰ ἀπὸ τῶν παλαιότερων, οὐκ ἄλογον.

3.6 περὶ οὗ δὴ καὶ ἀντιλέγουσί τινες· ἐκκαυλεῖν γάρ φασι<sup>2</sup> τὰ ἀσθενέστερα μᾶλλον, ὥσπερ ἐπὶ τῶν λαχάνων, αἴτιον δέ, ὅτι εὐπαθέστερά τε, καὶ ἐλάττω τροφήν ἔχοντα τελειοῖ (τὸ δ' ἐκκαυλεῖν ὥσπερ τελέωσι<sup>3</sup>). διὸ καὶ τῶν δένδρων τὰ πρεσβύτερα θᾶπτον πέττει καὶ μᾶλλον τοὺς καρπούς, τὰ δὲ ἐν ἀκμῇ πλείους μὲν <καὶ><sup>4</sup> καλλίους ἔχει, βραδύτερον δέ.

φαίνεται δ' οὖν, εἰ τοῦτο ἀληθές, ὅτι ταχυγυνώτερα τὰ παλαιότερα· μεμιχθῆναι γάρ τις ἐν τοῖς

<sup>1</sup> u: -ην U.

<sup>2</sup> U<sup>c</sup>: φησι U<sup>ac</sup>.

<sup>3</sup> U: τελέωσις Heinsius.

<sup>4</sup> a.

<sup>1</sup> For animals cf. Aristotle, *On the Generation of Animals*, i. 18 (725 b 19–25): "Further, semen is found neither in the earliest age nor in old age nor in illnesses, . . . in youth because of growth, for everything is first used up on that, since in about five years in the case of man at least the body is held to acquire half of the whole size

from these too is purer (as it were) and greater, whereas in young seeds it is mixed and more conducive to feeding than to creation, just as it is in other young parts (since whatever does much feeding is always later in development).<sup>1</sup> This is why it is not unreasonable that if the plants from seeds in their prime are not first to send up a stem, it should be the plants from older seed that do so instead.<sup>2</sup>

Some dispute this and assert that it is rather the weaker seeds that are quickest to send up stems (as in vegetables), the reason being that the weaker seeds are more easily affected and having less food bring it to completion (sending up a stem being, they say, an achievement as it were of the goal); this moreover is why in trees the older ones concoct their fruit quicker and better, whereas trees that are in their prime have more and finer fruit<sup>3</sup> but take longer to get it.

In any case it appears (if this is true) that it is the older seeds that generate more rapidly. For it is considered<sup>4</sup> that matter of a sort and food for the

achieved during the rest of the time." (For this last point cf. Plato, *Laws* vii 788 D 5–8.)

<sup>2</sup> Cf. note 7, p. 215. <sup>3</sup> Cf. CP 2 11. 10.

<sup>4</sup> Cf. CP 4 3. 4; 1 7. 1 and Aristotle, *On the Generation of Animals*, i. 23 (731 a 5–9): "For the egg is a fetation and the animal comes from part of it, the rest being food, and the plant too comes from part of the seed, the rest becoming food for the sprout and the first root."



σπέρμασιν οἶον ὕλη δοκεῖ<sup>1</sup> καὶ τροφή ταῖς ἀρχαῖς, ἦν δεῖ<sup>2</sup> προκατειργάσθαι πρότερον ἢ εἰς τὴν βλάστησιν ἐλθεῖν.

- 3.7 εἴη δ' ἂν κἀκεῖνο λέγειν πρὸς γε τὸ ἐκκαυλεῖν ὡς, ἦττον ριζουμένων τῶν παλαιῶν, εἰς δὲ τὸ ἄνω μᾶλλον<sup>3</sup> φερομένων, ταχεῖαν ποιεῖται<sup>4</sup> τὴν τελείωσιν, ὥσπερ σχεδὸν καὶ ἐπὶ τῶν ὀλιγοχρονίων πάντων ἐστίν (καθάπερ καὶ ἐπὶ τῶν τριμήνων λέγεται). τοὺς δὲ χρόνους δῆλον ὅτι καὶ τὰς ἀκμὰς κατὰ τὰς φύσεις ἐκάστων ληπτέον.

ἀλλὰ γὰρ ταῦτα μὲν ὁμοιότητά τινα ἔχει· τὰ δ' ἴδια καθ' ἕκαστον γένος αὐτὰ καθ' ἑαυτὰ λέγουσιν ἐπὶ πλεόν· ῥητέον δὲ τοῖς <τὰ><sup>5</sup> τῶν δένδρων καὶ πρὸς αὐτὰ<sup>6</sup> καὶ πρὸς τὰ ἄλλα θεωροῦσιν.

- 4.1 ἄτοπον δ' ἂν δόξειεν καὶ ἅμα θαυμαστόν, εἰ ἀπὸ τῶν ἀτελῶν ἔνια γεννᾷ, καὶ ταῦτα δένδρων φύσεις<sup>7</sup> μεγάλας οὕτως οἶον ἰτέας καὶ πτελέας·

<sup>1</sup> οἶον ὕλη δοκεῖ ego : δοκεῖ· οἶον ὕλη

<sup>2</sup> U<sup>c</sup> : δὲ U<sup>ac</sup>.

<sup>3</sup> Gaza (*sursum potius*), Itali : ἀνωμαλον U.

<sup>4</sup> ego : ποιεῖ U.

<sup>5</sup> Heinsius.

<sup>6</sup> Schneider : αὐτὰ U.

<sup>7</sup> U<sup>c</sup> : φύσεων U<sup>ac</sup>.

starting-point is mixed in with the seed, and this food must first be worked up before the seed can reach the stage of sprouting.

One could make a further point, at any rate in support of the view that it is the plants from older seeds that first send up a stem,<sup>1</sup> that since the older seeds run less to root and more to upward growth, the plants reach their completion sooner, just as this direction is taken by practically all plants of short duration (as is also said of three-months cereals). We must evidently take length of time of sending up a stem and the prime of the seed in each case with reference to the nature of the particular plant in question.

But enough. These matters involve a certain similarity between different kinds of plant, whereas the authorities dwell more on special features, taken by themselves, of the various kinds. But the points must be discussed by those who study the seeds of trees as compared among themselves and with the seeds of other plants.

#### *Tree Seeds: Peculiar Features*

It would appear odd and wonderful as well that some trees should propagate from immature seed, and propagate moreover trees that grow as large as

<sup>1</sup> The discussion is not concerned with the objector's parallel with older trees (CP 4 3. 6).

ἀτελὲς γὰρ τὸ ὠμόν. ἄρ' οὖν, εἴπερ τοῦτ' ἀληθές, διαιρετέον τὴν τελειότητα τὴν τε πρὸς ἡμᾶς καὶ πρὸς τὴν γένεσιν; ἢ μὲν γὰρ πρὸς τροφήν, ἢ δὲ πρὸς δύναμιν τοῦ γεννᾶν· ἐνια δὲ ἄτροφα, γεννητικὰ δέ, τὰ δ' ἴσως ἀνάπαλιν. τάχα δ' ἐκεῖνη<sup>1</sup> πρὸς γε τὰ νῦν ἢ διαίρεσις, ὅτι τὴν πέψιν τιθέμεθα χρώμασιν καὶ χυλοῖς καὶ πυκνότητι<sup>2</sup> καὶ τοῖς τοιοῦτοις· ἐπεὶ τό γ' ἐδάδιμον ὑπάρχει καὶ τοῖς τῆς πετέας καὶ ἄλλοις· ἀλλ' οὐ τοῦτο κύριον, ἀλλὰ τὸ γεννᾶν· ἕκαστον γὰρ τῷ ἔργῳ κρίνεται. καὶ ταῦτα μὲν ὡς πρὸς ὑπόθεσιν.

4.2 ἐκεῖνο<sup>3</sup> δὲ ἀποπώτατον, εἰ τελεούμενα γένους τινὸς ἄγονα γίνεται τὸ ὅλον, καίτοι<sup>4</sup> ἀπὸ σπέρματος γινομένου τοῦ δένδρου, καθάπερ ἐπὶ τῆς κυπαρίττου· τὸ γὰρ ἄρρεν γένος ὅλως ἄγονον,

<sup>1</sup> ego: δ' ἐκευη U<sup>c</sup>: δέκευη U<sup>ac</sup>.

<sup>2</sup> U<sup>r</sup> aP: -τα U<sup>ar</sup> N.

<sup>3</sup> U<sup>r</sup> N aP: ἐκεῖνω U<sup>ar</sup>.

<sup>4</sup> u: καὶ | ται U.

<sup>1</sup> Cf. *HP* 3 1. 2–3: “All trees that have seed and fruit . . . can also propagate from these; indeed authorities say that trees reputed to have no fruit propagate in this way, as

willows and elms, since a raw fruit is immature.<sup>1</sup> If this is true shall we distinguish two kinds of maturity, maturity for man and maturity for propagation? For the former kind provides food, the latter the power of generation, and some seeds are useless as food, but capable of generation, whereas others perhaps are the reverse.<sup>2</sup> But perhaps the distinction is to be made in the present circumstances as follows: that to us concoction lies in the colour and flavour and firmness and the like, since simple edibility is found not only in the seeds of the elm<sup>3</sup> but also in others. But what determines maturity is not such concoction, but propagation, since each part is judged by its function.<sup>4</sup> These remarks are made on the assumption that the raw seed generates.

But another matter is oddest of all: if trees of a given variety as they mature turn out to be entirely 4.2 infertile, although the tree is produced from seed, as with cypress, for the whole male variety is infertile

willow and elm . . . The truth, they say, is that the willow drops its fruit before making it vigorous and concocting it . . . And that this is true of the elm they show as follows . . .”; *HP* 3 3. 4: “The rest all bear fruit, but as we said, this is disputed in the willow, black poplar and elm.”

<sup>2</sup> Useful as food but incapable of generation.

<sup>3</sup> Which are edible when raw.

<sup>4</sup> Cf. Aristotle, *On the Parts of Animals*, i. 1 (640 b 35–641 a 5).

πολλά<sup>1</sup> δὲ καὶ τῶν θηλειῶν,<sup>2</sup> ἐπεὶ τό γε μὴ καρποφορεῖν ἔνια τῶν ὁμογενῶν ἤττον ἄτοπον.

καὶ πάλιν ἐπὶ τῶν σπερμάτων αὖ, τὸ<sup>3</sup> πηρωθὲν ἄγονον, ἀλλ' ἴσως τοῦτό γε καὶ ἀναγκαῖον · τὸ δὲ μηδὲν ὄλως γόνιμον ὥσπερ ἐλέγχει τὴν φύσιν ὅτι καὶ μάτην, ὃ καὶ ἡμῖν ὑπεναντίον πρὸς τὰ πρότερον. καὶ τὰ μὲν τῆς πτελέας ἀμφισβητούμενα καὶ τῆς ἰτέας · ὃ δ' ἐρινεὸς ὁμολογουμένως γεννᾷ καὶ

<sup>1</sup> πολλά U : πολλαί Schneider.

<sup>2</sup> αP : θηλείων UN.

<sup>3</sup> αὖ τὸ u : αὐτὸ UN αP.

<sup>1</sup> For male and female cypresses cf. *HP* 1 8. 2; 2 2. 6; cf. also *HP* 1 14. 5: "Here is another peculiar feature separating the wild trees from the cultivated: people distinguish the wild into only or mainly the male and female variety, whereas they distinguish the cultivated into several varieties"; *HP* 3 3. 6-7: "At all events it is held that also with other plants of the same kind and called by the same name there is a division into a variety that has no fruit and another that has . . . And just about all the trees called male among those of the same kind bear no fruit . . ."

<sup>2</sup> Cf. *CP* 2 6. 1; 2 11. 2; 2 11. 7; 2 13. 5.

<sup>3</sup> *CP* 1 1. 1.

<sup>4</sup> Or "fruit"; they are the same. Aristotle speaks of the wild fig as having no fruit: *On the Generation of Animals*, i. 1 (715 b 21-25): (Testacea and other animals, because their nature is similar to that of plants, have no distinction of female and male any more than plants have, and when

(and so too are many of the females)<sup>1</sup>; as for the failure of occasional individuals of the same kind to bear fruit, there is less oddity here.

Again (to return to seeds) the mutilated individual is infertile, but perhaps the infertility here is a matter of mechanical causation<sup>2</sup>; whereas that no seed at all should be fertile as it were convicts nature of also acting in vain, and this is inconsistent with our earlier statement.<sup>3</sup> Now the case of the seed of the elm and the willow is in dispute, but the wild fig is conceded to generate seed, and seed<sup>4</sup> that

we get to these the terms male and female are used not in the proper sense but because of a certain similarity and analogy, for there is in the animals a slight difference of the sort.) "For in plants too some trees of the same kind are fruit-bearing, but others do not bear fruit themselves but contribute to the concoction of fruit in those which do, as happens with the fig and the wild fig"; iii. 5 (755 b 7-11): "There are some who assert that all fish are female except the cartilaginous ones. They are wrong. For they fancy that the females among them differ from those reputed to be male just as in those plants where one bears fruit and the other has none, as olive and wild olive and fig and wild fig [olive and fig are feminine in Greek, wild olive and wild fig masculine]." In the *History of Animals*, v. 32 (557 b 25, 29) in the discussion of caprification he speaks of the *erineoi* of the wild fig in which the insects occur and of the *erina* attached to the cultivated fig. He evidently did not regard these *erineoi* and *erina* as fruit, since they were inedible (*erina* is also used of the unripe figs of the cultivated tree).

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ἄπεπτον εἰς τὴν ἡμετέραν τροφήν, γεννᾶ δὲ καὶ τὸ τοῦ θύμου<sup>1</sup> ἄνθος (καὶ ἄλλων) ἃ πρὸς τὴν ἡμετέραν αἰσθησιν ἀφανῆ, τὸ δ' ἄνθος μόνον φανερόν.

ἀλλὰ τὰ μὲν τῶν δένδρων (ἢ τινῶν γε<sup>2</sup>) καὶ ἄλλας ἴσως ἀπορίας ἔχει· καὶ γὰρ τὸ<sup>3</sup> περὶ τοὺς φοίνικας ἄτοπον<sup>4</sup> καὶ λόγου δεόμενον, καὶ τὸ οὕτως ἀμενῆ τινῶν εἶναι τὰ σπέρματα, καθάπερ  
4.4 καὶ τῆς κυπαρίττου. τὰ γὰρ τοιαῦτα δίδωσιν τινα ἔννοιαν καὶ ὑπὲρ τοῦ μὴ ἔχειν ἔνια τροφήν πρὸς ἑαυτοῖς· πλὴν ἴσως ἄλλοις ἄλλη καὶ ὕλη καὶ τροφή, καὶ ἰκανόν τισιν ἂν ἔχη τὸ διατηρῆσον.

ὑπὲρ δὲ τῶν σιτηρῶν, καὶ ὄλως τῶν ἐπετείων, αἱ μὲν τοιαῦται διαφοραὶ ῥάους, οἷον αἱ κατὰ τὰς

<sup>1</sup> u: θυμοῦ U.

<sup>2</sup> Scaliger (τινῶν ἔτι Wimmer): ἢ τινῶν τε U.

<sup>3</sup> aP: τὰ UN.

<sup>4</sup> U<sup>r</sup> N aP: ἄτοπόν U<sup>ar</sup>.

<sup>1</sup> Cf. HP 3 1. 3 (the elm is said by some to be propagated from fruit carried by the wind): "This appears to be similar to what happens with certain undershrubs and herbaceous plants: although they have no visible seed, but instead some have only a kind of down, others only a flower (as thyme), they grow from these."

<sup>2</sup> Cf. HP 1 11. 3 (of seeds): "Some seeds are simply a

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is unconcocted so far as human consumption is concerned. (And both the flowers of thyme and of other plants generate seeds that are invisible to men, the flower alone being seen.)<sup>1</sup>

But the seeds of trees, or at least of some trees, perhaps present other difficulties as well. For not only is the case of the date-palm<sup>2</sup> odd and in need of explanation, but there is also the fact that in some the seeds are so tiny, as in the cypress.<sup>3</sup> For such cases suggest the notion that some seeds contain no food within their enclosure; except perhaps that both matter and food are different for different seeds, and that it is enough for some to have protection until they sprout.

4.4

### *Seed Crops and Annuals: The Greatest Difficulty, Transmutation*

Passing to cereals and annuals in general we find that the differences of this sort involve less difficulty, namely the differences in sprouting and

stone or stonelike at least and as it were dry . . . most obviously those of the date-palm, since the seed does not even contain a hollow but is solid throughout. Still this seed too evidently possesses some fluid and heat, as was said [at HP 1 11. 1 (the seed) "... possesses in itself native fluid and heat . . ."]. But Theophrastus may be referring to the part played by the male flower (cf. CP 2 9. 15) or to the production of the fruit in a spathe (CP 1 20. 2).

<sup>3</sup> Cf. CP 1 5. 4.

4.5 βλαστήσεις καὶ τελειώσεις καὶ τὰ λοιπὰ πάθη τὰ συμβαίνοντα τοῖς τοιοῦτοις · περὶ δὲ τῆς ἐξαλλαγῆς εἰς ἕτερον γένος, ὡς περ ἐκ πυρῶν <καὶ κριθῶν><sup>1</sup> εἰς αἶρας (καὶ εἰ δὴ πάλιν τῶν αἰρῶν εἰς πυρούς) καὶ τῶν ζειῶν εἰς βρόμον, ἄτοπον αὐτῶ τε τῶ συμβαίνοντι καὶ τῶ ἰδίῳ · μόνα γὰρ δὴ ταῦτα μεταβάλλει τῶν σπερμάτων φυσικῶς<sup>2</sup> (ὁ γὰρ ἐκ τῆς τίφης καὶ τῆς ζειᾶς πυρὸς παρασκευῆ<sup>3</sup> πῶς καὶ τέχνη, καθάπερ οἱ τὰ σπέρματα προβρέχοντες εἰς τὴν γλύκανσιν).

4.6 ἄτοπον δὲ πρὸς τῶ μόνα καὶ ὅτι ἰσχυρότερα δοκοῦντα τῶν χεδροπῶν εἶναι (τὸ γὰρ ἀσθενὲς εὐφθαρτότερον, φθορὰ δὲ τις ἢ ἕκστασις), καὶ μᾶλλον πυρὸν,<sup>4</sup> ἤ<sup>5</sup> κριθῆς<sup>6</sup> ἰσχυρότερον. ἔτι δὲ

<sup>1</sup> ego. <sup>2</sup> Scaliger: φυσίς ὡς U.

<sup>3</sup> u: -ειή U.

<sup>4</sup> ego: πυρὸς UN aP: πυροῦ u.

<sup>5</sup> ego (ei Wimmer): ἤ U. <sup>6</sup> UN: κριθῆ aP.

<sup>1</sup> Cf. HP 8 7. 1: "Now of other seed crops none changes naturally into another by a loss of identity, but they say that wheat and barley change over to darnel, and wheat does so more . . . Now this mutation is peculiar to these, and also to flax . . ."; HP 8 8. 3: "No seed crop changes over from one whole kind into another except one seeded wheat and rice-wheat . . . and darnel coming from the natural loss of identity of wheat and barley . . ."

maturing and in all but one of the effects to which such plants are liable; their mutation however from one kind to another, as from wheat and barley to darnel<sup>1</sup> (and again, if it happens, from darnel back to wheat)<sup>2</sup> and from rice-wheat to oats<sup>3</sup> is strange both in the occurrence itself and in its restriction to these, for these are the only seed crops to change by their own nature, since the wheat that comes from one seeded wheat and from rice-wheat<sup>4</sup> makes the change because of a certain act of human planning and art (just as when seeds are soaked to make the fruit sweet).<sup>5</sup>

4.6 It is odd that besides being the only plants to change they do so although they are regarded as stronger than legumes (for the weak plant perishes more readily than the strong, and to depart from one's nature is a kind of perishing); and the change of wheat is the odder<sup>6</sup> insofar as wheat is stronger than barley. Another oddity is that change else-

<sup>2</sup> Cf. CP 5 3. 7. <sup>3</sup> Referred to at CP 4 5. 1, 2.

<sup>4</sup> Cf. HP 2 4. 1: "Among other plants (sc. than trees) bergamot mint is held to change to green mint . . . and wheat to darnel. Now in trees these changes occur of their own accord, supposing that they do occur. But the changes in annuals are through human intervention: thus one seeded wheat and rice-wheat change to wheat if sown after being bruised in a mortar . . ."

<sup>5</sup> Cf. CP 2 14. 3 with note c.

<sup>6</sup> Wheat has a greater tendency than barley to change to darnel: HP 8 7. 1, cited on CP 4 4. 5, note 1.

τὰ μὲν ἰσχυρότερα εἰς τὸ ἀσθενέστερον μεταβάλλει·<sup>1</sup> ἢ δὲ αἶρα καὶ πυροῦ καὶ κριθῆς ἰσχυρότερον,<sup>2</sup> ὥσθ' ἅμα συμβαίνει καὶ τὸ παρὰ φύσιν τοῦ κατὰ φύσιν ἰσχυρότερον.

4.7 ἢ δὲ διαφθορὰ καὶ ἡ μεταβολὴ δυοῖν θάτερον· ἢ ἐν τοῖς σπέρμασιν, ἢ ἐν τῇ χλόῃ. σπέρματος μὲν οὖν γαλάκτωσις, σήψις, ὄλως διάχυσις, ὧν οὐδὲν φύσιμον· ἢ<sup>3</sup> δὲ χλόη ῥιζωθέντων ἤδη, τὰς δὲ ῥίζας μεταβάλλειν ἄτοπον.

ὅθεν δὴ τοῖς τοιοῦτοις παραπεπεισμένοι<sup>4</sup> τινὲς ὡς ἀλόγοις, ὄλως οὐδὲ γίνεσθαι φασιν τὴν ἔκστασιν, ἀλλ' ἐπομβρίασις<sup>5</sup> φύεσθαι καὶ συνίστασθαι τὴν αἶραν, ὃ καὶ καθ' αὐτὴν φαίνεται ποιούσα, μὴ σπαρέντων πυρῶν ἢ κριθῶν, ἐν ταῖς ἐπομβροτάταις χώραις.

4.8 αἱ μὲν οὖν ἐναντιώσεις αὐταὶ δοκοῦσιν ἐλέγχε-

<sup>1</sup> U: -εω Wimmer.

<sup>2</sup> aP: -ότερος UN.

<sup>3</sup> Schneider: φύσει· μόνη U.

<sup>4</sup> Heinsius: περι- U.

<sup>5</sup> Schneider: ἐπομβρίας U: ἐπὶ ὀμβρίας u.

where is of stronger to weaker; but darnel is stronger than either wheat or barley, so that we are also faced with this result: that the plant produced unnaturally is stronger than the one produced naturally.

The corruption and change must occur in one of 4.7 two ways, either in the seed or in the blade. Now such a change in the seed is either by its becoming milky<sup>1</sup> or by its decomposing, in a word by deliquescence, and none of these allows sprouting. A plant in blade, on the other hand, has already struck root, and it is odd that the roots should change.

Hence some persons, beguiled by this appearance of unreason, assert that no transmutation takes place whatever, and that darnel instead is made to grow and form by rainy weather, a thing which it is also seen to do by itself in the rainiest districts when no wheat or barley has been sown.

*Seed Crops: Transmutation;*

*Answer to the Objections (1) From the Facts*

Now these objections are considered to be refuted 4.8

<sup>1</sup> Cf. CP 3 23. 1; CP 4 4. 9, and HP 8 6. 1: "It is held . . . that the worst sowing is that in half-wet ground, for the seeds perish and turn milky." Such milkiness is especially evident in germinating seeds of cereals with starchy endosperms.

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σθαι τοῖς ἔργοις (πολλοὶ γάρ, ὡς φασι, σπείραντες πυροῦς ἢ κριθᾶς ἐθέρισαν αἶρας) ·

τὴν δὲ ἔκστασιν<sup>1</sup> καὶ τὴν μεταβολὴν θείημεν ἄν ἀμφοτέρως<sup>2</sup> γίνεσθαι, καὶ τοῦ σπέρματος ἀλλοιουμένου, καὶ τῶν ριζῶν (ἡ γὰρ ἐν τῇ χλόῃ μεταβολὴ δι' ἐκείνας), συμφυεῖς δ' οὔσας οὐκ ἄλογον συμπάσχειν. ἐπεὶ τό γε σπέρμα διαφθαρέν οὐ φύσιμον ὅλως ἦν (τοῦτο μὲν κοινόν · οὐδὲ γὰρ ρίζαι φθαρεῖσαι τρέφοιεν ἄν).

4.9 τὴν δὲ τοῦ σπέρματος φθορὰν οὐδεμίαν τῶν εἰρημένων ὑποληπτέον, σῆψιν ἢ γαλάκτωσιν, ἀλλ' ἕτερον, ἢ γίνεται διὰ πλήθος τῆς τροφῆς ἐκτηκόμενων ·<sup>3</sup> αὕτη δὲ τὸ μὲν ὅλον οὐκ ἀπόλλυσιν, μεθίστησι δὲ εἰς ἕτερον, ἐπικρατοῦσά πως τῆς ἀρχῆς. τὸ δὲ συμβαῖνον ὁμοιον τρόπον τινα καὶ ἐπὶ τῶν ζώων, ὡς κατ' ἀναλογίαν, <ἄν><sup>4</sup> ἢ<sup>5</sup> τὸ θῆλυ κρατήσῃ<sup>6</sup> τοῦ ἄρρενος ἢ καὶ ἔτι μείζων ἐναλλαγῇ

<sup>1</sup> Itali : ἐξέτασιν U.

<sup>2</sup> U<sup>c</sup> from -ων.

<sup>3</sup> Gaza, Heinsius : ἐκτηκόμενων U.

<sup>4</sup> ego.

<sup>5</sup> aP (quum Gaza) : ἦ U : ἦ N.

<sup>6</sup> aP<sup>c</sup> : -ει U N P<sup>ac</sup> (?).

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by the facts, since authorities say that many persons have sown wheat or barley and reaped darnel.

(2) *From Arguments for the Change Occurring  
(a) in the Seed*

We would take the position that the departure from one identity and passage to the other occurs in both ways, the seed being altered and so too the roots (the change in the blade being due to these); the roots and seed are of a piece, and it is not unreasonable for the roots to be influenced by what is done to the seed. We saw<sup>1</sup> in any case that the seed when corrupted<sup>2</sup> did not sprout at all (this last point applies to both: the roots too, if corrupted, would not provide food).

We must understand the "corruption" of the seed 4.9 as none of the corruptions mentioned,<sup>1</sup> decomposition or turning milky, but as distinct from them, a kind that arises when the seeds deliquesce from too much food; and this corruption does not destroy the seed wholly but shifts it to something else by somehow mastering the starting-point. The result is similar to what happens in animals too (taking the similarity as one of analogy) when either a female is produced by the female parent's mastering the male or a still greater departure in the direction

<sup>1</sup> CP 4 4. 7.      <sup>2</sup> And not merely "altered" or passing to another identity.

- 4.10 γένηται πρὸς τὸ<sup>1</sup> παρὰ φύσιν · δεῖ γὰρ δὴ τὴν γῆν ὥσπερ τὸ θῆλυ νοῆσαι, καὶ τὸ ἀνὰ λόγον οὕτω λαμβάνειν. ὅταν οὖν ἐκ ταύτης ἡ τροφή πλείων<sup>2</sup> γίνηται<sup>3</sup> διὰ τὰς ἐπομβρίας, τότε τὴν ἔκστασιν συμβαίνειν, οὐ φθείρουσαν μὲν ὅλως τὴν γεννητικὴν δύναμιν, ἐξαλλοιοῦσαν δ' εἰς ἑτέραν. εὐζώου δὲ τῆς φύσεως οὕσης, εὐζωότερα<sup>4</sup> γὰρ πολὺ τῆς<sup>5</sup> τῶν ζώων, εὐλογον καὶ διαμένειν μᾶλλον ταύτην · ἐπεὶ καὶ ἄνευ σπερματικῆς ἀρχῆς αὐτόματα πολλὰ συνίσταται καὶ τῶν ἐλαττόνων καὶ τῶν μειζόρων φυτῶν.
- 4.11 ὅθεν καὶ τοῦτο ἂν εἴη φανερόν, εἴ τις ἀκολουθήσει τῇ ἀναλογίᾳ · διότι τῇ τῶν σπερμάτων ἀλλοιώσει, καὶ οὐ τῇ τῆς χλόης μεταβολῇ ·<sup>6</sup> καὶ γὰρ

<sup>1</sup> Schneider : τὴν U.

<sup>2</sup> U<sup>ac</sup> : πλείων U<sup>c</sup>. <sup>3</sup> u : γίνεται U.

<sup>4</sup> Gaza (*vivacior*), Schneider : -ότερα U.

<sup>5</sup> Wimmer (*quam* Gaza : <ῆ> τὰ Itali) : τα U.

<sup>6</sup> μεταβολῇ U : ἡ μεταβολῇ Schneider.

<sup>1</sup> Cf. Aristotle, *On the Generation of Animals*, iv. 1–4 (766 a 16–770 b 27), where the production of female offspring instead of male, of offspring not resembling the one parent or the other, of offspring not resembling any ancestor, and of offspring not resembling a human being, is explained as due to the failure of the male starting-point to master the female matter.

of the unnatural occurs<sup>1</sup>; for we must think of the earth as the female and take the analogy in this fashion. And so when the food from the earth becomes too abundant because of the rains we must suppose that the loss of identity occurs not by a complete corruption of the generative power but by an alteration of that power to a different one. Since the nature of plants is full of life (for it is much more so than the nature of animals)<sup>2</sup> it is reasonable that this nature should also do better at surviving. (For that matter, even without a seed for a starting-point, many plants, both greater and smaller, are formed spontaneously.)<sup>3</sup>

Hence our first contention would be established, if one is to follow the analogy: the transmutation is by alteration of the seed and not by mutation of the blade, this being also the way in which the change

<sup>2</sup> Cf. Aristotle, *On Length and Shortness of Life*, chap. vi (467 a 10–30): "We must set down the cause why the nature of trees is long-lasting, for they have a cause peculiar to themselves when compared to animals (except insects). Plants have a constantly renewed youth, and hence last long. For there are constantly young shoots while the others grow old. So too with the roots . . . Plants resemble insects . . . for they live when divided and two and more come from one. The insects get as far as living, but cannot do so long, for they have no organs for it and the starting-point in each of the divided parts is unable to produce any. But that in the plant can, for a plant has a root and stalk everywhere potentially . . ."

<sup>3</sup> Cf. CP 1 1. 2.



ἐπὶ τῶν ζώων οὕτω γίνεται.

καὶ ἅμα δὴ τότε ἄσθενέστατον, ὅταν ἐν μεταβολῇ τυγχάνῃ τῇ κατὰ τὴν βλάστησιν· ἤδη δ' ἐκβεβλαστηκὸς καὶ ἐρριζωμένον ὡς περ γέγονεν· τούτου δὴ καὶ μείωσις εἰς αὐξήσιν καὶ τροφήν ἦ καὶ ὄλην φθοράν, οὐκ εἰς μεταβολήν.

ἔτι δὲ καὶ φασιν οἱ ἔμπειροι φανερόν εὐθύς εἶναι τὸ φύλλον ἀνατέλλον τῆς αἴρας, λιπαρώτερον ὃν καὶ ποιωδέστερον καὶ στενότερον, καὶ οὐχ ὕστερον τοιοῦτον γινόμενον.

4.12 ἐκ μὲν οὖν τούτων δόξειεν ἂν <ἐν><sup>1</sup> τοῖς σπέρμασιν.

οὐ μὴν οὐδὲ θάτερον ἀδύνατον, οὐδ' ἄλογον, ὥστε ἐν τῇ χλόῃ μεταβάλλειν, ἀλλοιουμένων τῶν ριζῶν (τοῦτο γὰρ ἀνάγκη συμβαίνειν, εἴπερ ἅπαν ἀπὸ τῆς ἀρχῆς ἀρχεται).

καὶ<sup>2</sup> φαίνεται δὲ τοῦτο καὶ ἐφ' ἑτέρων συμβαίνειν, ὡς περ τῶν δένδρων ὅσα μεταβάλλει ταῖς

<sup>1</sup> ἂν <ἐν> Schneider (ἐν Heinsius) : ἂν U.

<sup>2</sup> ἀρχεται. καὶ ego (ἑτέρας ἕτερον Wimmer) : ἀρχεται δευτέραι U : ἀρχεται δεύτεραι u N : ἀρχεται δεύτερον P (a omits εἴπερ... συμβαίνειν).

<sup>1</sup> Cf. HP 8 7. 1 (of darnel): "... it differs in many ways from wheat and barley, for it has a leaf that is narrow,

occurs in animals.

Again at that very time the plant is weakest, when it is undergoing the change involved in emergence from the seed; whereas when it has already sent out its sprout and struck root it has (as it were) completed the process of becoming, and here, to this later stage, belongs a decrease of powers that affects growth and feeding and even leads to total destruction, but no decrease that leads to transmutation.

Moreover persons experienced in these matters say that the moment the leaf appears it is clearly that of darnel, being oilier, more grass-like and narrower,<sup>1</sup> and does not assume this character later.

From these considerations, then, it would appear 4.12 that the change is of the seed.

(b) in the Roots

Nevertheless the other supposition too is not impossible or yet unreasonable, that the mutation occurs in the blade with the alteration of the roots (since the roots must change if everything begins from the starting-point).<sup>2</sup>

Again this change from the roots is observed in other plants as well, as in the trees that by receiving

hairy and oily...

<sup>2</sup> Either the roots or the seed may be taken as the starting-point. For the roots as starting-point cf. CP 2 14. 3; 3 9. 14.

θεραπείαις τοὺς καρποὺς ἐξ ὀξέων καὶ πικρῶν εἰς  
γλυκεῖς<sup>1</sup> καὶ ποτίμους, ἧ<sup>2</sup> ἐκ πολυπυρήνων  
<εἰς><sup>3</sup> ἀπυρήνους.

4.13 ἧ δ' αἰτία τῆς μεταβολῆς ὁμοίως καὶ ταύτης ἐν  
πλήθει τροφῆς ὅταν ἐπομβρίαί γένωνται, καὶ ὡς  
γε δὴ τινές φασιν μάλιστα τοῦ ἥρος ἐὰν ἡλιοὶ συν-  
επιλάμψωσιν,<sup>4</sup> ὡς ἐξ ἀμφοῖν γινομένης τῆς μετα-  
στάσεως. ἐνιαχοῦ γὰρ ἐν τισὶ τόποις ἐλώδεσιν  
ὄλως τοῦτο συμβαίνειν<sup>5</sup> καὶ τό γε<sup>6</sup> φύλλον μετα-  
βάλλειν<sup>7</sup> ὥστε πᾶσιν εἶναι φανερόν· ἐὰν δὲ τὰ  
ἐαρινὰ μὴ γένηται πολλὸν γίνεσθαι πυρῶν πλήθος.

ὥστε τοῦτο μὲν οὐδετέρως ἄλογον. εἰ δὲ καὶ  
ἀμφοτέρως<sup>8</sup> συμβαίνει τάχ' ἂν οὐδ' ἄτοπον εἶη,  
διαφορὰν δέ<sup>9</sup> τινα ὡς εἶναι<sup>10</sup> δεῖν<sup>11</sup> καὶ τῶν ἐδα-  
φῶν<sup>12</sup> καὶ τοῦ ἀέρος· ἐπεὶ καὶ σπαρέντων εὐθὺ  
μεγάλη βλάβη πολυυδρίαν ἐπιγίνεσθαι, συμβαίνει

<sup>1</sup> U<sup>c</sup> from -ειας.

<sup>2</sup> N aP: ἧ U: ἧ u.

<sup>3</sup> Schneider.

<sup>4</sup> u: -ψουσω U.

<sup>5</sup> ego: -νει U.

<sup>6</sup> ego: τε U.

<sup>7</sup> U: -ει u. <sup>8</sup> Gaza: -οις U.

<sup>9</sup> [δέ] Gaza, Wimmer (δὴ Schneider).

<sup>10</sup> ego (*aliquam esse* Gaza: τινα εἶναι, ὡς ἄρα Itali: συναι-  
τίαν εἶναι Wimmer): τινα ἴνα (after -α a letter or stroke  
erased U<sup>c</sup>?) ὡς εἶρ (or an uncial η; to ν U<sup>c</sup>) αι U: τινα εἶναι ὡς

various kinds of tendance transmute their fruit  
from acid and bitter to sweet and potable, or from  
having many stones to having none.<sup>1</sup>

The cause of this mutation<sup>2</sup> to darnel too, the one 4.13  
in the roots, is likewise too much food when there  
has been rainy weather, and (as some assert) the  
change is especially apt to occur in spring if the sun  
comes out afterwards, the passage from the one  
plant to the other being due to both rain and sun.  
Thus in some countries in certain marshy districts  
the change (they say) is general, and the leaf  
changes over in a way that is evident to everyone;  
whereas if there is no spring rain the wheat pro-  
duced is very plentiful.

The mutation, then, is not unreasonable,  
whether it occurs in the blade or in the seed. And if  
it moreover occurs in both ways the mutation would  
perhaps not even be odd<sup>3</sup> (with the proviso that  
there should be a certain difference in both the soil  
and the air). Thus heavy rains immediately after  
sowing cereals are very harmful,<sup>4</sup> since the conse-

<sup>1</sup> Cf. CP 3 17. 6-7 and the notes.

<sup>2</sup> As well as of the mutation of the seed (cf. CP 4 4. 10).

<sup>3</sup> Additional instances may either increase our wonder-  
ment or do away with it: CP 2 17. 3.

<sup>4</sup> Cf. CP 3 23. 3; HP 8 6. 6-7.

ἦραι N: τινα εἶναι ὡς αἶραι aP.

<sup>11</sup> [δεῖν] Schneider, Wimmer.

<sup>12</sup> Itali (*soli* Gaza): ἐφαφῶν U.

γὰρ ἀσθενεστέρας εἶναι τὰς ρίζας, τὸ δ' ἀσθενὲς  
εὐπαθέστερον.

ἡ μὲν οὖν ἐξαλλαγή διὰ τοῦτ' ἂν εἴη.

- 5.1 τὸ δὲ μόνον ταῦτα πάσχειν, ἔτι<sup>1</sup> δ' ἰσχυρότατα  
δοκοῦντ' εἶναι (καὶ γὰρ ἡ ζεῖα ἰσχυρόν), μιᾷ τινι  
λύοιτ' ἂν αἰτία καὶ τῇ αὐτῇ· διὰ γὰρ τὸ<sup>2</sup> ἰσχυρό-  
τατα καὶ πολυρριζότατα εἶναι, πλείστην ἔχοντα  
τροφήν καὶ μάλιστα [πάσχειν τὰ] πάσχοντα<sup>3</sup>  
ὑπομένει, τὰ δ' ἄλλα<sup>4</sup> φθείρεται τελέως. ἔτι δ' ἡ  
ᾠρα καθ' ἣν ὁ σπόρος ἐπομβροτέρα, καὶ πλείω  
χρόνον ἐν τῇ γῆ γίνεται· τὰ δέ, πρὸς τὸ ἔαρ καὶ  
διαγελῶντος ἤδη τοῦ ἀέρος, ἐν εὐκρασίᾳ μᾶλλον,  
5.2 καὶ εὐθὺς εἰς τὴν βλάστησιν ἢ ἀναδρομῇ. διὸ καὶ  
οὐδ' ἕτερον οὐδὲν ἐκ τῆς διαφθορᾶς αὐτῶν, ἂν  
ποτε διαφθαρή, γίνεται. τὸ μὲν γὰρ τὴν αἶραν  
ἀξιοῦν ἀτοπον, εἰς γὰρ τὸ σύνεγγυς<sup>5</sup> καὶ ὁμογενές

<sup>1</sup> U<sup>cc</sup>: U<sup>ac</sup> omits.

<sup>2</sup> u a (το U<sup>c</sup>): τα U<sup>ac</sup> (τὰ NP).

<sup>3</sup> ego (πάσχειν· [τὰ] πάσχοντα δὲ Schneider): πάσχειν τὰ  
πάσχοντα U: πάσχειν τὰ πάσχοντα δὲ u (N aP omit τροφήν...  
πάσχοντα).

<sup>4</sup> u: τὸδ' ἀλλὰ U.

<sup>5</sup> U<sup>cc</sup>: συγγενές U<sup>ac</sup>.

<sup>1</sup> Cf. CP 4 4. 6.

<sup>2</sup> Cf. CP 4 4. 5 (it changes to oats).

<sup>3</sup> Cf. HP 8 2. 4: "During the winter the cereals remain

quence is weaker roots, and what is weak is more  
easily affected.

The departure, then, would be due to this.

- The difficulty that these are the only grains 5.1  
affected<sup>1</sup> and the further difficulty that they are so  
affected although considered strongest (rice-wheat<sup>2</sup>  
too being strong) can be solved by one and the same  
reason: because they are strongest and have most  
roots, these grains endure this containing the  
greatest quantity of food and being most affected,  
whereas in the rest corruption is complete. They  
are moreover sown at a rainier season and spend a  
longer time underground<sup>3</sup>; the rest on the other  
hand are sown towards spring, in a better tempered  
ambience, when the air is turning mild,<sup>4</sup> and  
proceed at once to send up shoots. This is why no 5.2  
other plant at all arises from the corruption of these,  
should corruption occur: to expect that darnel  
should arise from it is absurd, since mutations

in the blade, but when the season turns mild they send up  
a stem from their midst..."

<sup>4</sup> Cf. HP 8 1. 3-4: "Now wheat and barley are sown early  
[i.e., about the time of the setting of the Pleiades, in Sep-  
tember], and further... all others that resemble wheat  
...; and of legumes mainly (one might say) bean and birds'  
pease...; lupine too is sown early... Late sown [i.e., sown  
at the beginning of spring after the winter solstice] are...  
of legumes those such as lentil, tare and pea; and at both  
seasons those such as vetch and chickpea, and some also  
sow bean late..."

πως αἱ μεταβολαί · τὸ δὲ μῆδ' εἰς ἕτερον μῆδὲν εἰς ἀσθένειαν ἀνακτέον,<sup>1</sup> ὡς ὄλως φθειρομένων · ἀλλὰ τοῖς ὁμοιοπύροις ἂν εἴη καὶ ὁμοιοκρίθους μᾶλλον εἰς τὴν αἶραν.<sup>2</sup> τούτων δὲ τὰ μὲν ὄλως οὐχ ὑπομένει διὰ τὴν ἀσθένειαν, ὥσπερ ἡ τίφη · τὰ δὲ εἰς τὸ σύνεγγυς μᾶλλον μεταβάλλει, καθάπερ ἡ ζειὰ πρὸς τὸν βρόμον.

5.3 ὁ δὲ πυρὸς εἰς τίφην οὐ μεταβάλλει καὶ ζειὰν ἐξαμβλούμενος, ὅτι πλείων ἢ τροφή καὶ ἰσχυρότερα,<sup>3</sup> δι' ἣν συμμένει · τοιαύτη δ' οὔσα οὐκ ἂν ἐκθηλύνειεν οὐδέν,<sup>4</sup> εἰς <δὲ><sup>5</sup> τὸ σφοδρότερον ἀγάγοι καὶ ὄλως ἐκστήσειε τοῦ γένους. ἐπεὶ μᾶλλον ἂν τις εὐλόγως θαυμάσειεν ὅτι οὐκ εἰς τὸν ἄγριον<sup>6</sup> πυρὸν, ὥσπερ καὶ ἄλλα.<sup>7</sup> τυγχάνει δὲ καὶ τούτου παραπλησία τις ἢ αἰτία · μετακινεῖ γὰρ ἀπλῶς ἢ φύσις.

<sup>1</sup> Schneider : ἀκτεον U.

<sup>2</sup> ego (in *lolium* Gaza : εἰς αἶραν Itali : ἡ μεταβολὴ εἰς αἶραν Schneider) : εἰστ' ἦραν U.

<sup>3</sup> u (z- U<sup>c</sup>) M aP : ἰσχυρότερα U<sup>ac</sup> (i- N).

<sup>4</sup> ego (sed Gaza : ἀλλ' Itali) : οὐδὲ U.

<sup>5</sup> ego. <sup>6</sup> U<sup>c</sup> : ἄγιον U<sup>ac</sup>.

<sup>7</sup> <τὰ> ἄλλα Schneider.

<sup>1</sup> To these wheat-like and barley-like grains belong rice-wheat, once-seeded wheat, *olymra* and haver-grass (*HP* 8 9. 2).

<sup>2</sup> Literally "by being aborted."

are into what comes close and is (in a way) of the same kind; and their failure again to change to any other must be traced to weakness, their corruption being entire. It is rather in wheat-like and barley-like grains<sup>1</sup> that a change to darnel would occur. But of these some are too weak to survive at all, as single-seeded wheat, whereas others change into something closer to themselves, as rice-wheat to oats.

On the other hand wheat does not change by arrested development<sup>2</sup> to one-seeded wheat or rice-wheat because its food is too abundant and too strong for that, and the food is why it retains its identity; food of this character, far from producing any femininity,<sup>3</sup> would shift a plant to greater vigour and lift it entirely out of its kind. In fact one would more reasonably wonder rather why the food does not change it to wild wheat, just as food makes other cultivated plants go wild.<sup>4</sup> Here too the reason is a similar one: the nature of the plant makes the shift absolute.<sup>5</sup>

<sup>3</sup> Cf. Aristotle, *On the Generation of Animals*, iv. 6 (775 a 14-16): "... for the females are weaker and colder in their nature, and we must take femininity to be (as it were) a natural stunting of development."

<sup>4</sup> As in the change of bergamot mint (*CP* 4 5. 6).

<sup>5</sup> And not qualified. Change to wild wheat would be change from wheat with the qualification "cultivated" to wheat with the qualification "wild"; change from wheat to darnel is unqualified and absolute.

5.4 ἄτοπον δὲ καὶ λόγου δεόμενον εἶ καὶ τὸ λίνον  
ἐξαίρουται, μεγάλη γὰρ ἡ διάστασις· εἰ μὴ ἄρα  
καὶ τοῦτο τῆς τροφῆς ὀλκόν, φιλεῖ γοῦν χώραν  
ἀγαθὴν, ὥστ' ἐκ τῆς ὑπερβολῆς ἡ διάστασις.<sup>1</sup>

ὁ δὲ θέρμος, ἰσχυρὸς ὢν καὶ πρῶτισπορούμενος,<sup>2</sup>  
οὐδὲ εἰς ἓν μεταβάλλει διὰ τὴν ἄγαν ἰσχύν, ἐπι-  
κρατεῖ<sup>3</sup> γάρ, δεῖ δὲ τὸ μέλλον μεταβάλλειν μήτ'<sup>4</sup>  
ἀπαθὲς εἶναι μήτε ἄγαν εὐπαθὲς· τὸ μὲν γὰρ οὐ  
μετακινεῖται, τὸ δ' ὅλον εἰς αὐτὸν<sup>5</sup> φθείρεται, κα-  
θάπερ ἐλέχθη.

5.5 σκεπτέον δὲ καὶ εἴ τι τῶν ἄλλων σπερμάτων, ἢ  
τῶν ἀγρίων ἢ τῶν ἡμέρων, δέχεται τὴν τοιαύτην  
ἀλλοίωσιν.

καὶ περὶ μὲν αἰρῶν<sup>6</sup> ἀρκείτω τὰ εἰρημένα.

τὰς γὰρ ἐν αὐτοῖς τοῖς γένεσιν τῶν πυρῶν  
μεταβολὰς (οἶον<sup>7</sup> <ἄν><sup>8</sup> ἐκ τοιῶνδε τοιοῦδε  
γίνονται·<sup>9</sup> καὶ κριθαὶ καὶ τᾶλλ' ὁμοίως) οὐκέτι

<sup>1</sup> U: ἐκστασις Wimmer (*ista quoque mutatio Gaza*).

<sup>2</sup> ego (πρῶτος σπειρόμενος Scaliger: *mature ... obseratur*  
Gaza): πρῶτος ἐξαίρουμένος U.

<sup>3</sup> u: ἐπεὶ κρατεῖ U.

<sup>4</sup> Schneider (*neque Gaza*): μη U.

<sup>5</sup> ego (ὄλωσ ἀσθενὲς ὄν Wimmer): ὄλον ὡς αὐτὸν U.

<sup>6</sup> u: αἰρετῶν U. <sup>7</sup> U<sup>c</sup>: οἶων U<sup>ac</sup>.

<sup>8</sup> ego: <ἄτε> Schneider (*quum Gaza*): <εἰ> Wimmer.

<sup>9</sup> ego: γίνονται U.

But that flax<sup>1</sup> too should change to darnel is odd 5.4  
and requires explanation, since the disparity  
between them is wide; unless it is because flax too  
attracts a great deal of food. Thus flax is fond of  
good land; and the interval covered would be due to  
the excess of food.

Lupine, which is strong and sown early,<sup>2</sup>  
changes to no other plant at all because of its excep-  
tional strength. For the strength makes it prevail,  
and the plant that is to change must be neither  
unaffected nor very easily affected, since the unaf-  
fected plant undergoes no transmutation, whereas  
the easily affected plant undergoes total corruption  
and withers away, as we said.<sup>3</sup>

We must also investigate whether any other 5.5  
grain, either wild or cultivated, admits this sort of  
change of character.

As for darnel, the preceding discussion must  
suffice.

As for the changes that occur within the various  
kinds of wheat themselves—that is, wheat of one  
sort changing to wheat of another, and so too with  
barley and the rest<sup>4</sup>—we do not seek an answer, as

<sup>1</sup> Cf. *HP* 8 7. 1, cited in note 1 on *CP* 4 4. 5.

<sup>2</sup> Like wheat and barley. For its early sowing cf. *HP* 8 1.  
3, cited in note 4 on *CP* 4 5. 1.

<sup>3</sup> *CP* 4 5. 1; 4 5. 2.

<sup>4</sup> The change of imported grain to the character of the  
native variety is meant: for this cf. note *a* on *CP* 1 9. 3.

ζητοῦμεν, οὐδὲ<sup>1</sup> τοῦτ' ἔχει τὸ θαυμαστόν· ἡ γὰρ χώρα<sup>2</sup> καὶ αἱ τροφαὶ καὶ ὁ ἀήρ<sup>3</sup> (καθάπερ εἴρηται) ποιούσι τὰς ἀλλοιώσεις ὁμοίως ζώων καὶ φυτῶν.

5.6 ὁ καὶ πρὸς τὴν ἔκστασιν ὅλως τοῦ γένους χρῆναι φάμεν μετενεγκεῖν, ποιᾶν τινα καὶ ποσὴν ποιήσαντας τὴν τροφήν· ἐπεὶ καὶ ἡ<sup>4</sup> τῶν δένδρων, καὶ ὅλως τῶν φυτῶν αἱ ἐν ταῖς ἱστορίαις εἰρημέναι μεταβολαὶ διὰ ταύτας γίνονται τὰς αἰτίας (ὥσπερ ἐν τοῖς πρότερον ἐλέχθη)· τῶν μὲν ἀτροφούντων<sup>5</sup> ἐν ταῖς<sup>6</sup> οἰκείαις τροφαῖς καὶ θεραπαίαις, ὥσπερ τὸ σισύμβριον ὅταν εἰς μίνθαν,<sup>7</sup> ἀπόλλυται γὰρ τὸ δριμύ τῆς ὀσμῆς καὶ οἶον ἀποθελύνεται, διὰ τὴν τροφήν δὲ καὶ ἀργίαν ἢ ἀπαργίωσις· ἔνια δ' ὅλως καὶ ἀπόλλυσιν, ὥσπερ τὴν μίνθαν, καταπνιγομένων τῶν ῥιζῶν ὑφ' ἑαυτῶν.

5.7 ἡ δὲ λεύκη τὸ μὲν ὅλον οὐ πόρρω τῆς αἰγείρου καὶ τῆ ὄλη μορφῆ καὶ τοῖς φύλλοις· ἀπογρηάσκουσα δὲ ἕξομοιοῦται τῷ καταξηραίνεσθαι καὶ

<sup>1</sup> Schneider: οὐν εἰ U.

<sup>2</sup> ego: ὦρα U.

<sup>3</sup> U<sup>c</sup>: ἀνῆρ U<sup>ac</sup>.

<sup>4</sup> [ἡ] a.

<sup>5</sup> U<sup>c</sup> (-οῦν- U<sup>ac</sup>) NP: ἐτροφούντων a.

<sup>6</sup> U: μὴ Wimmer.

<sup>7</sup> N aP: μίνθαν U.

we did with the other changes, nor does this occurrence have the quality of the marvellous, for the country and the different food and the air (as we said)<sup>1</sup> produce alterations of character in animals and plants alike. One must transfer this explanation, I say, and apply it to the complete departure of a plant from its kind, showing that the food is of such and such a quality and quantity. Indeed not only the change in trees<sup>2</sup> but also the changes of plants in general recorded in the History of Plants<sup>3</sup> come about for these reasons (as we said earlier),<sup>4</sup> some plants getting a starvation diet when they get their appropriate food and tendance (so when bergamot mint changes to green mint,<sup>5</sup> the pungency of odour being lost and the plant becoming as it were female; and this turning wild<sup>6</sup> is due to the increase of food and neglect of tendance); whereas food even completely destroys some plants, as green mint, since its roots choke themselves.<sup>7</sup>

White poplar is in any case not far removed from black poplar both in its general shape and in its leaves; and when it grows old it not unreasonably is

<sup>1</sup> CP 2 13. 1, 5.

<sup>2</sup> Cf. CP 2 13. 1-2 16. 8.

<sup>3</sup> HP 2 2. 4-2 4. 4.

<sup>4</sup> CP 2 13. 1-2 16. 8.

<sup>5</sup> Cf. HP 2 4. 1. <sup>6</sup> Cf. CP 2 16. 5.

<sup>7</sup> Compared to bergamot mint it has deep and numerous roots: cf. CP 2 16. 5.

μᾶλλον ἀτροφεῖν οὐκ ἀλόγως.<sup>1</sup>

ἀλλὰ<sup>2</sup> περὶ μὲν τούτων ἐν ἄλλοις διὰ πλειόνων εἴρηται, καὶ ὅτι δὲ καὶ περὶ τὰ ζῶα κατὰ μὲν τὰς γενέσεις τοιοῦτόν<sup>3</sup> τι συμβαίνει, <sup>4</sup> τελεισθεισῶν δὲ τῶν νοσσιῶν οὐκέτι (πλὴν εἴ τις τὰς κατὰ τοὺς ὄρνιθας ἀλλοιώσεις ἅμα ταῖς γινομέναις ὥραις<sup>5</sup> λέγει·<sup>6</sup> φαίνονται δὲ αὐταὶ γε πάθωσιν μᾶλλον ὅμοιαι σωματικῶς ἢ μεταβολαῖς).

- 6.1 τῶν δὲ ἄλλων τῶν περὶ τὰ σπέρματα μάλιστα ἄπορον<sup>7</sup> (εἶπερ ἀληθές) τὸ παρὰ μέρος, καὶ μὴ ἅμα, γεννῶν ἔνια, καθάπερ ἐπὶ τε τοῦ αἰγίλωπος λέγεται καὶ τοῦ λωτοῦ καὶ τοῦ βολβοῦ. τοῦτο δ' οἱ μὲν φασιν εἶναι ψεῦδος, ἀλλὰ ἀπὸ τῆς ρίζης βλαστανόντων τῶν ὕστερον, ἔτι<sup>8</sup> ἀπὸ τοῦ σπέρματος ὑπολαμβάνοντων·<sup>9</sup> οἱ δ' ὡς ἀληθῶς<sup>10</sup> δια-

<sup>1</sup> ego: ἀλογον U.      <sup>2</sup> u aP: ἄλλα U: ἄλλα N.

<sup>3</sup> U<sup>ac</sup> from τοιοῦτι.      <sup>4</sup> U<sup>r</sup> N aP: -ειν U<sup>ar</sup>.

<sup>5</sup> ego: τοις γινομένοις ὥραιν U.

<sup>6</sup> U<sup>c</sup>: -ειν U<sup>ac</sup>.

<sup>7</sup> μάλιστα ἄπορον Wimmer: μαλιστα πόρον U.

<sup>8</sup> U: *regerminare anno posteriori: aut Gaza: βλαστάνειν τῶ ὕστερον ἔτει ἢ Schneider.*

<sup>9</sup> ego (ὑπολαμβάνουσαν Schneider): ἐναπολαμβάνοντων U (dot over first α).

<sup>10</sup> U: -ὲς Schneider.

assimilated to it by getting dry and taking less food than before.

But these cases have been treated at length elsewhere,<sup>1</sup> as has the point<sup>2</sup> that in animals too something of the sort (it is true) occurs in the process of generation but no longer occurs when the young have been fully formed (unless one brings up the seasonal alterations in birds<sup>3</sup>; but these last evidently bear a closer resemblance to bodily affections than to mutations).

*The Next Greatest Problem:*

*Alternate Germination in Annual Seeds*

Of other points concerning annual seeds the most difficult is this (if true): that the germination of some seeds is alternate and not simultaneous, as is said of haver-grass, trefoil and purse-tassels.<sup>4</sup> Some assert that this is false; that the later plants come up from the root, but are supposed by the other side to be produced from the seed. But the

<sup>1</sup> CP 2 16. 2-5.

<sup>2</sup> CP 2 16. 6-7.

<sup>3</sup> Cf. CP 2 16. 6 and note b.

<sup>4</sup> Cf. HP 7 13. 5: "The following is said to be peculiar to purse-tassels, that it does not come up at the same time from all the seeds, but from one seed the same year, from another the next year, as they say is true of haver-grass and trefoil. This then, if true, is a common character of several plants."

THEOPHRASTUS

τείνονται,<sup>1</sup> σημεῖα φέροντες ἄλλα τε καὶ <ὡς><sup>2</sup>  
οἱ ἀπολλύντες τὸν αἰγίλωπα δὴ ἔτη<sup>3</sup> τὸν  
<ἀργρὸν><sup>4</sup> ἀργρὸν ποιούσιν, ὅπως ἀμφότερα τὰ  
σπέρματα ἐκβλαστήσῃ καὶ ἐπωμεθῆ τε καὶ ἐκ-  
θερισθῆ τὸ ὅλον ὁ καρπός.

6.2 ἔχει δέ τινα καὶ ἄλλως ἀπορίαν ἢ παρ' ἔτος  
βλάστησις · καὶ εἴπερ, συνεχῆς ὄν καὶ δίκρουν  
(ὡσπερ φαίνεται), καὶ ἅμα πίπτουν, τὸ μὲν ἀλλοι-  
οῦται καὶ διαβλαστάνει, τὸ δ' ἀπαθὲς διαμένει  
πάντα τὸν ἐνιαυτόν · ὅσω γὰρ ἀσθενέστερον τὸ  
ἔλαττον (ὃ δὴ φασι διαμένειν), τοσοῦτω καὶ εὐπα-  
θέστερον ἐχρῆν εἶναι καὶ εἰς τὴν διαβλάστησιν καὶ  
εἰς τὴν ὄλην φθοράν. ἀνάγκη δὲ δηλοῦν ὅτι καὶ,  
ὅταν ἐκβλαστήσῃ, θάτερον χωρίζεσθαι · μὴ γὰρ  
χωρισθέν, καὶ εἰ μὴ γίνεται συμπαθές, ἀλλ' ἐξαι-  
ρουμένων γε τῶν ριζῶν συνεξαιροῦτ' ἄν, πολλάκις  
δὲ τοῦτο δρῶσιν οἱ γεωργοί, καὶ οὐ φασι φθείρειν.

<sup>1</sup> Schneider: *διάκεινται* U.

<sup>2</sup> ego: *quod* Gaza: <ἔτι> Schneider.

<sup>3</sup> ego (*biennio* Gaza: *διετη* Scaliger): *διετη* U: *δυ' ἔτη* ·  
εἰς u.

<sup>4</sup> Schneider.

<sup>1</sup> Cf. *HP* 8 11. 9: "A peculiar feature cited for haver-  
grass in contrast to other cereals is this: that one of the  
seeds takes a year longer than the other to germinate.

DE CAUSIS PLANTARUM IV

first side insists that it really happens, and comes  
forward with proofs, among them the practice of  
farmers who wish to get rid of haver-grass of letting  
the field lie fallow for two years on end so that both  
sets of seed may come up and the whole crop be  
grazed over and cut out.<sup>1</sup>

6.2 Even so such sprouting with a year's difference is  
attended with further difficulty: if the two seeds are  
of a piece with two segments (as we observe) and the  
two are dropped at the same time, that the one seg-  
ment nevertheless is altered and sprouts, whereas  
the other continues unaffected for that whole year.  
For the greater the weakness of the smaller seg-  
ment (the one which they say continues unaffected),  
the more readily should it be affected not only so as  
to sprout but also so as to perish totally. Further  
when the one seed sprouts the other must clearly  
become detached, since otherwise, even if it is not  
affected along with its partner, still when the roots  
are pulled up it would be pulled up along with them,  
and farmers do this often and say that they do not  
thereby destroy the plant.

Hence farmers who wish to extirpate it completely (and it  
is not easy to extirpate) allow their fields to go unsown for  
two years, and when the plant comes up let their sheep in  
repeatedly to graze, until the plants have been destroyed  
by the grazing, and in this way the plant is completely  
extirpated. And the procedure also testifies to the alterna-  
tion in the sprouting of the seeds."



6.3 τὸ δὲ διαρκεῖν ἀπαθὲς ἐν τῇ γῆ, μέχρι μὲν τῆς οἰκείας ὥρας εἰς τὴν ἔκφυσιν εὐλογόν τε καὶ ἐπὶ πολλῶν γινόμενον · τὸ δὲ ὅλον ἐνιαυτὸν ἐπισχεῖν ἤδη θαυμασιώτερον. ἀλλὰ μὴν καὶ τὸ μὲν τέλεον, τὸ δὲ ἀτελὲς αὐτῶν εἶναι, τελεοῦσθαι δὲ παρ' ἐνιαυτόν, ἄλογον · οὔτε γὰρ ἀσθενές, ἀλλ' ἰσχυρὸν ὁ αἰγίλωψ, ὥστε ἐκτελεοῦν δύνασθαι πλείω (καὶ ἅμα δὴ καὶ τὸ ἀσθενέστερον τοῦτο δρᾶ). ἢ τε αὖτελέσις ἢ κατὰ φύσιν οἰκειοτάτη, τάχα δὲ καὶ μόνη · τροφήν γὰρ τότε λαμβάνει τὴν αὐτοῦ, διὰ δὲ τῆς τροφῆς ἢ αὔξη καὶ τὸ τέλεον, χωρισθὲν δὲ ἦτοι φθείρεται πάμπαν ἢ ἀναυξὲς καὶ ἀνεπίδοτον · τὸ δ' αὖτε πολύχιτον<sup>1</sup> [δ']<sup>2</sup> εἶναι καὶ τῷ βρόμῳ καὶ τῇ ζειᾷ συμβέβηκεν, ὥστ' ἐχρῆν<sup>3</sup> καὶ ταῦτα διαμένειν ἀπαθῆ.

6.4 τὰ<sup>4</sup> μὲν οὖν ἀντιβαίνοντα<sup>5</sup> σχεδὸν ταῦτ' ἐστίν. [ἀλλ']<sup>6</sup> οὐ μὴν ἀλλ' εἰ δεῖ λέγειν τι<sup>7</sup> αἰτίαν, ἐκείνην ἂν τις ἴσως μάλιστα εἴποι, τὴν φάσκουσαν

<sup>1</sup> Schneider: πολυχίτων U N aP: πολυχίτωνι u.

<sup>2</sup> aP.

<sup>3</sup> Wimmer (ὥστε χρῆν Schneider): ὥστε χρῆ U.

<sup>4</sup> u: ταῦτα U.

<sup>5</sup> U<sup>r</sup>: -μαίν- U<sup>ar</sup>: -μέν- N aP.

<sup>6</sup> Schneider.

<sup>7</sup> U: τῆν u.

That this seed should survive unaffected in the ground until the season appropriate for its sprouting is reasonable and happens with many other plants<sup>1</sup>; but that it should hold off a whole year begins to be astonishing. On the other hand, that of the two seeds one should be perfect, the other imperfect, but perfected a year later, is unreasonable, for haver-grass is not weak, but strong, and so is capable of perfecting more seeds than that (then too even a weaker plant does this); and again the natural way<sup>2</sup> is the most appropriate, and perhaps the only way too, of perfecting the seed, since it then receives its own food,<sup>3</sup> and from the food comes growth and perfection, whereas when the seed is detached it either perishes completely or fails to grow and develop. As for its having a number of coats, this is also true of oats and rice-wheat, and on this showing these seeds too should remain unaffected in the ground.

These then (I may say) are the points that make difficulty.

Nevertheless if one is to give some reason for the year's difference one would perhaps incline most to

<sup>1</sup> Cf. HP 7 1. 7 (of herbaceous plants): "Each seed, if it is robust when it drops, waits for its own season and does not come out before . . ."

<sup>2</sup> That is, while the seed remains attached to the plant.

<sup>3</sup> That is, food that has been worked up for it, and not unprepared food taken directly from the ground.

μὴ τελεοῦν ἄμφω πρὸς τὸ<sup>1</sup> φύσιμα<sup>2</sup> ποιεῖν, ἀλλ' ὁμοίον τι ξυμβαίνειν<sup>3</sup> καὶ τῶν ᾠσπτόκων καὶ τῶν σκωληροτόκων<sup>4</sup> τισί· τὰ γὰρ [ὡὰ]<sup>5</sup> ἀποτικτόμενα τρέφεται καὶ ἐκτελεοῦται, τὰ μὲν ἐν τῷ ὕδατι καὶ τῇ θαλάττῃ, τὰ δὲ ἐν τῇ γῇ καὶ τῷ ἀέρι, καὶ ταῦτα δεχόμενα ζωοποιεῖ, τὰ δὲ φύσαντα καὶ ἐκτεκόντα ἐξαδυνατεῖ.

6.5 φαίνεται δὲ τοῦτό γε καὶ ἄλλως ἀληθές· ὡς οὐκ εὐθὺς ἀλοαθέντα<sup>6</sup> τὰ σπέρματα βελτίω τῶν χρονισθέντων, οὐδὲ τὰ νέα τῶν ἔνων (ὥσπερ εἶπο-

<sup>1</sup> Schneider : τὰ U.

<sup>2</sup> aP : φύσημα UN.

<sup>3</sup> u, Schneider : -ει U aP (συμβαίνει N).

<sup>4</sup> Scaliger : σκληρωτόκων U<sup>ar</sup> : σκληροτόκων U<sup>r</sup> : σκληροτάτων N aP.

<sup>5</sup> ego.

<sup>6</sup> αλοαθέντα U : ἀλοαθέντα Wimmer (cf. CP 4 12. 9 ἡλοημένους U : CP 4 12. 8 ἀπηθαλωμένους U).

<sup>1</sup> Cf. Aristotle, *On the Generation of Animals*, ii. 1 (732 a 25–732 b 7): "Of animals some perfect their young and bring them forth like themselves . . . , but others bring forth young that are unarticulated and have not yet received their own shape. Of such animals the blooded ones lay eggs, the non-sanguineous larvae . . . Of the ovi-

the following, which asserts that the plant does not perfect both seeds to the point of making them fit for germination, but that what happens is similar to what happens in certain oviparous and vermiparous animals<sup>1</sup>: the eggs and larvae on being brought forth feed and are perfected, some<sup>2</sup> in fresh water and the sea, the rest<sup>3</sup> in the earth and in the air, and taking these substances into themselves produce animals, whereas the parents that generated them and brought them forth are unable to take them so far.

This point about imperfection at least appears in any case true: thus seed is not better right after winnowing than after being kept some time, nor yet are this year's seeds better than last year's (as we

parous animals some put forth an egg that is perfect . . . (for the eggs of these after coming out cease to grow), but others bring forth imperfect eggs, as fish and crustacea and cephalopods, for the eggs of these grow after coming out"; *ibid.* iii. 9 (758 b 15–21): "For all larvae on coming forth and acquiring size become as it were an egg . . . The cause of this is that the nature (*sc.* of the insect) as it were lays eggs before their time because of its own imperfection, as if the larva were a soft egg still in the process of growing."

<sup>2</sup> The eggs.

<sup>3</sup> The larvae.

μεν), ἀλλὰ δεῖ τινα λαβεῖν ἐν ἑαυτοῖς οἶον πέψιν καὶ δύναμιν, ἀποπνεύσαντος τοῦ ἀλλοτρίου. τί οὖν, ἴσως ἂν τις φαίη, κωλύει καὶ ἐπὶ τῶν ἀπορουμένων τοιοῦτόν τι συμβαίνειν ὥστε καὶ τελέωσιν λαμβάνειν καὶ δύναμιν ἐκπεττόμενά πως τῇ θερμότητι τῇ τε ἐν ἑαυτοῖς καὶ τῇ περιεχούσῃ;

- 6.6 ἢ τοῦτο παράλογον, ὡς μᾶλλον ἐν τῇ γῆ κατακλειομένη ἢ θερμότης ἐκπέττει τὴν τροφήν (ἣν ἐπισπᾶται καὶ δι' αὐτῶν)<sup>1</sup> τῆς<sup>2</sup> ἐν τῷ ἀέρι, καὶ ταῦτα πεφυκότων ἐν τούτῳ τελεοῦσθαι (καὶ ἅμα λαμβανόντων τροφήν<sup>3</sup> οὐκ ὠμῆν, ἀλλὰ προ-  
6.7 πεπονημένην ὑπὸ τοῦ καυλοῦ καὶ τῶν ριζῶν· ἔτι δὲ τῶν μὲν ὠμῶν μία τις ἢ πέψις καὶ τελείωσις ἀπάντων, εἴθ'<sup>4</sup> ὑπὸ τῶν ἕξω); συμβαίνει γὰρ ὥσπερ τὸ μὲν κατὰ φύσιν, τὸ δὲ παρὰ φύσιν, καὶ ταῦτ'<sup>5</sup> ἰσχύοντος ἔτι τοῦ φυτοῦ καὶ οὐ περικατα-  
λαμβανομένου<sup>6</sup> τῇ ὥρᾳ πρὸς τὴν πέψιν.

πλὴν εἴ τις λέγοι ὅτι προεκπηδᾷ τὰ σπέρματα

<sup>1</sup> ego: ἢ ἐπισπᾶται καὶ δι' αὐτῶν U: ἣν ἐπισπᾶται, καίτοι αὐτῶν Schneider: τὴν ἐν τῷ σπέρματι καὶ τελειῶι Wimmer.

<sup>2</sup> Wimmer (τῶν Schneider): τὴν U.

<sup>3</sup> <τὴν> τροφήν Schneider.

<sup>4</sup> aP: εἴθ' UN: ἢ θ' u.

<sup>5</sup> aP: ταῦτ' UN.

<sup>6</sup> Schneider: περιλαμβανομένου U.

said),<sup>1</sup> but they need to acquire within themselves a certain concoction (as it were) and power by the evaporation of the foreign element. Someone perhaps might ask: "Then what prevents the like from also happening with the seeds that are the subject of our present difficulty—that the seed acquires full development and power by being concocted in some fashion not only by its internal heat but also by the heat that surrounds it?"

Or is this highly unreasonable? That when the heat is shut up in the earth it does more to bring the food to full concoction (food moreover that the seeds attract by their own efforts) than does the heat in the air, especially when it is natural for seeds to be perfected in the air (where at the same time they get food that is not raw but previously prepared by the stem and the roots; further in the eggs there is a single concoction and maturing of the whole batch, and only then does concoction by external agencies follow)? For the result is that (as it were) the one concoction occurs naturally, the other unnaturally, and this happens when the parent is still strong and not yet precluded from concocting by the season.<sup>2</sup>

Except that one might urge that the seeds drop

<sup>1</sup> CP 43.4.

<sup>2</sup> So some late tree fruits (seeds) ripen after removal from the tree after the arrival of the cold weather (CP 2.8.2-3).

πρὶν τελειωθῆναι διὰ τὸ τὴν φύσιν ἔχειν ἀσθενῆ. συμβαίνει μὲν δὴ τοῦτο καὶ πολλὸν προτερεῖ καὶ τῶν κριθῶν, ὥστε κενὸν<sup>1</sup> ἔσταναι τὸν κάλαμον. τοῦτό τε<sup>2</sup> οὖν εἰς τὴν οὐσίαν ἀνακτέον, καὶ τὸ συνεκτρέφεσθαι<sup>3</sup> δὲ καὶ τελειοῦσθαι τοῖς περιέχουσιν οὐκ ἄλογον. ἐπεὶ τό γε διαμένειν ἀπαθές, ἄλλως τε καὶ ἐν χιτῶσι τοσοῦτοις, ἦττον θαυμαστόν· πολλὰ<sup>4</sup> γοῦν φαίνεται (καθάπερ ἐλέχθη) καὶ τῶν ἄλλων, μᾶλλον δὲ πάντα, διατηρούμενα πρὸς τὴν οἰκείαν ὥραν. ἐκεῖνο γὰρ ἔτι θαυμασιώτερον, ὅπερ εἴρηται περὶ τῶν τευτλίων, ὅτι οὐ μόνον ἐνὶ μηνί<sup>5</sup> καὶ δυοῖν καὶ τρισὶν ὕστερον, ἀλλ' ἐνιαυτῷ διαβλαστάνει τινά, καὶ ταῦτα βρεχομένου καὶ κηπευομένου τοῦ τόπου.

6.8 ἔστι<sup>6</sup> δὲ καὶ τὸ τοῦ λωτοῦ σπέρμα τοιοῦτον (ἢ τό γε περιέχον τὸν παρπὸν) διὰ τὸ μὴ εὐχώριστον εἶναι μηδ' ὁμοίως ἀφαδρύνεσθαι.<sup>7</sup>

<sup>1</sup> u : καινὸν U : κοινὸν N aP.

<sup>2</sup> U : μὲν Schneider.

<sup>3</sup> U : ἐκτρέφεσθαι Schneider.

<sup>4</sup> Gaza (*permulta*), Schneider : πολλαχού U.

<sup>5</sup> Gaza (*uno mense*), Schneider : κ μηνί U<sup>ac</sup> : μηνί U<sup>c</sup> (κ crossed out) : ἀμηνί N : ἐν μηνί aP.

<sup>6</sup> U N : ἔτι aP.

<sup>7</sup> Gaza (*capere crassitudinem*), Heinsius (ἀποδύεσθαι Scaliger) : ἀπαδρύνεσθαι U : ἀποδρύνεσθαι N aP.

before maturing because their nature is weak. Now this in fact happens and the seeds drop much sooner than even in the barley,<sup>1</sup> so that the haulm stands empty. This, then, is to be ascribed to the plant's nature; and it is not unreasonable that part of their feeding, together with their maturing, should fall to the environment. As for the seed's remaining unaffected, especially when enclosed in so many coats, there is less to surprise one here (thus many seeds of other plants too, as we said,<sup>2</sup> or rather all seeds, are observed to keep until their proper season). For another case is still more astonishing, where we said<sup>3</sup> of beets that some come up not only a month or two or three but a whole year later, even when the bed is watered and tended.

The seed of trefoil too is of this description<sup>4</sup> (or 6.8 rather the envelope of the fruit), since it does not separate easily<sup>5</sup> or acquire the same stoutness in all cases.

<sup>1</sup> Cf. *HP* 8 8. 3: "... haver-grass is held to grow by preference in barley ..." Barley was harvested in the seventh month after sowing, wheat in the 8th: *HP* 7 2. 7.

<sup>2</sup> *CP* 4 6. 3 with note 1.

<sup>3</sup> *CP* 4 3. 2 with note 2.

<sup>4</sup> The seeds come up at different intervals.

<sup>5</sup> Presumably the seed does not separate easily from its envelope.

τὸ δὲ τοῦ βολβοῦ καὶ τῷ μεγέθει διάφορον·  
σκεπτέον δ' ὑπὲρ αὐτοῦ.

εἰ δ' οὖν οὕτως ἕνια δυσφυῆ τῶν σπερμάτων  
ὥστε<sup>1</sup> πολλοῖς ὕστερον χρόνοις ἀνατέλλειν, δηλον  
ὅτι ταῦτα πέττεται καὶ τελειοῦται πρὸς τὴν  
βλάστησιν ἐν τῇ γῆ, διὸ καὶ αὕτη<sup>2</sup> τις ἂν εἴη  
συνεργοῦσα πίστις. ἀντιβαίνει δ' αὐτῇ τὸ καὶ  
πρότερον λεχθέν, ὅτι καὶ τελειοῦται τινα κατὰ τὴν  
πρόσφυσιν, ἃ καὶ σπειρόμενα διαβλαστάνει παρα-  
χρήμα.

6.9 μείζον δ' ἔτι τῶν<sup>3</sup> παρὰ<sup>4</sup> τὰ σπέρματα καὶ  
τοὺς καρποὺς ἀπορημάτων<sup>5</sup> (οὐχ ὑποπίπτοντα<sup>6</sup>  
δὲ ὑπὸ τὴν αἰτίαν ταύτην) τὸ περὶ τὸν λωτὸν συμ-  
βαῖνον (τοῦτο δέ ἐστι δένδρον παρόμοιον ἔχον τὸν  
καρπὸν τῷ λωτῷ) καὶ τὸ περὶ τὸν τιθύμαλλον [τὸ  
περὶ]<sup>7</sup> τὸν μυρτίτην καλούμενον (τοῦτο δ' οὐ

<sup>1</sup> Gaza (*ut*), Scaliger (τε ὥστε α): ὡσπερ U N P.

<sup>2</sup> Gaza (*id*), Scaliger: αὕτη U: αὐτῇ u (-ῆ aP): αὐτῆ N.

<sup>3</sup> Itali: τοῦ U.

<sup>4</sup> U: περὶ Gaza (*de*), Heinsius.

<sup>5</sup> U: ἀπορήματος u.

<sup>6</sup> N: ὑποπίπτοντα U: ὑποπίπτοντος u: ὑποπίπτον aP.

<sup>7</sup> u: καὶ τὸ περὶ aP.

In purse-tassels<sup>1</sup> the seed also varies in its size.  
We must investigate it.

At all events if some seeds are so slow to sprout  
that they come up long after they are dropped, it is  
evident that they are concocted and matured for ger-  
mination in the ground, and so we have here a piece  
of corroborative evidence. But opposed to this evi-  
dence is the point mentioned before<sup>2</sup>: that some  
seeds are perfected when still attached, and these  
come out right after sowing.

*A Greater Difficulty for Consideration*

A still greater difficulty than those depending on 6.9  
variations in the annual seed and fruit (but these  
new cases do not fall under this cause)<sup>3</sup> is what hap-  
pens in the *lotos*<sup>4</sup> (this is a tree with fruit resem-  
bling that of trefoil)<sup>5</sup> and with the so-called "myrtle"

<sup>1</sup> Cf. HP 7 13. 5: "The following feature is cited as pecu-  
liar to purse-tassels, that it does not come up simultane-  
ously from all the seeds, but from one seed in the same  
year, from another in the next, as is said of haver-grass  
and trefoil."

<sup>2</sup> CP 4 6. 1 (cf. HP 7 13. 5, just cited).

<sup>3</sup> Concoction of the seed (fruit) in the ground.

<sup>4</sup> Perhaps the Libyan *Zizyphus lotus*. But the name  
*lotos* is also used of the nettle-tree (*Celtis australis*).

<sup>5</sup> *Lotos* in Greek.

δένδρον, ἀλλὰ θάμνος ἐπιγειόκαυλος)· ἀμφότερα γὰρ ταῦτά φασι παρὰ μέρος φέρειν ἐξ ἑκατέρων τῶν βλαστῶν, ὥστ' ἀνάγκη τὸν μερισμὸν τῶν δυνάμεων ἐν ταῖς ῥίζαις ποιεῖν.

ἀλλὰ περὶ μὲν τούτων ἐπισκεπτέον.<sup>1</sup>

7.1 τῶν δὲ σιτηρῶν σπερμάτων εἴ τινες διαφοραὶ κατὰ τὴν ἔκφυσιν ἢ τοὺς καρπούς ἢ τὴν ἄλλην οὐσίαν δεῖ πειραῖσθαι λέγειν.

οἶον ὅτι πρὸς μὲν καὶ κριθῇ καὶ τὰ ὅμοια πρωῖ-  
σπορεῖται, τὰ<sup>2</sup> χεδροπὰ δὲ πρὸς τὸ ἔαρ, πλὴν  
κιάμου καὶ θέρμου. τοῦτο γὰρ ποιούσιν ὅτι τὰ μὲν  
σιτώδη ῥιζωθῆναι δεῖ, παρὰ<sup>3</sup> τὸ<sup>4</sup> μονόκαυλα<sup>5</sup>  
γίνεσθαι, τῆς ἀναφορᾶς εὐθὺς ἄνω γινομένης·  
ῥιζοῦται δὲ κατεχόμενα καὶ πιλούμενα τοῖς  
χειμῶσιν, ὥστε πολλὰς ἀρχὰς λαμβάνειν τῆς

<sup>1</sup> u: ἐπισκεπτει U.

<sup>2</sup> Schneider (*mature seruntur Gaza*): πρῶρεῖ (προρεῖ U<sup>r</sup>).  
τα δὲ (δὲ crossed out U<sup>c</sup>) U.

<sup>3</sup> ego: πρὸς U.

<sup>4</sup> τὸ <μῆ> Schneider.

<sup>5</sup> MN<sup>2</sup>: μονόκωλα U (dot over ω) N<sup>1</sup> aP.

<sup>1</sup> Cf. *HP* 9 11. 9: "The so-called 'myrtle' spurge sends out branches on the ground about a span long, and these do

spurge<sup>1</sup> (this is not a tree but a shrub with a stem running on the ground), for both plants are said to bear alternately from two sets of shoots, so that the plants must make this apportionment of their powers in the roots.

But these are matters that we must investigate.

*Cereals and Legumes:  
The Easier Differences*<sup>2</sup>

Regarding the seeds of cereals we must 7.1  
endeavour to treat any differences they have in  
sprouting or in fruit or in the rest of their nature.

So for instance the difference that wheat and barley and the like are sown early,<sup>3</sup> whereas legumes (bean and lupine excepted) are sown towards spring.<sup>4</sup> This is done because cereals need to get rooted because they become single-stemmed when their growth is directed upward from the start; and they get rooted by being held back and pushed down by the cold weather, with the result that they acquire many starting-points for their upper

not bear the fruit at the same time but in alternate years, some bearing now and some next year, although they grow from the same root."

<sup>2</sup> A subject broached at *CP* 4 4. 4, second paragraph.

<sup>3</sup> In autumn: cf. note 4 on *CP* 4 5. 1.

<sup>4</sup> Cf. *HP* 8 1. 3-4, cited in note 4 on *CP* 4 5. 1.

βλάστης.

- 7.2 τὰ δὲ χεδροπά, μονόρριζά τε καὶ ἰσχυρόρριζα, καὶ εὐθὺ τὴν<sup>1</sup> ὀρμὴν ἄνω ποιούμενα, προσφόρως ἔχει τῇ ὥρᾳ, τὸ γὰρ πολὺ τῆς φύσεως ἐν τῷ ἀέρι. τὸν δὲ κύαμον πρῶτισποροῦσιν (ὥσπερ εἴρηται) διὰ τὴν ἀσθένειαν, ὅπως ῥιζῶθεις<sup>2</sup> ἐν ταῖς εὐδαίαις ἀντέχη τοῖς χειμῶσι·<sup>3</sup> τὸν δ' αὖ θέρμον εὐθύς ἀπὸ τῆς ἄλω, διότι μὴ καταβληθεὶς ἔτι θερμῆς οὐσης τῆς γῆς κακοβλαστῆς γίνεται·<sup>4</sup> τούτου δ' αἴτιον ὅτι ἀτέραμον φύσει καὶ ὥσπερ ἄπεπτον· δηλοῖ δ' ἡ πικρότης διότι πολλῆς δεῖται θερμότητος. ἐὰν οὖν προσλάβῃ τὴν ἐκ τῆς χώρας, δύναται κατεργασθῆναι καὶ εὐβλαστεῖν· εἰ δὲ μὴ, κακοβλαστεῖ,<sup>5</sup> καὶ παρόμοιον τὸ ξυμβαῖνον ὥσπερ εἴ τις ὀλίγω πυρὶ τὸ ἰσχυρότατον ἔψειν ἢ<sup>6</sup> ὅπτῶν ἐπιχειροίη. διὰ τοῦτο δ' ἔοικεν οὐδὲ τὴν ἀγαθὴν χώραν

<sup>1</sup> ego: εὐθύς τὴν aP: εὐθετην U (-ῆν u N).

<sup>2</sup> u aP<sup>c</sup> (-ῆς N): ῥιζῶθη U (-ῆ P<sup>ac</sup>?).

<sup>3</sup> u N aP: χιτῶσι U.

<sup>4</sup> U: γίνηται u.

<sup>5</sup> u: κακοβλαστη U.

<sup>6</sup> ἔψειν ἢ ego: ἐκείνο εἰ U<sup>ar</sup>: ἐκείνο U<sup>r</sup> N aP: κρέας

Wimmer.

growth.

- Legumes on the other hand, with their single strong root, and their impetus of growth at once directed upward, are well suited to spring sowing, since the greater part of their nature is above ground. But bean (as we said)<sup>1</sup> is sown early because of its weakness, to let it get rooted in the fine weather and so withstand the cold<sup>2</sup>; lupine again is sown straight from the threshing floor,<sup>3</sup> since unless it is sown when the ground is still warm it sprouts poorly. The reason is that the plant is by nature refractory to concoction and (so to say) not concocted at all<sup>4</sup>; and the bitter taste shows that a great deal of heat is required. Now if it gets the additional heat from the ground, the seed can be worked up and sprout well; but otherwise it sprouts poorly and what happens is like attempting to boil or roast with too little fire a piece of food that needs a great deal of cooking.<sup>5</sup> For this reason, it appears,

<sup>1</sup> CP 3 24. 3, 4; cf. CP 4 7. 1.

<sup>2</sup> Cf. HP 8 1. 3, cited in note 1 on CP 3 24. 3.

<sup>3</sup> Cf. HP 8 1. 3: "... lupine is also sown early, for we are told to sow it straight from the threshing floor"; HP 8 11. 8: "... for lupine, in spite of its great strength, if not sown straight from the threshing floor, sprouts poorly, as we said ..."

<sup>4</sup> Cf. CP 4 1. 7.

<sup>5</sup> For this *mōlysis* or "half-cooking" cf. CP 2 15. 2 with the notes.

φιλεῖν, ἀλλὰ τὴν ὑφαιμον·<sup>1</sup> εὐθερμαντοτέρα<sup>2</sup> γὰρ αὕτη καὶ οἶον εὐκατεργαστοτέρα. καὶ κρύπτεσθαι <δ'><sup>3</sup> οὐκ ἐθέλει κατὰ βάθους, ἀλλ' ἐπιπολῆς, ὅπως μᾶλλον ἀπολαύη τῆς θερμότητος, καὶ ποτιμώτερος· καὶ μετέωρος ὡς ἐκβλαστάνει καὶ καθήσι<sup>4</sup> τὴν ρίζαν.

7.4 καὶ τὰ μὲν τοιαῦτα σχεδὸν ὡςπερ γεωργικά· τὰ δὲ αὖ τῆς<sup>5</sup> φύσεως, οἶον ὅτι τῶν μὲν χεδροπῶν ἐκ τοῦ αὐτοῦ μέρους ἢ τε ρίζα καὶ ὁ καρπὸς<sup>6</sup> ἐκβλαστάνει, καὶ τὸ μὲν εὐθὺς ἄνω, τὸ δὲ κάτω νεύει καὶ ὀρμᾶ· πυροῦ δὲ καὶ κριθῆς καὶ ὄλως τῶν σιτωδῶν, ἐξ ἑκατέρων τῶν ἄκρων, ἀπὸ μὲν τοῦ παχέος <ῆ> καὶ<sup>7</sup> πρὸς τῷ<sup>8</sup> στάχυϊ προσπέφυκεν, ἡ ρίζα, ἀπὸ [δε]<sup>3</sup> τοῦ λεπτοῦ <δε><sup>3</sup> ὅθεν ὁ ἀθήρ,<sup>9</sup> ὁ καυλός, ὡς ἂν<sup>10</sup> ἑκάτερον ἀνὰ λόγον,<sup>11</sup> τὸ μὲν ἀπὸ

<sup>1</sup> U (cf. HP 8 11. 8): ὑφαιμον Schneider.

<sup>2</sup> U<sup>r</sup> N aP: -τέραι U<sup>ar</sup>.

<sup>3</sup> ego.

<sup>4</sup> Schneider: καθιστησι U.

<sup>5</sup> u: αὐτῆς U.

<sup>6</sup> U: καυλός Itali.

<sup>7</sup> ego (ῆ) Schneider: quod Gaza): καὶ U.

<sup>8</sup> τῷ u N aP: το U.

<sup>9</sup> Gaza (arista), Scaliger: ἀήρ U.

<sup>10</sup> U: ὅν Schneider.

<sup>11</sup> Wimmer: ἀνάλογον U.

it also does not like good soil but prefers sandy,<sup>1</sup> for sandy soil is more easily heated and (so to say) digested.<sup>2</sup> Again, it does not like to be covered deep but to be near the surface,<sup>3</sup> so that it may profit better from the heat, and it is then more palatable; even when the seed fails to hit the ground it sprouts and sends down its root.<sup>4</sup>

Such matters as these belong (one may say) to the art of husbandry. Others belong to the nature of the plants, for instance that in legumes the root and fruiting-stem come out of the same side of the seed, the stem at once turning and moving upwards, the root downwards; whereas in wheat, barley and cereals in general the one part comes from the one extremity, the other from the other: the root from the thick end where the seed is attached to the ear, the stem from the thin end from which rises the awn, each coming from the extremity to which it

7.4

<sup>1</sup> Cf. HP 8 11. 8 (of lupine): "And it seeks by preference sandy and poor soil, and is in general unwilling to grow in tilled ground."

<sup>2</sup> "Working up" or "digestion" involves the application of heat; so what is more easily heated is also more easily digested.

<sup>3</sup> Cf. HP 8 11. 8 (of lupine): "... it does not like to be covered by the ground, which is why it is sown without any ploughing immediately preceding."

<sup>4</sup> Cf. HP 1 7. 3, 8 11. 8, cited in note b on CP 2 17. 7. Thus suspended it gets more heat from the sun.



τοῦ ἄνω, τὸ δὲ ἀπὸ τοῦ κάτω, καὶ γὰρ ἡ ῥίζα καὶ ὁ  
καυλὸς οὕτω.

7.5 τὴν <δ><sup>1</sup> αἰτίαν εὐθὺς ἐν τῇ φύσει ληπτέον·  
ὅτι τὰ μὲν χεδροπά, δίθυρα<sup>2</sup> ὄντα, μίαν τινὰ καὶ

<sup>1</sup> Wimmer: τὴν U N P: καὶ τὴν α (no punctuation pre-  
cedes in the MSS.).

<sup>2</sup> Gaza (*bipartito et compactili . . . corpore* [from *HP* 8 2.  
2]), Itali: αἰθυρα U: ἄθυρα u N<sup>c</sup> (from ἄθύρα) aP.

<sup>1</sup> This is a correction of Aristotle, who did not differen-  
tiate in this matter between leguminous seeds and the  
rest. Cf. Aristotle, *On Youth and Age*, 3 (468 b 18–23): “For  
the generation from the seeds arises in all plants from the  
middle of the seed. For since all seeds are two-valved, they  
cling to the plant at the place where the valves grow  
together, and this is the mid-place between the two parts,  
for the stem and root of plants grow from here, and the  
starting-point is the middle place between the two”; cf. also  
*On the Generation of Animals*, iii. 2 (752 a 18–23): “Things  
are the same way (*sc.* as with eggs) in the seeds of plants;  
for the starting-point of the seed is attached in some cases  
to the twigs, in others to the husks, and in others to the  
pericarpia. This is evident in legumes; for the point where  
the two valves of bean and such seeds are connected is the  
point where the seed is attached, and here is the starting-  
point of the seed.”

With these passages and *CP* 4 7. 4–7 cf. *HP* 8 2. 1–2 (of  
seed-crops):

“Some seeds send both root and leaf from the same  
extremity, but others send the one from the one extremity  
and the other from the other. Now wheat, barley, one-  
seeded wheat and in general all cereals send one from

corresponds, the one from the upper extremity, the  
other from the lower, root and stem having these  
positions in the plant.<sup>1</sup>

The cause is to be found directly in their nature.  
Leguminous seeds, on the one hand, since they are  
two-valved, have (one may say) one and the same

7.5

each extremity, just as (*ὡσπερ* Scaliger: πάντα U) the seeds  
grow on the ear, sending the root from the lower, thick,  
extremity and the shoot from the upper extremity, and the  
product of both becomes a single continuous unit. But  
bean and the other legumes do not do so. Instead they  
send root and stem from the same extremity, where the  
seed is attached to the pod, and where they have a sort of  
starting-point plain to the eye (in some it actually looks  
like a penis, as in bean, chickpea and especially lupine); for  
from this part in the various legumes the root moves down-  
ward and the leaf and stem move upward.

“In this way legumes and cereals differ. But in another  
way they are alike, in that all of them send out the root at  
the place of attachment to the pod or the ear, and not the  
other way round as in some seeds of trees, for instance  
almonds, filberts, acorns and the like. In all seeds the root  
comes out a little earlier than the stem. It happens in  
cereals at least that the shoot first sprouts inside the seed  
itself, and as the shoot grows the seed splits open (for all  
these seeds too are in a way, as in legumes, of two parts,  
legumes being visibly all two-valved and composite),  
whereas the root is sent outside directly. But in legumi-  
nous seeds this (*sc.* the previous sprouting of the shoot  
within the seed, with consequent splitting) does not occur,  
because the valves are separate, although the root comes  
out a little earlier.”

τὴν αὐτὴν <ἀρχὴν><sup>1</sup> ἀμφοῖν ἔχει κατὰ τὸ ἄκρον (ὃ καὶ φαίνεται προσπεφυκὸς ὡς περ ἕξωθεν), ἧ<sup>2</sup> καὶ συνάπτουσι πρὸς τὸν λοβὸν· ἅτε γὰρ ἐναγγειόσπερμα ὄντα ταύτην μὲν ἐξ ἀνάγκης ἔχει, τρέφεται γὰρ ἄλλως οὐκ ἦν· τὴν δέ, ἐκ τοῦ αὐτοῦ<sup>3</sup> μέρους, ὃ δυνατόν,<sup>4</sup> συνεχῆ τ' ἀλλήλοις ὄντα καὶ περιεχόμενα τῷ λοπῷ·<sup>5</sup> τὸ δ' εἶναι τοιαῦτα τῆς οὐσίας.

7.6 ὥστε τούτῳ μὲν εἰκότως ἡ φύσις εἰς ταῦτ' οὐκ ἀρχὰς ἔθηκεν· τῶν δὲ σιτωδῶν, καθ' αὐτά τε πεφυκότων καὶ<sup>6</sup> περιεχομένων, ἔτι δ' ὡς περ εὐθέως πως ὄντων τὴν μορφήν, ἐχώρισεν<sup>7</sup> τὴν ἔκφυσιν, ἀπὸ μιᾶς μὲν ἀρχῆς ἀμφοτέρως ποιήσασα, συν-

<sup>1</sup> Gaza (*initium*), Heinsius.

<sup>2</sup> ἧ u : ἧ U : ἧ N : ὄν aP.

<sup>3</sup> U : *altera . . . parte* Gaza : μὴ ἐκ τοῦ αὐτοῦ Scaliger : ἐκ τοῦ ἄλλου Heinsius : ἐκ τοῦ ἐτέρου Schneider.

<sup>4</sup> ego (*ἀδύνατον* Wimmer) : ὃ δυνατόν U : οὐ δυνατόν u.

<sup>5</sup> ego : λόγωι U : λοβῶι u.

<sup>6</sup> καὶ <μὴ> Schneider.

<sup>7</sup> U<sup>r</sup> from ἐχώρησεν.

<sup>1</sup> That is, root and stem.

<sup>2</sup> That is, at the extremity shared by the two valves.

<sup>3</sup> That is, on the outside of the extremity.

<sup>4</sup> Food, whether from the parent or from the seed's own root, must enter the seed at the same place.

starting-point for both<sup>1</sup> at their extremity<sup>2</sup> (an extremity that is observed to be attached to the valves as if from outside), at the place where the valves connect with the pod. For since legumes have their seeds in a pod, they necessarily have this one of the two starting-points here<sup>3</sup> (for the seed could not otherwise be fed)<sup>4</sup>; and they have the other starting-point on the same side,<sup>5</sup> which it is possible for them to do,<sup>6</sup> since here the seeds have their valves continuous with one another and are enveloped by the skin. That the seeds should have this character belongs to their nature as legumes.<sup>7</sup>

And so in the leguminous seed the nature of the 7.6 plant has understandably put the two starting-points in the same place; whereas in cereal seeds, which grow and are enclosed singly,<sup>8</sup> and which furthermore are (as it were) straight in shape, the nature of the plant divided the place of emergence, letting both emergences arise from a starting-point

<sup>5</sup> That is, at the same end of the seed as the connexion with the pod, but inside the skin.

<sup>6</sup> This location is not dictated by necessity (as with the starting-point of the root). It is a possible location since the skin protects the germ of the shoot and the germ itself is within easy distance of the root.

<sup>7</sup> There is therefore no need to explore why legumes have two-valved seeds contained in pods.

<sup>8</sup> That is, they do not grow as two valves enclosed in the same skin.

εχοῦς δέ τινος οὔσης καὶ διηκούσης<sup>1</sup> ἐφ' ἑκάτερον τῶν ἄκρων, ὥσπερ<sup>2</sup> καὶ κατὰ τὴν βλάστησιν φανερὰ διατείνουσα κατὰ τὴν ἐντομήν. τοῦ μὲν οὖν μὴ ὁμοίως ἔχειν ταύτην ὑποληπτέον τὴν αἰτίαν.

7.7 ἐκεῖνο δ' ὁμοίως ἐν ἀμφοῖν ἔστιν, ὥστε τὴν τῆς ρίζης φύσιν<sup>3</sup> ἀπὸ τοῦ αὐτοῦ καὶ<sup>4</sup> τὴν ἐν τῷ στάχυϊ καὶ τῷ λοβῷ γίνεσθαι πρόσφυσιν, ἀφ' ὧν<sup>5</sup> ἀμφοτέρων αἱ τροφαί, τοῦ μὲν καλάμου<sup>6</sup> καὶ τῆς πρώτης βλάστης ἢ ρίζα, τῶν δὲ καρπῶν ἢ πρόσφυσιν ἢ τε πρὸς τὸν λοβὸν καὶ πρὸς τὸν στάχυον. (σκεπτέον<sup>7</sup> δὲ <τὸ><sup>8</sup> τῶν καρυωδῶν καὶ βελανωδῶν.)

καὶ τὰ μὲν περὶ τὴν ἔκφυσιν οὕτως ἂν τις διέλοι.

8.1 τὴν δὲ ταχυβλαστίαν τοῖς χεδροποιῖς ἀποδοίη

<sup>1</sup> ἀμφοτέρας . . . διηκούσης U : ἀμφοτέρων ποιήσασα, συνεχῆ δὲ τὰ οὔσαν καὶ διήκουσαν Schneider.

<sup>2</sup> U : ἤπερ Gaza, Schneider.

<sup>3</sup> U : ἐκφυσιν Heinsius (*exortus* Gaza).

<sup>4</sup> U : κατὰ Schneider.

<sup>5</sup> U : οὖ Schneider.

<sup>6</sup> Gaza, Itali : βαλσάμου U.

<sup>7</sup> σκεπτέον ego (. . . Πίπτοι Schneider) : πίπτοι U.

<sup>8</sup> ego.

that is single, it is true, but that is on the other hand a continuous one, and runs through to each of the two extremities, just as at the time of sprouting the starting-point can be seen extending along the groove.<sup>1</sup> To conclude: we must suppose that the reason for the difference in the place of emergence is this.

But in both the cereal and the leguminous seed 7.7 the following feature is equally present: the root-part is produced from the same side as that where the attachment to the ear and to the pod is formed, and it is these places that are the sources of the food supply for both, the root being the source for the haulm of the cereal and the first shoot of the legume, the attachment to the pod and to the ear being the source for the fruit. (We must investigate the case of nuts and acorns.)<sup>2</sup>

These are the distinctions one would make in the matter of growth from the seed.

*Seed-Crops: Relative Speed of Sprouting and Maturing in Legumes and Cereals*

One would assign the rapid sprouting of 8.1

<sup>1</sup> It can be seen because by then the seed has split open.

<sup>2</sup> Cf. HP 8 2. 2, cited in note 1 on CP 4 7. 4.

τις<sup>1</sup> διὰ τὴν ὥραν, ὅτι μαλακωτέρα καὶ γονιμωτέρα τῆς χειμερινῆς· ἀλλ' ἀμφοῖν τούτων αἰτιάσαιτο τὴν ἀσθένειαν, δι' ἣν καὶ σπείρονται πρὸς τὸ ἔαρ, καὶ διαβλασάνουσιν θάττον· τὸ γὰρ ἀσθενέστερον (ὥσπερ πολλάκις ἐλέγομεν) εὐπαθέστερον· τάχα δὲ καὶ τῆς πολυκαρπίας (πολυχούστερα γὰρ δὴ τὰ χεδροπά) τὴν αὐτὴν ἢ παραπλησίαν, καὶ τοῦ θάττον δὲ ἐκτελεοῦν, καὶ μὴ καρπίζεσθαι τὴν γῆν, ἀλλὰ νειὸν<sup>2</sup> ποιεῖν· ἅπαντα γὰρ ταῦτα ἢ τὰ τοιαῦτα συμβαίνει σχεδὸν (ὥσθ' ἀπλῶς εἰπεῖν) διὰ τὴν ἀσθένειαν. καὶ γὰρ ἐκθρέψαι καὶ 8.2  
τελειῶσαι ῥάδιον<sup>3</sup> τὸ ἀσθενέστερον, ὡς ἅμα καὶ πλείον<sup>4</sup> καὶ τὴν γῆν ἤττον καρπίζεσθαι, καὶ τὴν ἔκφυσι δὲ τὴν πρώτην ῥᾶον<sup>5</sup> καὶ θάττω ποιεῖ-

<sup>1</sup> τις <ἀν> Wimmer.

<sup>2</sup> N<sup>c</sup> (ἀλλὰ in an erasure) aP: ἀλλ' ἀνειον U.

<sup>3</sup> U: ῥᾶον Gaza (*facilius*), Wimmer.

<sup>4</sup> U: *ut et fructificetur uberius* Gaza: ὥσθ' ἅμα καὶ πλείον (φέρειν Schneider) φορεῖν Itali: ὥστε καὶ πολυκαρπεῖν Wimmer.

<sup>5</sup> U<sup>c</sup> (ῥαίον U<sup>ac</sup>: ῥᾶον N): ῥάω aP.

<sup>1</sup> Cf. HP 8 1. 5 (wheat and barley come up on the seventh day, pulses on the fourth or fifth.)

<sup>2</sup> CP 2 11. 6; 4 1. 3; 4 3. 6; 4 6. 2.

<sup>3</sup> Cf. Aristotle, *On the Generation of Animals*, i. 18 (726 a 9–11) (some things have much seed and are prolific

legumes<sup>1</sup> to the season, because it is milder and more procreative than winter. But one would give their weakness as the reason for both the season and the speed, since it is owing to their weakness that they are sown towards spring and that they come up sooner, for the weaker plant (as we have been saying)<sup>2</sup> is the more easily influenced. Perhaps one would give the same reason or one close to it for their abundant crop<sup>3</sup> as well (legumes having a greater yield than cereals)<sup>4</sup> and for their maturing it sooner, and not exhausting the soil but renewing it<sup>5</sup>; for all these things (or things of the sort) result (one may say, to put it in a word) from 8.2  
weakness. For it is easy both to bring up and to mature the weaker seed, which leads to a greater yield accompanied by less exhaustion of the soil and also to easier and quicker production of the first emergence from the seed (except when a seed is

(πολύχοα) because of power, and some because of lack of power). The word πολύχους ("prolific," literally "with many choes; a chous contained about six pints) implies seed-crops; both the seed sown and the crop harvested consisted of "seeds" which could be measured and compared.

<sup>4</sup> Cf. HP 8 3. 4: "In general legumes have more fruit and a greater yield, but the summer seeds millet and sesame yield still more than these . . ."

<sup>5</sup> Cf. HP 8 7. 2: "Peculiar to chickpea compared to the other legumes is . . . that it exhausts the soil and does not renew it . . . Of the rest the best at fertilizing the soil is bean . . ."

σθαι (πλὴν<sup>1</sup> εἴ τι κωλύεται διὰ τὴν ἰσχὺν τοῦ περιέχοντος, ὥσπερ ὁ κύαμος· αἰτία γὰρ τούτω τῆς δυσφυΐας ἢ τοῦ κελύφους παχύτητος, ἐὰν δὲ καὶ ἐφύση<sup>2</sup> σπαρέντι, δυσφυέστερον ἔτι, καθάπερ ἔδαφιζομένης τῆς γῆς).

8.3 ἐν δὲ τοῖς σιτηροῖς καὶ ταῦθ' ὁμολογούμενα πρὸς τε τὴν χρονιότητα τῆς πέψεως καὶ πρὸς τὸν καρπισμὸν τῆς γῆς· οἶον ἢ τε πολυρριζία<sup>3</sup> καὶ ἢ γλισχροτήτος τῶν καρπῶν· βραδέως γὰρ τὰ γλίσχρα καὶ καθαρὰ καὶ ἐν τοῖς δένδροις πεπαίνεται, διὸ καὶ πυροὶ κριθῶν ὀψιαίτεροι καὶ ὀλιγοχούστεροι.<sup>4</sup> καὶ αἱ ρίζαι δὲ τῶν σιτηρῶν,<sup>5</sup> πολλὰ καὶ κατὰ βάθος ἰοῦσαι,<sup>6</sup> καρπίζονται μᾶλλον, οὐχ ὥσπερ τῶν γε<sup>7</sup> χεδροπῶν<sup>8</sup> ὃ τε καρπὸς γεωδέ-

<sup>1</sup> u : τὴν U.

<sup>2</sup> Gaza (*impluerit*), Itali : ἐκφυσθήσῃ U.

<sup>3</sup> aP (πολυρριζία u N) : πολυρία U.

<sup>4</sup> aP : ὀλιγοχουστότεροι U (δ- u N).

<sup>5</sup> U<sup>cc</sup> : δένδρων U<sup>ac</sup> (now crossed out).

<sup>6</sup> Schneider : οἰσαι U.

<sup>7</sup> aP : τε U N.

<sup>8</sup> χεδροπῶν <ὦν> Schneider.

<sup>1</sup> Cf. *HP* 8 1. 5 (of bean): "... for it is the slowest to come up of all legumes, and if there is fairly prolonged rain after it is sown, it is very slow indeed."

prevented from coming out by the strength of its envelope, as bean, for the reason for the slowness of bean to grow is the thickness of its skin; and if in addition there is rain after it is sown, bean is even slower to grow,<sup>1</sup> since the soil is as it were tamped down).

In cereals on the other hand there are these further reasons<sup>2</sup> that are agreed to make for their tardiness of concoction and their exhaustion of the soil<sup>3</sup>: their many roots and the viscosity of their fruit. For even in trees it takes long to ripen fruit that is to be viscous and rid of earthy admixture<sup>4</sup> (and this is why wheat comes up later than barley<sup>5</sup> 8.3 and has a smaller yield). So too in cereals the roots are numerous and go deep and thus do more to exhaust the soil, unlike legumes with their earthier

<sup>2</sup> In addition to relative strength compared to legumes.

<sup>3</sup> Cf. *HP* 8 9. 1-3: "Wheat and barley exhaust the soil most ... Of the plants resembling wheat or barley the strongest and most exhausting to the soil is rice-wheat, since it is many-rooted and deep-rooted, and many-haulmed ... , and of the rest oats, for oats too are many-rooted and many-haulmed ... Wild oats too exhaust the soil greatly and are many-rooted and many-haulmed ..."

<sup>4</sup> Cf. *CP* 1 6. 2 and 4 8. 3 (here the fruit of legumes is called earthier than that of cereals).

<sup>5</sup> Cf. *HP* 8 1. 5: "... wheat and barley come up on about the seventh day, barley being a bit ahead ..."

στερος καὶ ἡ ῥίζα μία καὶ ἐπιπολῆς <καὶ><sup>1</sup> ἡ σπορὰ μανῆ. πάντα δὲ ταῦτα συνεργεῖ καὶ πρὸς πλῆθος καρποῦ, καὶ πρὸς κουφότητα τῆς γῆς καὶ τὸ <μῆ><sup>2</sup> ὁμοίως καρπίζεσθαι, <καὶ><sup>1</sup> πρὸς ταχύτητα πέψεως. ἅπασα γὰρ ἡ δύναμις ἄνω φερομένη, καὶ οὐκ ἀντισπώσης τῆς ῥίζης, πλῆθος ἀποδίδωσι, καὶ συνεργούντος τοῦ ἀέρος ἐκπέττει ῥαδίως. ἐπεὶ ὦν γε<sup>3</sup> πλείων ἡ ῥίζα καὶ κατὰ βάθους καὶ οἱ καρποὶ<sup>4</sup> ξυλώδεις, ταχὺ δὲ<sup>5</sup> ἔκκαρπίζεται τὰ ἐδάφη, καθάπερ ὁ ἐρέβινθος· διὸ καὶ μόνον<sup>6</sup> οὐ<sup>7</sup> ποιεῖ νέον,<sup>8</sup> οὐδ' ἐστὶ τῆς τυχοῦσης χώρας,<sup>9</sup> ἀλλ' ἀγαθῆς.

8.4 ἄλογον δὲ ἐπὶ τούτου φαίνεται τὸ ταχὺ τελειοῦσθαι, εἴπερ ἐν τετταράκοντα ἡμέραις ἢ μικρῶν πλείοσω τέλειος. αἰτίαν δὲ ἂν τις ὑπολάβοι τῆν

<sup>1</sup> Gaza. <sup>2</sup> Itali (after Gaza).

<sup>3</sup> Scaliger: τε U. <sup>4</sup> U: καυλοὶ Heinsius.

<sup>5</sup> U: ταχὺ δὴ Schneider: τάχιστα Wimmer.

<sup>6</sup> U: μόνος Heinsius. <sup>7</sup> U<sup>css</sup>: U<sup>t</sup> omits.

<sup>8</sup> Schneider (νεὸν Wimmer): νέον U.

<sup>9</sup> Gaza, Itali: ὄρας U.

<sup>1</sup> Cf. HP 8 9. 3: "There is a difference between lightness for the soil and lightness for human digestion. For some are light for the former but heavy for the latter, as legumes and millet . . ."

<sup>2</sup> Legumes are sown in spring.

fruit, their single and shallow root, and their thinly sown seed, all this contributing to their abundant fruit, to their being light for the soil<sup>1</sup> and not exhausting it so much, and to the rapidity of their concoction. For their whole power is directed upward, and there is no counter-pull on the part of the root; this gives us the greater yield and (with the help of the weather)<sup>2</sup> the easy completion of concoction. Indeed where plants have a larger and deeper root and woody fruit they soon exhaust a soil, as chickpea does,<sup>3</sup> which is why it is the only legume that does not renew the soil<sup>4</sup> and needs no ordinary land, but the best.<sup>5</sup>

In the case of this legume its rapid maturing 8.4 (inasmuch as it matures in forty days<sup>6</sup> or slightly more) looks unreasonable.<sup>7</sup> One would take the

<sup>3</sup> Cf. HP 8 9. 1: "Of legumes chickpea most exhausts the soil, although it remains the shortest time in the ground . . ."

<sup>4</sup> Cf. HP 8 7. 2: "Peculiar to chickpea compared to the rest of the legumes is . . . its not renewing the soil at all, since it exhausts it . . ."

<sup>5</sup> Cf. HP 8 7. 2 (of chickpea): "And in general no ordinary soil can support it, but one with black earth and that is fat is needed."

<sup>6</sup> Cf. HP 8 2. 6: "... chickpea matures in the smallest number of days, inasmuch as (according to some) it matures in forty days in all from the time of sowing. In any case it evidently matures soonest."

<sup>7</sup> The larger and deeper root should exert a counter-pull and prevent the directing of the whole power upwards and make for slower maturing.

ισχύν, ἣ<sup>1</sup> δύναται τῶν τε ἄλλων κρατεῖν καὶ πρὸς τοῦτο<sup>2</sup> διαρκεῖν, εἶπερ καὶ ὕδατος ἐλαχίστου δεῖται, πρὸς τὸ διαβλαστεῖν<sup>3</sup> μόνον, εἶτα<sup>4</sup> αὐτὸς αὐτὸν ἐκτρέφει, εἰ μὴ ἄρα τι καὶ ἡ ἄλμη πρὸς τὴν τελείωσιν συμβάλλεται, καταξηραίνουσα καὶ ἐξικμάζουσα τὴν ὑγρότητα τὴν πλείω τῆς συμμέτρου. φαίνεται δὲ συνεργεῖν πως τῇ γενέσει, καὶ οὐκείων εἶναι· σημεῖον δ', ὅτι καὶ οἱ πρὸς τῇ θαλάττῃ βελτίους γίνονται, καὶ ὅτι καταπλυθείσης τῆς ἄλμης ἀπόλλυται καὶ ἐκζωοῦται· δι' ἣν δ' αἰτίαν μόνον τούτῳ,<sup>5</sup> σκεπτέον, εἰ μὴ ἄρα τῆς οὐσίας.

ἀλλὰ δὴ τούτων πέρι<sup>6</sup> τοιαῦταί τινες αἰτίαι.

8.5 μόνα δ' ἀπὸ τῶν ριζῶν ἀποφύεται τῷ ὕστερον

<sup>1</sup> Wimmer: εἰ U: ἣ u: N omits: δι' ἣν aP.

<sup>2</sup> U N aP: τούτω u. <sup>3</sup> U<sup>c</sup>: -στῶν U<sup>ac</sup>.

<sup>4</sup> aP: εἶτε U N. <sup>5</sup> τούτω U: τοῦτο u. <sup>6</sup> u: περ U.

<sup>1</sup> The plant's strength would make it attract more food and lead to the presence of excess fluid.

<sup>2</sup> Cf. CP 3 22. 3; 3 24. 3; HP 8 6. 5: "Rain is harmless to pulses except chickpea; for when the brine is washed off these perish by getting gangrenous and eaten up by caterpillars . . ."

<sup>3</sup> Those treated in CP 4 8. 1-4.

<sup>4</sup> Cf. HP 8 7. 5: "Wheat and barley also grow from the

reason to be its strength, whereby it is able both to prevail over most circumstances and reach maturity by managing without the rest, inasmuch as it also needs very little water, just enough to let it come up, and then supports itself. Unless the brine too contributes something to the maturing by drying out and extracting the fluid that is in excess of the right amount.<sup>1</sup> And the brine does appear to contribute in a way to the production of the plant and to belong to it, the proof being that the plants grown by the sea turn out superior and that when the brine is washed off the plant perishes and engenders worms.<sup>2</sup> (The reason why brine does this in chickpea alone among legumes must be investigated, unless the brine is part of the plant's nature.)

Such are the reasons for these matters.<sup>3</sup>

*Grains: A Second Growth*<sup>4</sup>

The only grains that come up from the root in the 8.5

roots in many districts in the following year; and they also grow in the same year [reading *αὐτοερέις* with the CP; U<sup>c</sup> has *αὐτο|ετῆς* (ο from ω)] from the plants cut for fodder, another haulm springing up alongside. But the ear of such plants is undeveloped and small. . . . They also grow in the following year from plants roughly treated and trodden down so that nothing (so to speak) can be seen, as when an army has passed through. Here too the ears (which they call 'lamb's') are small. But no legume can do the like or do it to the same extent."

ἔτει πυρὸς καὶ κριθῆ, καὶ αὐτοετείς δὲ καὶ ἀπὸ τῶν εἰς κράστιν καρέντων,<sup>1</sup> ἑτέρου καλάμου παραβλασάνοντος. αἴτιον δ' ὅτι μόνοις ὕπεστι<sup>2</sup> πλήθος ριζῶν καὶ δύναμις, τὰ χεδροπὰ δὲ μονόριζα καὶ ξυλώδη καὶ ἐπιπολῆς. ὡσαύτως δὲ καὶ ἐπὶ τῶν καταπατουμένων ὑπὸ τῶν στρατοπέδων ὥστε μηδὲν εἶναι δῆλον. ἐξ ἀπάντων δὲ οἱ στάχυες μικροὶ καὶ ἀτελεῖς, ἅτε παλιμβλαστεῖς ὄντες.

9.1 περὶ δὲ τοῦ εἶναι βαρύτερα<sup>3</sup> τὰ χεδροπὰ πρὸς τὰς τροφὰς ἢ τὸν σίτον ἡμῶν, καίπερ<sup>4</sup> ἐλάττω χρόνον ἐν τῇ γῇ γινόμενα (δοκεῖ δὲ καὶ πρὸς κουφότητα διαφέρειν τοῦτο, διὸ καὶ τῶν πυρῶν οἱ τρίμηνοι κουφότατοι, καὶ τῶν κριθῶν ὁμοίως, ὡς ἐλάττονος ἐνυπάρχοντος τοῦ γεώδους διὰ τὴν βραχύτητα<sup>5</sup> τοῦ χρόνου), τοῖς δὲ ἄλλοις ζώοις καὶ προσφιλεῖ, καὶ ἄλυπα ταῦτ' ἐκείνοις <ᾶ> καὶ<sup>6</sup>

<sup>1</sup> ego (cf. κειρομένων HP 8 7. 5) : σπαρέντων U.

<sup>2</sup> U<sup>r</sup> P : ὑπεστη U<sup>ar</sup> : ὑπέστη N a.

<sup>3</sup> Schneider (*difficiliora* Gaza) : βραδύτερα U.

<sup>4</sup> u : καὶ παρ U.

<sup>5</sup> Gaza (*brevitatem*), Basle ed. of 1541 : βραδυτητα U.

<sup>6</sup> ego (<δὲ> καὶ Schneider : εἶναι ᾶ Wimmer) : καὶ U.

<sup>1</sup> Cf. HP 8 2. 3: (all legumes have a single, woody root).

following year are wheat and barley: these also come up in the same year from plants cut for fodder, another haulm growing up alongside the stub. The reason is that these alone have a basis of roots possessing numbers and power, whereas in legumes the root is single, woody<sup>1</sup> and shallow. So too with the wheat and barley trodden down by armies so that no trace of the plants can be seen. But in all these cases the new ears are small and undeveloped, since they are a second growth.

*Grains: Comparative Lightness or Heaviness of Cereals and Legumes as Food for Man and Animals: Difficulties*

There is the difficulty that legumes are heavier 9.1 as food for man than cereals, although legumes spend a shorter time in the ground (this spending of a shorter time in the ground being considered to help greatly in also<sup>2</sup> making a plant easy to digest: hence of wheat the three-months variety is the easiest to digest and so too with barley, there being a smaller amount of earthy matter in them because of the short time spent in the ground), whereas animals actually find legumes a pleasure to digest, and food even more indigestible causes them no

<sup>2</sup> As well as in keeping it from exhausting the soil: cf. HP 8 9. 1. (of legumes chickpea exhausts the ground most, although it remains in the ground the shortest time).



χαλεπώτατα μᾶλλον ·<sup>1</sup> καὶ πάλιν ἃ ἡμῖν εὐκατέργαστα, ταῦτα ἐκείνοις χαλεπώτατα, καίπερ ἰσχυροτέροις οὖσιν (πολλὰ γοῶν ἀπόλλυται χορτασθέντα πυρῶν, καίτοι τὸ γεῶδες ἐλάχιστον ἔχουσιν).

- 9.2 πρὸς δὴ ταύτας τὰς ἀπορίας καὶ εἴ τις ἄλλη παραπλησία ταύταις καθόλου μὲν καὶ κοινὴν τήνδε λαβεῖν χρὴ τὴν ἀρχήν, ὡς οὐ πᾶσι ταῦτα<sup>2</sup> πρόσφορα κατὰ τὰς τροφάς, ἀλλ' ἐκάστοις κατὰ τὰς ἰδίας φύσεις. ὅπερ ἐν πολλοῖς μὲν φανερόν, ἐκ πλείστης δ' ἀποφάσεως (ὡς εἰπεῖν) τῶν γε γνωρίμων τὰ<sup>3</sup> περὶ τὰς ἐλάφους αἱ τοὺς ἔχεις ἐσθίουσιν, ὑφ' ὧν τὰ ἄλλα θνήσκουσιν, πολὺ μείζω καὶ ἰσχυρότερα τὴν φύσιν ὄντα · καὶ ἐπ' ἀνθρώπων<sup>4</sup> δὲ τό γε τοιοῦτόν ἐστιν ὥστ' ἀναιρεῖσθαι ταῖς πληγαῖς ὑφ' ὧν οὐθὲν ἄλλοι<sup>5</sup> πάσχουσιν, καθάπερ

<sup>1</sup> U : ἡμῖν Wimmer.

<sup>2</sup> ταῦτα u : ταῦτα U N aP.

<sup>3</sup> [τὰ] Schneider : τὸ Wimmer.

<sup>4</sup> ego : ἀλλῶν U.

<sup>5</sup> ego : ἄνθρωποι U.

<sup>1</sup> Theophrastus apparently has in mind the wheat at Pissangae, for which cf. *HP* 8 4. 5; *CP* 4 9. 5; 4 11. 6.

<sup>2</sup> Cf. Nicander, *Theriaca* 139–144; Oppian, *Cyn.* ii. 233,

discomfort, whereas on the other hand food that we digest easily is very indigestible for them, although they are stronger than we (thus many animals die of eating their fill of wheat,<sup>1</sup> which nevertheless has the smallest amount of earthiness).

### Solution

To meet these difficulties and the like we must 9.2 begin at first with a general principle applying to all cases: that the same things taken as food are not wholesome for all animals, but suit the different kinds according to their distinctive natures. This can be seen in many, but the most widely asserted instances (one may say), at least concerning well-known animals, are those of deer eating vipers,<sup>2</sup> which are fatal to other animals much superior to deer in natural size and strength. With man too we have instances of some persons killed by the sting of animals not at all fatal to others, as the persons

*Hal.* ii. 209; Aelian, *On the Nature of Animals* ii. 9; *Geoponica* xix. 5. 3: "The deer, by drawing its breath up and in, kills the serpent and draws it to itself"; Lucretius, vi. 765–66; Martial, xii. 29. 5; Pliny, *N.H.* 28. 149: "Everyone knows that deer are fatal to serpents; thus they pull any serpents that are about from their holes and chew them ..." The story rests on a popular etymology of *elaphos* ("deer") from *helein* ("capture") and *óphis* ("serpent"): cf. Plutarch, *The Cleverness of Animals*, chap. xxiv (976 D); *Etym. Magnum* 326. 2; *Etym. Gud.* 179. 39.

[οἱ ὄφεις]<sup>1</sup> οἱ<sup>2</sup> ὑπὸ τῶν σκορπίων.

9.3 ὑποκειμένου δ' οὖν τούτου, καὶ τῶν ἄλλων γεω-  
δεστέρα τροφή χρωμένων, οὐκ ἄλογον ἐκείνην μάλ-  
λον αὐτοῖς ἀρμόττειν, τὴν <δὲ><sup>3</sup> ἀλλοτριωτέραν  
εἶναι καὶ ἀπρόσφορον, καὶ διὰ τὴν γλυκύτητα καὶ  
τὴν ἡδονὴν πλείω προσενεγκαμένων βήγγυσθαι.

τοῦτο μὲν οὖν καθόλου καὶ κοινόν.

ἴδιον δ' ὅτι καὶ συμβαίνει τὰς κοιλίας ἐκπνευ-  
ματοῦσθαι, ἣ πᾶσιν ἢ τοῖς ἔχουσιν ἐχίνον · φυσῶ-  
δες γὰρ καὶ οὐκ εὐκατέργαστον ὁ πυρὸς ὠμὸς ὢν,  
ἔτι δ' ἤττον τὸ ἄχυρον. μέγα δὲ καὶ τὸ ἀσύνηθες  
εἶναι · τὰ γὰρ ξένα, κἂν ἦ κοῦφα, διαταράττει  
πλήθος λαμβάνοντα.

9.4 διὰ δὴ ταύτας τὰς αἰτίας (ὡς ἀπλῶς εἰπεῖν)<sup>4</sup>  
οὐκ ἀλόγως μὲν ἔχει, δοκεῖ δὲ τῇ παραλλαγῇ.

ὡς δ' ἀπλῶς<sup>5</sup> εἰπεῖν τύπῳ,<sup>6</sup> πρὸς βαρύτητα  
καὶ κουφότητα τροφῆς καὶ ἡμῖν καὶ τοῖς ἄλλοις

<sup>1</sup> ego. <sup>2</sup> U : u erases.

<sup>3</sup> Basle ed. of 1541 : τὴν <δὲ καθαρὰν> Schneider (*purus autem ille Gaza*) : ταύτην δ' Wimmer.

<sup>4</sup> [ὡς ἀπλῶς εἰπεῖν] Schneider.

<sup>5</sup> [ἀπλῶς] Wimmer. <sup>6</sup> <καὶ ἐν> τύπῳ Schneider.

<sup>1</sup> Cf. Aristotle, frag. 605 (ed. Rose<sup>3</sup>): "Aristotle says in his *Collection of Foreign Observances* that at Latmos in

killed by the scorpions.<sup>1</sup>

At all events when this principle is accepted, and 9.3  
when we add that the brutes use earthier food than  
ours, the inference is not unreasonable: that food of  
theirs is the better suited to them; whereas this food  
of ours is too foreign to their nature and not whole-  
some, and when they are tempted by its sweetness  
and the pleasure of eating to consume too much of it,  
they burst.

This point, then, is general and of common appli-  
cation.

Of specific application to the case in hand is the  
following: the digestive tract gets filled with gas  
either in all the brutes or those that possess the  
third stomach of ruminants, since wheat taken raw  
is flatulent and not easy to digest, and the bran still  
less digestible. The unfamiliarity of the food is also  
important: strange foods, even when light on the  
stomach, are upsetting in large quantities.

For these reasons, then, broadly speaking, the 9.4  
difference is not unreasonable, although it is taken  
to be so owing to the discrepancy in strength of the  
animals involved.

#### *Light and Heavy Grains Themselves*

To put it broadly in rough outline, the differences  
in heaviness and lightness both for us and for the

Caria there are scorpions that do no great harm when they  
sting a stranger, but drive a native to his death."

τῆς καὶ φύσεως ἐκάστης οἰκείας,<sup>1</sup> αἱ χώραι καὶ ὁ ἄηρ ποιεῖ τὰς διαφοράς· τὰ μὲν γὰρ ἐκ τῶν εὐείλων καὶ εὐπνων καὶ λεπτογειῶν κουφότατα, τὰ δ' ἐκ τῶν ψυχρῶν καὶ ἐπόμεβρων βαρύτερα διὰ τὸ πλείω τροφήν καὶ ἰσχυροτέραν ἔχειν.

9.5 καὶ διὰ τοῦτο τοῦ μὲν ἄλλου πυροῦ δοκεῖ τοῦ Ἀθήναζε καταπλέοντος ὁ Σικελικὸς ἰσχυρότατος εἶναι, τούτου δὲ ἔτι βαρύτερος<sup>2</sup> μᾶλλον ὁ Βοιωτικὸς (ὡς περ ἐν ταῖς ἱστορίαις εἴρηται)· καὶ γὰρ ἡ χώρα πείρα καὶ ὁ ἄηρ ψυχρὸς, καὶ τὰ ἄλλα δὲ τὰ τῶν καρπῶν παραπλησίως ἔχει τῇ βαρύτητι. ἐν δὲ τοῖς Πισσάγγαις<sup>3</sup> ὁ διαρρηγνύων (ὃν εἴπαμεν)

<sup>1</sup> ego (*cuiusque naturae* Gaza : τῆς καὶ φύσει ἐκάστων οἰκείας Schneider : τῆς κατὰ φύσιν ἐκάστοις οἰκείας Wimmer) : τοῖς καὶ φύσεως ἐκάστης οἰκειοῦς U : τοῖς καὶ φύσεως ἐκάστης οἰκειοῦς u.

<sup>2</sup> aP : βραδύτερος UN.

<sup>3</sup> ego (U has ταῖς ἐπισυνάγγαις at CP 4 11. 6, τοῖς πισσάτοις at HP 8 4. 5) : τοῖς πιεσάγγαις U.

<sup>1</sup> Cf. HP 8 4. 5: "... but the Sicilian is heavier than the rest of the wheat imported into Greece, and the Boeotian heavier still. They cite as proof the athletes who can barely consume a choenix and a half in Boeotia, who easily consume two choenices and a half when they come to

other animals of the food that is suited to the various natures is caused by the country and the air: the produce of sunny and well-ventilated countries with thin soil is the lightest, whereas that of cold and rainy countries is heavier because the grain there has more plentiful and powerful food.

This moreover is why Sicilian wheat is said to be the strongest of all the wheat brought to Athens by sea, whereas the Boeotian is held to be of a still heavier character (as was said in the History),<sup>1</sup> for the land is fat and the climate cold, and the other produce is similarly heavy; and at Pissangae<sup>2</sup> is found the wheat we mentioned<sup>3</sup> that causes burst-

Athens . . . Now the cause of all this lies in the country and the climate."

<sup>2</sup> The name appears as τοῖς Πισσόγγους (a place or people not far from Pessinus, with which the name appears to be related) in a letter of Eumenes II of 164-163 B.C. (W. Dittenberger, *Orientalis Graeci Inscriptiones Selectae* vol. I [Leipzig, 1903], no. 315 A 6). Alexander's army must have traversed the district on the way to Gordium in 334 B.C.

<sup>3</sup> CP 4 9. 1; 4 9. 3. Cf. HP 8 4. 5 (continuing the citation in note 1): "Indeed in Asia not far from Bactra they say that in a certain district the grain is so big that it reaches the size of an olive pit, and that in the district of the so-called Pissati [read Pissangae] it is so strong that if an animal (reading τ[ι]ς) took much it burst, and that this happened to a good number of the Macedonians as well." Cf. CP 4 11. 6.

ὑπερβάλλων δῆλον ὅτι τῇ βαρύτητι. ὁ δὲ Ποντικὸς κουφότατος καὶ σκληρότατος, καίπερ ψυχροῦ τοῦ ἀέρος ὄντος, ὅτι καὶ τὰ σπέρματα καὶ τὰ ἐδάφη κουφότερα, καὶ ἡ χιῶν συνεκπέττει μᾶλλον.

9.6 ὅτι δὲ καὶ τὰ σπέρματα ῥοπήν οὐ μικρὰν ἔχει φανερόν ἐκ τῶν τριμήνων καὶ εἴ τινες ἐν ἐλάττωι χρόνῳ τελειοῦνται τούτου· οὐ πολὺ γὰρ τοῦ γεώδους ἔλκοντες, ἀλλὰ κουφότερα τροφή χρώμενοι, καὶ κουφότεραν ποιοῦσιν καὶ τὴν προσφορὰν. ἔοικε δὲ καὶ ἡ ὥρα τι συμβάλλεσθαι,<sup>1</sup> πρὸς τῷ<sup>2</sup> μὴ χρονίζειν, οἷον γὰρ εἰς ὀργῶσαν πίπτειν<sup>3</sup> τὴν γῆν, καὶ παραπλήσιον τὸ συμβαῖνον ὥσπερ τὰ<sup>4</sup> ἐπὶ τὸ ζέον ἐμβαλλόμενα τῶν ἐψομένων· οὐδεμίαν γὰρ οὐδὲ κακείνα λαμβάνει μάλισιν.<sup>5</sup> εἰ δὲ τινες τῶν ὀλιγοχρονίων<sup>6</sup> τούτων βαρεῖς, ὥσπερ

<sup>1</sup> N aP: -άλε- U.

<sup>2</sup> ego: το U.

<sup>3</sup> U: -ει Wimmer.

<sup>4</sup> u: το U.

<sup>5</sup> U: μόλυσιν u aP: μόλυσιν N. <sup>6</sup> ὀλιγογοχρονίων U.

<sup>1</sup> Cf. HP 8 4. 5: "Now the lightest wheat on the whole is the Pontic . . . Odd and in conflict with the lightness of three-months wheat is what happens with Pontic wheats, their hard varieties being spring wheats, their soft, winter wheats, since the soft is much superior in lightness to the hard."

ing, which is evidently heavy to excess. On the other hand the Pontic is the lightest and hardest<sup>1</sup> of wheat, although the climate there is cold, because both the seed<sup>2</sup> and the soil are lighter and the snow helps to bring about better concoction.

That the grains themselves too play no small 9.6 part is evident from three-months wheat<sup>3</sup> and the varieties that mature even sooner<sup>4</sup>; since they do not attract much earthy substance, but use lighter food, they also make lighter work of consumption. The season<sup>5</sup> too would appear to contribute something, as well as their not tarrying in the ground, since they appear to be sown in the earth when it is (so to say) in heat, and what occurs is like cooking food by immersion in boiling water, for the grains too undergo no half-cooking.<sup>6</sup> But if some of these rapid-growing varieties are heavy, as they say of the

<sup>2</sup> That is, the Pontic variety of wheat.

<sup>3</sup> Cf. HP 8 4. 4: "There are many three-months wheats and these are everywhere light."

<sup>4</sup> Cf. HP 8 4. 4: "There are also two-months wheats . . . ; these are . . . light to digest and pleasant to eat."

<sup>5</sup> Rapidly maturing wheat was sown in spring; the later (and heavier) varieties were sown at the beginning of winter in early November.

<sup>6</sup> That is, imperfect boiling, which makes them sodden and raw. Such imperfect boiling is a form of lack of concoction: cf. Aristotle, *On the Generation of Animals*, iv. 7 (776 a 7-8); *Meteorologica*, iv. 3 (381 a 12).

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φασίιν τοὺς περὶ Αἴνον,<sup>1</sup> ἐνταῦθα τοῦ σπέρματος  
τὴν φύσιν αὐτοῦ κατάλοιπον αἰτιᾶσθαι.

καὶ περὶ μὲν τούτων ἀρκεῖ τὰ εἰρημένα.

10.1 τὴν δὲ ἄνησιον πολυχρονιωτέραν ποιοῦνται τὰ  
χεδροπὰ τῶν σιτωδῶν, ὅτι τῶν μὲν χροῶδες τὸ  
ἄνθος,<sup>2</sup> εἴρηται δὲ ὅτι τὰ ἀσθενέστερα πανταχοῦ  
θᾶπτον τελεοῦνται. διὸ καὶ βρέχεσθαι τὰ μὲν οὐ  
δύναται, τὰ δὲ καὶ ζητεῖ καὶ ὀνίναται (τάχα δὲ  
τοῦτό γε<sup>3</sup> κατὰ συμβεβηκός, ὅτι τὸ ὄλον φυτὸν

<sup>1</sup> ego (cf. CP 4 11. 4; HP 8 4. 4): λινον U: λῖνον (λεῖνον?)  
u: λιμῖον N aP.

<sup>2</sup> τῶν ... ἄνθος ego (*flos frumentis imbecillior est Gaza*:  
τὸ μὲν σιτωδες ἀσθενές Scaliger: τῶν μὲν ἀσθενέστερον [ἀσθενές  
Wimmer] τὸ ἄνθος Itali): τῶν μὲν σιτωδες τὸ ἄνθος U.

<sup>3</sup> Scaliger: τε U.

<sup>1</sup> Cf. CP 4 11. 4 and HP 8 4. 4: "For such distinctions as  
these would appear to be the ones most closely connected  
with the nature of the plants. Here belong the three-  
months and two-months varieties and any that mature in  
a still smaller number of days, such as they say is found in  
the district of Aenos. This gets firm and matures forty  
days after sowing; and it is said to be strong and heavy and  
not light like three-months wheat, which is why (they say)  
it is fed to the slaves; indeed it does not have much bran  
either."

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wheat at Aenos,<sup>1</sup> our recourse here is to find the  
reason in the nature of the grain itself.

This discussion suffices for these points.<sup>2</sup>

*Seed-Crops: Flowering of Legumes  
and Cereals Compared*

Legumes take a longer time flowering than 10.1  
cereals<sup>3</sup> because in cereals the flower is downy,<sup>4</sup>  
and we have said<sup>5</sup> that whatever is weaker is every-  
where sooner matured. This is why the flowers of  
cereals cannot stand rain, whereas the flowers of  
legumes not only like rain but are benefited by it.<sup>6</sup>  
But this benefit, to the flowers at any rate, may be

<sup>2</sup> That is, lightness and heaviness (CP 4 9. 1-6).

<sup>3</sup> Cf. HP 8 2. 5: "As soon as wheat and barley are set  
free of the sheath they flower four or five days later and  
remain in flower for about the same number of days;  
those that give the highest figure say that they shed the  
flower in seven days. But the flowering of legumes lasts a  
long time; the flowering of vetch and chickpea is longer  
than that of the rest, whereas that of the bean is by far  
the longest of all, for they say that it flowers for forty days  
..."

<sup>4</sup> Cf. HP 8 3. 3. <sup>5</sup> CP 41. 4; 2 11. 7.

<sup>6</sup> Cf. HP 8 6. 5: "Abundant rain is good for all crops  
when they have come into leaf and are pregnant with fruit,  
but injures wheat, barley and the cereals when they are in  
flower, for the flower is killed. But it is harmless to pulses  
except chickpea, for chickpea is killed when the brine is  
washed off, getting gangrenous and eaten by caterpillars  
..."; cf. CP 2 2. 2.

εὐτροφει<sup>1</sup> βρεχόμενον, ὁ δὲ καιρὸς<sup>2</sup> δεῖται βοηθεί-  
ας πρὸς τὴν τελέωσιν, μάλιστα δ' ὁ κύαμος, ὅτι  
μανότατον καὶ πολυανθέστατον καὶ πολυκαρπό-  
τατον) · ὁ δὲ ἐρέβινθος ἀπόλλυται διὰ τὴν εἰρημέ-  
νην αἰτίαν.

10.2 ἀλλὰ περὶ μὲν τοῦ σίτου τῆς διαφορᾶς<sup>3</sup> λεκτέ-  
ον. αἰτιάσαιτο δ' ἂν τις μάλιστα τὴν ἀσθένειαν ·  
οὐχ ὑποφέρει γάρ, ἀλλὰ φθείρεται καὶ ἀποπίπτει  
(καθάπερ καὶ τῶν δένδρων ἐνίων), ὅτε μὲν οἶον  
ἐρυσιβούμενα, ὅτε δ' ἐξυγραινώμενα λίαν.

εὐλόγως δὲ καὶ ἡ ἀνθησις οὐχ ἅμα πᾶσι τοῖς  
μέρεσι · κευώριστα γὰρ (ἐκτὸς τῶν λοβῶν) καὶ  
διὰ τὴν εὐτροφίαν · τὰ μὲν γὰρ ἤδη κύει καὶ ἀνθεῖ,  
τὰ δ' ἄνω προαύξεται<sup>4</sup> (διὸ καὶ τὰ μὲν αὖα καὶ  
τέλεια, καίπερ ἐγγυτάτω τῆς τροφῆς ὄντα, τὰ δ'

<sup>1</sup> ego: εὐτρεφέι U: εὐτραφέι u.

<sup>2</sup> U: καρπὸς (fructus Gaza) Basle ed. of 1541.

<sup>3</sup> U aP (-ὰς N): διαφθορᾶς u.

<sup>4</sup> U: προαύξεται Schneider.

<sup>1</sup> Cf. CP 2 2. 2.

<sup>2</sup> CP 3 24. 3; cf. HP 8 6. 5 (cited in note 6, p. 291).

<sup>3</sup> The reason for the inability of the cereal flower to stand rain had been touched on very briefly at CP 4 10. 1.

incidental, because the entire plant gets well fed when rained on,<sup>1</sup> and the situation requires replenished resources for the task of completing the formation of the fruit, the bean needing this help most of all, because it has the most open texture and the greatest number of flowers and fruits. Chickpea on the other hand is killed by rain for the reason that was mentioned.<sup>2</sup>

(But we must deal with the difference as it relates to cereals.<sup>3</sup> One would give the weakness of the flowers as the main reason, for they do not bear up against rain but perish and drop (like those of some trees),<sup>4</sup> sometimes getting infected with rust (as it were), and sometimes getting too wet.)

It is reasonable moreover that there is no simultaneous flowering in all the parts,<sup>5</sup> since the process is rendered progressive (outside of the pods)<sup>6</sup> if only by the good feeding, some parts of the plant being already pregnant with fruit or in flower while the parts above are growing out, which is why some parts are dry or fully developed, although they are closest to the food supply, whereas the parts at the

<sup>4</sup> As pomegranate, pear and almond (CP 2 9. 3-4).

<sup>5</sup> Cf. HP 8 2. 5: "For the flowering of grains with an ear is simultaneous, whereas in plants of the pod-bearing sort and all legumes it is progressive."

<sup>6</sup> Flowering is the first stage of fruiting, and the different seeds in the same pod can therefore be spoken of as simultaneous in a discussion of flowering.

10.3 ἐπὶ τῶν ἄκρων χλωρά). (τοῦτο δ' οὐκ ἴδιον, ἀλλὰ καὶ ἑτέρων καὶ πλειόνων κοινόν · πολλὰ γὰρ ἀνθεῖ καὶ γονεύει<sup>1</sup> κατὰ μέρος, καὶ ἅμα τὴν βλάστην ἀφίησι εἰς τὸ ἄνω · διὸ καὶ τὰ μὲν τέλεα, τὰ δ' ἀτελεῖ, τὰ δὲ μέλλοντα.) καὶ οὐκ ἐμποδίζεται τὰ κάτω διὰ τὴν ἐπιρροὴν καὶ τὴν ἀναφορὰν τὴν εἰς τὸ ἄνω, καθάπερ <γὰρ><sup>2</sup> ὑποκείμενόν τι πᾶσι ὁ καυλός, ἐξ οὗ τὴν τροφήν ἔχουσι ὥσπερ ὀχετοῦ τινος.

ἡ μὲν οὖν ἀνθησις εὐλόγως χρόνιος τε καὶ ἀβλαβής αὐτοῖς ὑπὸ τῶν ὑδάτων · ἐν δὲ τοῖς ἄλλοις ὅταν ἀπανθήσῃ σχεδὸν ἐπισυνέστερα<sup>3</sup> τοῦ σίτου διὰ τὴν ἀσθένειαν, καὶ μάλιστα ὁ κύαμος, ἀσθενέστερον γάρ.

καὶ περὶ μὲν τῶν πρὸς ἄλληλα διαφορῶν τοσαῦτα εἰρήσθω.

11.1 περὶ δὲ τῶν ὁμογενῶν, τάχα ἂν τις ἀπορήσειεν

<sup>1</sup> Schneider (*fructificans* Gaza) : ποιεῖ U.

<sup>2</sup> aP. <sup>3</sup> Schneider : ἐπισυνέστερα U.

<sup>1</sup> Cf. *HP* 8 2. 5 (continued from note 5, p. 293): "For the first parts to flower are those below; when these have shed their flowers, the parts next to them flower, and in this fashion flowering proceeds toward the top. This is why vetches are pulled up with the fruit already shed in the lower parts while the upper parts are quite green."

extremities are fresh and green.<sup>1</sup> (This is not 10.3 confined to legumes but is found in a good many other plants as well, many flowering and generating fruit progressively<sup>2</sup> and at the same time adding to their upward growth, which is why some fruits are mature, some immature, and some not yet formed.) And the lower parts are not prevented from this by the flow of food moving upward, for the stalk is (as it were) a substrate shared by all the parts, from which they get their food as if from an irrigation ditch.<sup>3</sup>

It is reasonable then that the flowering should last a long time in legumes and be unharmed by the rains. But in all other matters, once the flower is shed, legumes are (one might say) even more susceptible to injury than cereals because of their weakness, the bean especially, since it is weaker than the rest.

With regard to the differences of cereals and legumes from one another let this much be said.

*A Difficulty: Different Rates of Growth  
Within the Same Kinds*

With regard to seed-crops belonging to the same 11.1

<sup>2</sup> Cf. *HP* 7 3. 1 (basil and heliotropion and some wild plants); *HP* 7 14. 2 (anthemion); cf. also *CP* 1 11. 7 (citron) and *CP* 5 2. 5.

<sup>3</sup> That is, they are like separate plants fed from the same source: cf. *CP* 1 11. 4.

τί ποτ' <sup>1</sup> οὐκ ἐν ἴσοις χρόνοις ἅπαντα τελειοῦται, ἀλλ' οἱ μὲν τρίμηνοι τῶν πυρῶν, οἱ δὲ δίμηνοι (καὶ τῶν <κριθῶν> <sup>2</sup> ὡσαύτως) · εἰ δὲ ἐν ἐλάττονι τινας χρόνῳ, πλείων ἢ διαφορὰ πρὸς τοὺς χειμωσπόρους, ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων.

μάλιστα δ' ἐπὶ τῶν εἰρημένων (τάχα δὲ καὶ μόνων) αἱ διαφοραί, καὶ τοῦτο εὐλόγως · τὰ μὲν γὰρ ὄσπρια, σπαρέντα χειμῶνος, οὐκ ἂν ὑπομείνειεν διὰ τὴν ἀσθένειαν (πλὴν εἰ τιῶν ὀλίγων · ὄροβον γὰρ σπείρουσιν καὶ πρῶτον ὥστε μὴ ὥρα ἀπολείπεσθαι <sup>3</sup>) · ἡ κριθὴ δὲ καὶ ὁ πυρὸς ἀμφοτέρως ([καὶ] <sup>4</sup> ὅσα μὴ τρίμηνα), πλὴν <sup>5</sup> ἐλάττους καὶ ἀσθενεστέρους φέρει τοὺς στάχους.

τοῦτο μὲν οὖν ὡς καθόλου τῷ γένει πρὸς τὸ γένος.

11.2 τὸ δὲ μὴ ἰσοχρονίους εἶναι κοινὸν καὶ ἐπὶ τῶν δένδρων · ἔστιν γὰρ ἐν ἐκάστοις τὰ μὲν πρῶτα, τὰ δ' ὄψια (καθάπερ ἄμπελος συκῆ μηλέα ἄπιος).

<sup>1</sup> U<sup>r</sup> N aP : ποτ' U<sup>ar</sup>.

<sup>2</sup> aP : U N omit (U between lines).

<sup>3</sup> ego (μηδεμῆ ὥρα ἐκλείπειν Schneider) : μὴ ὥρα καταλείπειται U.

<sup>4</sup> ego.

<sup>5</sup> μὴ τρίμηνα πλὴν ego (μὲν τρίμηνα τῶν γενῶν Schneider) : μητρην ἀπλὴν U.

kind one might perhaps raise a difficulty: why it is that all do not mature in the same length of time, some wheats maturing in three months, some in two (and similarly with barleys)? And if some wheats mature in still less time<sup>1</sup> the difference with winter-sown wheat is greater, but just as much a difference as in the rest.

The differences occur mainly, perhaps even only, in the seed crops mentioned.<sup>2</sup> This moreover is reasonable: pulse sown in winter would never survive, owing to its weakness (except for some few plants; so farmers sow vetch early<sup>3</sup> as well as late, so as not to run out of it in spring); whereas barley and wheat (except for the three-months varieties) are sown both early and late (still, when sown late<sup>4</sup> they have fewer and weaker ears).

This then is to be taken as a generic difference between the one kind and the other.<sup>5</sup>

But this difference in time is shared with trees, 11.2 for within the several kinds there are some early members, some late, as with the vine, fig, apple and pear.<sup>6</sup>

<sup>1</sup> For wheat at Aenos maturing in forty days cf. HP 8 4. 4, cited in note 1 on CP 4 9. 6. <sup>2</sup> Wheat and barley.

<sup>3</sup> Cf. HP 8 1. 4: "But of legumes such plants as vetch and chickpea are sown at both seasons . . ." <sup>4</sup> Cf. CP 4 11. 4.

<sup>5</sup> Of seed crops, namely cereals and legumes; it is not a difference between varieties within the same kind, as of wheats. <sup>6</sup> Cf. CP 1 18. 3.



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αἴτιον δ' ἐν ἀμφοῖν ὅτι τῆς ἰδίας φύσεως ἢ διαφορά, τὸ δ' ὄνομα κοινόν, ὥσπερ καὶ ἐν τοῖς ζώοις ἐπὶ τῶν κυνῶν,<sup>1</sup> οὐδὲ γὰρ ἐκέينو τὸ γένος ἔν.

ἢ<sup>2</sup> δ' αἰτία παραπλησία καὶ διὰ τί τὰ μὲν πρῶα, τὰ δ' ὄψια· εἶτε γὰρ θερμότης, εἶτε ψυχρότης, εἶθ' ὅ τι ποτέ, καὶ ἐνταῦθ' ὁμοίως<sup>3</sup> τὸ αἴτιον.

11.3 καὶ καθόλου μὲν οὕτω·

τοῖς δὲ σπέρμασι καὶ ἐμφανέστερον ἐκ τῶν συμβαινόντων τὸ αἴτιον. ὁ μὲν γὰρ χειμοσπορούμενος

<sup>1</sup> Gaza, Basle ed. of 1541 : κοινῶν U.

<sup>2</sup> ἔν. ἢ Wimmer : ἐν U.

<sup>3</sup> U : ὁμοιον Schneider.

<sup>1</sup> Cf. Aristotle, *History of Animals*, vi. 20 (574 a 20–29): “The Laconian bitch has a period of gestation of a sixth of a year . . . Some bitches have a period of a fifth of a year . . . And some of a fourth of a year . . .”

<sup>2</sup> Cf. CP 1 18. 3–4.

<sup>3</sup> Theophrastus does not commit himself further about the cause in animals and trees. In the late cereals it would appear to be a power of multiplying parts.

<sup>4</sup> Here the distinctive natures of the slow-maturing and fast-maturing varieties: the first has many roots (and haulms), the second few roots (and a single haulm). Theo-

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*The Solution: a Difference in Nature  
Is Disguised by a Community of Name*

The reason in both cereals and plants is that the difference between early and late belongs to the special nature of the plant, whereas the name is held in common, as in animals is the case with dogs,<sup>1</sup> for here too the kind is not a unit.<sup>2</sup>

### *The Cause of the Difference*

The cause in the animals is like the cause which makes some plants early, some late: whether it is heat or cold or what you will,<sup>3</sup> it is equally present in the plants.

Such then is the general formulation.

11.3

### *The Cause Examined in Cereals in the Light of the Observable Results*

In the seed crops however the cause<sup>4</sup> can actually be seen more clearly when viewed from the results.<sup>5</sup> Thus winter-sown<sup>6</sup> wheat is many-rooted,

phrastus does not push the enquiry further back and ask what causes the many-rooted character, but actually begins at a stage below the “distinctive nature,” replacing it by its immediate consequence, the multiplicity of roots.

<sup>5</sup> Cf. CP 1 21. 4 (we must consider powers in the light of their results).

<sup>6</sup> Actually autumn-sown, but there is no such compound in Greek.

πυρός, πολύριζος ὤν, καὶ ἐνταῦθα πρῶτον ἀποδοῦς τὴν δύναμιν, ἀποδίδωσι πλῆθος καλάμους (καὶ γὰρ πολυκάλαμος)· ὁ δὲ τρίμηνος καὶ δίμηνος ὀλιγόριζος καὶ μονοκάλαμος,<sup>1</sup> διὸ<sup>2</sup> τὴν τε ἀναφορὰν εὐθὺς ἄνω ποιεῖται καὶ τὴν τελειώσιν ταχείαν, ῥᾶον γὰρ τὸ ἔλαττον ἀποτελεῖσθαι.

διὸ καὶ [ὁ]<sup>3</sup> πολύχους, ὁ δὲ ὀλιγόχους, καὶ κοῦφος, ὁ δὲ βαρὺς, ὡς περ ἐλέχθη πλείω τὴν τροφήν ἔλκων καὶ θολωτέραν·<sup>4</sup> ἢ δ' ἀποδρομῆ<sup>5</sup> ταχέια κατὰ λόγον ἄτε καὶ μὴ χρονίζοντος ἐν ταῖς ῥίζαις δι' ὀλιγότητα.

- 11.4 μέγα δὲ καὶ ἡ ὥρα συνεργεῖ· καὶ γὰρ ὁ πολύριζος, σπαρεῖς ἐν ταύτῃ, θᾶπτον ἀναβλαστάνει, καὶ ὀλιγοκαλαμώτερος, καὶ ὁ στάχυς μικρὸς καὶ ὀλιγόπυρος· ὁ δὲ τρίμηνος, πρῶϊσπορηθεῖς, οὐκ ἂν ὑπομείναι<sup>6</sup> διὰ τὴν ἀσθένειαν.

<sup>1</sup> ego (ὀλιγοκάλαμος Gaza, Itali : οὐ πολυκάλαμος?): πολυκάλαμος U. <sup>2</sup> U : διότι Schneider.

<sup>3</sup> ego : ὁ <μὲν> aP.

<sup>4</sup> U : θολωτέραν Schneider.

<sup>5</sup> U : ἀναδρομῆ Schneider.

<sup>6</sup> Schneider : ὑπομείναι U.

<sup>1</sup> Cf. HP 8 4. 4 (3-months wheat is single-haulmed).

<sup>2</sup> The few roots and single haulm.

and after first approving its power by producing many roots goes on to approve it by producing many haulms (since it is a many-haulmed variety too). Three-months and two-months wheat on the other hand is a kind with few roots and a single haulm,<sup>1</sup> which is why it at once directs its growth upwards and rapidly matures: the task with the fewer items<sup>2</sup> is more easily accomplished.

This also is why winter wheat has a big yield,<sup>3</sup> spring wheat a small one and why spring wheat is light on the stomach, winter wheat heavy, attracting as it does a greater amount and muddier type of food<sup>4</sup> (as we said)<sup>5</sup>; and the rapid springing up of the other kind is quite in order, since the roots are too few in number to delay it.

#### *Inhibition by the Season*

The season too contributes greatly to the result: 11.4 thus many-rooted wheat, if sown in the spring season, comes up more rapidly and with fewer haulms, and the ear is small and has few grains; three-months wheat, on the other hand, if sown early,<sup>6</sup> would never survive, it is too weak.

<sup>3</sup> It has many haulms (and ears).

<sup>4</sup> It has more roots; the attraction is therefore stronger and less discriminating.

<sup>5</sup> CP 4 9. 4.

<sup>6</sup> In autumn.

ἄτοπον δὲ καὶ ὑπεναντίον τὸ συμβαῖνον εἰ βαρεῖς οἱ ὀλιγοχρόνιοι, καθάπερ οἱ περὶ Αἰνὸν φασὶ τοὺς τετταρακονθημέρους.<sup>1</sup> λοιπὸν γὰρ αἰτιῶσθαι τὴν ἰδίαν φύσιν, ἣν ὀρώμεν ἐν πλείοσιν μεγάλας ἔχουσιν διαφοράς, καὶ κατὰ τὴν ἔκφυσιν καὶ τελείωσιν, καὶ κατὰ τὰς ἰδίας μορφάς (οἷον μεγέθους καὶ μικρότητος καὶ σχήματος), καὶ τῶ<sup>2</sup> πολυάχρονον εἶναι καὶ μῆ, καὶ τῶ τέλει<sup>3</sup> δὴ τῶ<sup>4</sup> πρὸς ἡμᾶς καὶ κατὰ τροφήν καὶ σίτισιν.<sup>5</sup>

11.5 τάχα δὲ καὶ τὰ γένη ποιούσιν αἱ χώραι, ἥτοι πάντα ἢ ἕνια· συνεξομοιοῦσιν γὰρ πῶς ἑαυταῖς ἢ διαφορὰν γέ τινα<sup>6</sup> ἐμποιοῦσιν ἢ<sup>7</sup> καὶ πρὸς τὸ δέον χρήσιμος.<sup>8</sup> (ὥσπερ<sup>9</sup> τῶ Θρακίῳ πυρῶ τὸ πολύλοπον εἶναι καὶ ὀμβιβλαστῆ· διὰ γὰρ τοὺς χειμῶνας ἄμφω συμβαίνει)· καὶ διὰ ταῦτα καὶ ἐν ταῖς

<sup>1</sup> ego (cuius cura equinoctio delegata est Gaza : ἰσημερινός Scaliger) : ἰσημεροῦς U.

<sup>2</sup> ego : τὸ U.

<sup>3</sup> μῆ, καὶ τῶ τέλει ego (incommoditatem Gaza : μὴ κατωφελεῖ Scaliger) : μὴ κατωτελεῖ U.

<sup>4</sup> δὴ τῶι U : τὸ Wimmer.

<sup>5</sup> Schneider : σίτησιν U.

<sup>6</sup> γε τινα U : γενῶν u : γενᾶ N : γένη aP.

<sup>7</sup> ego : ἡ U.

*An Untoward Result*

The result is odd and in conflict with our exposition if rapid-growing wheats are heavy, as they say at Aenos<sup>1</sup> of their forty-day variety, since we must fall back on the distinctive nature and put the heaviness there. We observe that this nature includes important distinctions in a number of matters, distinction in germination and maturing, in the special conformation (as largeness, smallness and shape), in the great or small quantity of the bran, and finally in ultimate utility to man, whether as food or as feed.

*The Country Causes the Difference*

But perhaps the countries even produce the 11.5 varieties (either all the varieties or some), since countries bring about a certain assimilation to themselves or at least produce in the wheat a certain difference, useful for meeting the new requirements, just as Thracian wheat is many-coated<sup>2</sup> and a late sprouter, both results being due to the Thracian winters. Hence Thracian wheat, sown early in

<sup>1</sup> Cf. CP 4 9. 6; HP 8 4. 4.

<sup>2</sup> Cf. HP 8 4. 3: "... some wheats have few coats, some many, like the Thracian."

<sup>8</sup> δέον χρήσιμος ego : αεχρησιμος U : χρήσιμος u : ἀχρήσιμος N : ἀχρήσιμον aP. <sup>9</sup> N aP : ὥσπερ U.

- ἄλλαις πρώϊσπορούμενος ὁ Θράκιος ὀψὲ δὴ<sup>1</sup> δια-  
 βλαστάνει καὶ ἐξαύξεται, καὶ πάλιν<sup>2</sup> ὁ παρὰ τῶν  
 ἄλλων,<sup>3</sup> ἐκεῖ<sup>4</sup> σπειρόμενος [ὄψε],<sup>5</sup> βλαστάνει·  
 11.6 γέγονεν γὰρ οἶον φύσις ἤδη τὸ ἔθος. ἐπεὶ καὶ (οἶον  
 ἐν τοῖς<sup>6</sup> Πισσάγγαις<sup>7</sup> καλουμένοις τῆς Ἀσίας) οἱ  
 διαρρηγγύναι<sup>8</sup> λεγόμενοι, καὶ οἱ τὰ μεγέθη τοῖς  
 πυρῆσιν ἴσοι, χώρας ιδιότητι καὶ φύσει τὰς δυνά-  
 μεις ἔχουσι ταύτας, καὶ οὐκ ἂν τηροῖεν<sup>9</sup> μετενε-  
 χθέντες. ὃ γὰρ ἐπὶ τῶν ἀμπέλων λέγουσιν, ὡς  
 ὅσα χώρας εἶδη, τοσαῦτα καὶ ἀμπέλων, τοῦτ'  
 ἀληθὲς καθόλου, καὶ οὐχ ἦττον ἐφ' ἐτέρων, ἐὰν  
 ἅμα τῇ χώρᾳ καὶ τὸν ἀέρα τις προσθῇ· διὰ τοῦτο  
 γὰρ αἶ τε ἀνωμαλῖαι τῶν καρπῶν,<sup>10</sup> ἀπὸ τῶν αὐ-  
 τῶν φυτευομένων, αἶ θ' ὅλως ἀκαρπῖαι, μὴ φερού-  
 11.7 σης τῆς χώρας. ἐκ δυοῖν γὰρ ἢ καὶ πλειόνων ὅταν  
 γένηται τι δύναμιν ἐχόντων, ἀνάγκη κατὰ τὰς

<sup>1</sup> ego (Scaliger omits) : δὲ U.

<sup>2</sup> aP : παριν U : πάρι N.

<sup>3</sup> N aP : ἄλλον U.

<sup>4</sup> Scaliger : βεκει U.

<sup>5</sup> ego.

<sup>6</sup> Wimmer : ταῖς U.

<sup>7</sup> ego : επισανάγγαις U.

<sup>8</sup> u : -ρυ- U.

<sup>9</sup> Scaliger (*nec ... servari incommutabilia possint*  
 Gaza) : οὐ κατηροῖεν U.

<sup>10</sup> καρπῶν <τῶν> Schneider.

- other countries too, sprouts and heads too late<sup>1</sup>;  
 and again wheat from elsewhere, sown in Thrace,  
 sprouts,<sup>2</sup> ancient habit having by then (so to speak)  
 become nature.<sup>3</sup> Indeed both the wheat reported to 11.6  
 cause bursting (as at the place called Pissangae<sup>4</sup> in  
 Asia) and the wheat kernels reported to be as big as  
 olive-pits<sup>5</sup> owe these powers to the special character  
 and nature of the country and would not retain  
 them if introduced elsewhere. For what is said<sup>6</sup> of  
 the vine, that there are as many kinds of vine as  
 there are of country, is true in general, and no less  
 true of other plants if one includes the air with the  
 country. For it is this that accounts not only for the  
 disparities in the crops when countries are planted  
 from the same plants, but also for the failure to pro-  
 duce any (when the country will not bear them).<sup>7</sup>  
 For when something comes about as the result of 11.7  
 two or more things<sup>8</sup> possessing power, the whole

<sup>1</sup> Cf. HP 8 8. 1: "Grain taken from countries with severe  
 winters heads too late in places where grain comes up  
 early, and so perishes from drought unless saved by rain."

<sup>2</sup> Instead of remaining dormant, like Thracian wheat.

<sup>3</sup> Cf. CP 2 5. 5 with note a.

<sup>4</sup> Cf. HP 8 4. 5; CP 4 9. 5.

<sup>5</sup> Cf. HP 8 4. 5.

<sup>6</sup> Cf. HP 2 5. 7.

<sup>7</sup> Cf. HP 4 4. 1 for an attempt to plant ivy in Babylonia.

<sup>8</sup> The plant is due to (1) the seed and (2) the country  
 (and air).

τούτων διαφορὰς καὶ τὸ ὅλον διαφέρειν (ὃ καὶ ἐπὶ τῶν ζώων συμβαίνει· καὶ γὰρ καὶ τῷ ἄρρηνι καὶ τῷ θήλει, καὶ τῇ χώρᾳ καὶ τῷ ἀέρι καὶ ὅλως ταῖς τροφαῖς, λαμβάνουσιν διαφορὰς<sup>1</sup>)· ὅθεν καὶ γενῶν ιδιότητες γίνονται, καὶ πολλάκις τὸ παρὰ φύσιν ἐγένετο κατὰ φύσιν, ὅταν χρονισθῆ καὶ λάβῃ πλήθος.

11.8 ἀλλὰ γὰρ τοῦτο μὲν καθόλου καὶ κοινόν. αἱ δὲ τῶν σπερμάτων διαφοραὶ γίνονται διὰ τὰς εἰρη-  
 μένας αἰτίας· ἐπεὶ<sup>2</sup> καὶ τοῦ<sup>3</sup> θάπτου τελειοῦσθαι  
 παρά τισιν, ὡσπερ ἐν Αἰγύπτῳ φασὶν μῆνι πρότε-  
 ρον ἢ ἐν τῇ Ἑλλάδι, τὸν ἀέρα τις ἀν αἰτιάσαιοτο,  
 μαλακὸν ὄντα καὶ εὐτραφῆ. τὸ δ' ὅλον ἐν δυοῖν  
 τούτου θετέον τὰς αἰτίας (ὡσπερ εἴρηται)· ἀέρι  
 καὶ ἔδαφει. τὸ γὰρ αὖ περὶ Μύλας<sup>4</sup> συμβαῖνον

<sup>1</sup> U<sup>cc</sup> from διαφθο- (-ὰς u or U<sup>c</sup>).

<sup>2</sup> u: ἐπι U.

<sup>3</sup> u aP: το U: τὰ N.

<sup>4</sup> ego: μήλον U.

<sup>1</sup> For the importance of numbers in deciding a similar question cf. CP 2 17. 3 ad fin.

<sup>2</sup> CP 4 11. 6 ("if one includes the air with the country"); CP 4 11. 7 ("the country and the air").

necessarily varies with the differences in its sources (and this also happens in animals; for animals get differences due not only to the male and the female parent but also to the country and air, in short to their food). From this second source moreover arise peculiarities within kinds, and we often find that what was contrary to nature has become natural, once it has persisted for some time and increased in numbers.<sup>1</sup>

This point, then, is general and of common appli-  
 cation. But the differences within the kinds of 11.8  
 grains are brought about by the causes mentioned<sup>2</sup>;  
 so one would give the air as the cause for earlier  
 ripening in some places, as ripening is said to be a  
 month earlier in Egypt than in Greece,<sup>3</sup> the air in  
 Egypt being mild and nutritious.<sup>4</sup> Indeed in gen-  
 eral we must lay it down that the place to look for  
 the causes<sup>5</sup> is these two things (as we said)<sup>6</sup>: air  
 and soil. So in the case again of what results at

<sup>3</sup> Cf. HP 8 2. 7: "Country differs from country and air from air in effect on maturation as well. For some countries are held to produce in less time, as Egypt most markedly among the rest: barley there is harvested in six months, wheat in seven, whereas in Greece barley is harvested in the seventh month (but in most districts in the eighth), wheat still later."

<sup>4</sup> It is foggy and laden with dew: CP 6 18. 3; HP 8 6. 6.

<sup>5</sup> That is, the causes proceeding from the country (CP 4 11. 6).

<sup>6</sup> In the passages cited in note 2.

τῆς Σικελίας,<sup>1</sup> ὥστε τὸν ὕστατον σπείροντα θερίζειν ἅμα τοῖς πρώτοις, ἐπὶ τὴν χώραν ἀνοιστέον ὡς εὐτροφον, ὃ γὰρ ἀῆρ παραπλήσιος.

- 11.9 τὸ γὰρ μὴ ἰσοχρονεῖν τὰ σπέρματα, καθάπερ καὶ τὰ ζῶα, παρὰ πᾶσιν, ὁποιασοῦν οὐσης τῆς ὥρας,<sup>2</sup> οὐδὲν ἄτοπον. ἐκεῖνα μὲν γὰρ ἐν ἑαυτοῖς ἔχει τὰς ἀρχὰς τὰς κυριωτάτας, τὸ δὲ σπέρμα καὶ ὅλως ἐν τῷ ἀέρι μᾶλλον, εἰ δὲ μή, τὰς γε πρὸς βλάστησιν, καὶ ὅλως γένεσιν καὶ διαφθοράν.<sup>3</sup> διόπερ οἶον ἂν ᾗ τὸ ἔτος, ἀκολουθεῖ καὶ τὰ τῶν καρπῶν, ἐν τε τοῖς ἄλλοις, καὶ ἐν τῇ πρωϊότητι καὶ ὀψιότητι.

- 11.10 σύμφωνον δὲ τρόπον τινὰ καὶ οὐ πόρρω τούτων καὶ τὸ μὴ κινεῖσθαι πρότερον μήτε σπέρμα μήτε μήτε φυτόν, ἀλλὰ κατὰ τὴν οἰκίαν ὥραν.<sup>4</sup> ὃ καὶ θαυμάζεται περὶ τῶν σπερμάτων, ὅτι διαμένει

<sup>1</sup> ego : τελέσεως U.

<sup>2</sup> ego : χωρας U.

<sup>3</sup> Gaza : διαφορὰν U.

<sup>4</sup> Heinsius : χώραν U.

<sup>1</sup> Cf. *HP* 8 2. 8: "It is . . . said that in Sicily at the place called Mylae . . . the crops sown late mature pretty fast: pulses are sown for six months, but the farmer who sowed in the last month harvests his crop with those who sowed

Mylae in Sicily,<sup>1</sup> where the last sower harvests his crop with those who sowed first, we must trace the result to the land and its fertility, since the air is much the same as elsewhere in those parts.

For it is not at all odd that grains do not behave like the animals and take the same time in all places for their gestation, whatever the character of the season when the seed is sown: animals have their most important starting-points in themselves, whereas the seed of the plant gets its impulses in general from the air (at least the ones that make it sprout and in general bring it to birth or destroy it). This is why "as goes the year, so goes the corn"<sup>2</sup> both in other matters and in that of coming up early or late.

*A Related Problem: Why Seeds Survive  
Until Their Time*

In agreement with this in a way and not far removed from it is this: that no seed and no plant begins to stir before its proper season.<sup>3</sup> This has aroused surprise in the case of the seeds, because

first . . ." (At Mylae one can sow five months later than the first to sow elsewhere in Sicily, and harvest the crop at the same time as they.)

<sup>2</sup> A paraphrase of the proverb "The harvest is the year's and not the field's" (*CP* 3 23. 4; *HP* 8 7. 6).

<sup>3</sup> Cf. *CP* 1 10. 6; *HP* 7 1. 7; *HP* 7 10. 1.

πρὸς τὸ θέρος ἔνια καὶ οὐ διαφθείρεται, πολλῶν ἰδάτων καὶ εὐδιῶν γενομένων· ἐπεὶ τό γε μὴ βλαστάνειν ἦττον ἄλογον, μὴ ἔχοντα τὴν οἰκείαν κρᾶσιν. αἴτιον δὲ ταῦτό<sup>1</sup> πως ὑποληπτέον, ἔς ἀσφαλὲς τῆς φύσεως πρὸς ἄμφω τιθεμένης ἐν τῇ τῶν περιεχόντων ἰσχύϊ· φαίνεται γὰρ τὰ μὲν ξυλώδη (καθάπερ τὰ δενδρικά<sup>2</sup>), τὰ δὲ πολυχίτωνα, τὰ δ' ἄλλας τοιαύτας ἔχοντα φυλακάς.

καὶ ταῦτα μὲν δὴ κοινὰ πως τῆς φύσεως.

- 12.1 ὑπὲρ δὲ τῶν σπερμάτων, πῶς ποτε τὰ τεράμωνα καὶ ἀτεράμωνα γίνεται; πότερα διὰ τὴν χώραν, ἢ διὰ τιν' ἀέρος κατάστασιν,<sup>3</sup> ἢ δι' ἄλλο τι πάθος, καὶ πάντα ἢ ἔνια (δοκεῖ γὰρ δὴ καὶ μάλιστα ἐπὶ τῶν κυάμων καὶ φακῶν); συμβαίνει δὲ πολλάκις καὶ τὸ χωρίον ὅτε μὲν τεράμωνα φέρειν, ὅτε δὲ ἀτεράμωνα, τῆς αὐτῆς ἐργασίας τυγχάνον·

<sup>1</sup> ego (τούτου Schneider): τοῦτο U.

<sup>2</sup> Wimmer (*arborum* in his translation): ἄνθηκα U.

<sup>3</sup> ego (cf. HP 8 8. 7 ἀέρος κατάστασις τις; διὰ τὸν ἀέρα καὶ τὰς <ἰδίας κρᾶσεις καὶ διαθέσεις> Heinsius): δια τὸν ἀέρα καὶ τὰς U.

<sup>1</sup> For examples of seeds that do not sprout until summer or later cf. HP 6 2. 6; 6 4. 4; 6 5. 1; 6 5. 2; 6 5. 4; 7 10. 1.

some of them survive until summer<sup>1</sup> and do not perish, in spite of the many rains and spells of fine weather in the interval; as for their not sprouting, this is less unreasonable, since they do not have the properly tempered weather. But we must take the cause to be in a way the same: the nature of the plant stores the seed away against both eventualities<sup>2</sup> in the strength of the enclosures. For we see that some seeds are woody (as in trees), some have many coats, and others have similar protections.

These matters, then, depend in a way on the nature of the plant as well.

*A Problem: Ready and Stubborn Seeds*

Touching seed-crops, how do the ready and stubborn<sup>3</sup> ones arise? Is the difference due to the country or to a certain settled state of the air or else to something in their character? And is it present in all kinds of seed crops or only in some (for it is believed that it occurs especially in bean and lentil)<sup>4</sup>? It often happens that a field bears ready seeds at one time, stubborn ones at another, although the

<sup>2</sup> Destruction and sprouting.

<sup>3</sup> A ready (or easy or yielding or biddable or responsive or cooperative) seed is one readily softened by boiling (CP 4 12. 2); the stubborn (or intractable or obdurate or uncooperative) one tends to remain hard. Cf. HP 8 8. 6-7.

<sup>4</sup> Cf. HP 8 8. 6, cited on CP 4 12. 13.

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καὶ τῶν συνεχῶν, αὔλακος<sup>1</sup> μόνον διειργούσης,<sup>2</sup>  
τὸ μὲν ἀτεράμονα, τὸ δὲ τεράμονα · καὶ τῶν σπερ-  
μάτων ὅτε μὲν ἐκ τῶν ἀτεραμόνων τεράμονα<sup>3</sup>  
γίνεσθαι, ὅτε δὲ ἐκ τῶν τεραμόνων ἀτεράμονα.  
κατὰ δὲ τὴν ἔκφυσιν καὶ βλάστησιν, καὶ τὴν ἀδρό-  
τητα καὶ εὐκαρπίαν, οὐδὲν διαφέρει τὸ ἀτεράμον  
ὡσάν τι νενοσηκὸς ἢ πεπονηκός.

12.2 ὑπὲρ δὴ τούτων, καὶ εἴ τι ἄλλο συνάπτει πρὸς  
τὴν ἀπορίαν ταύτην, πρῶτον ἐκείνο λεκτέον · ὅτι  
τὸ τεράμον καὶ ἀτεράμον πρὸς τὴν πύρωσιν λέγε-  
ται καὶ διάχυσιν, καὶ (ὡς ἀπλῶς εἰπεῖν) πρὸς τὴν  
τροφήν τὴν ἡμετέραν. τὸ μὲν γὰρ εὐδιάχυτον καὶ  
τῇ ἐψήσει ταχὺ ἀλλοιούμενον, τεράμον · τὸ δ'  
ἀδιάχυτον ἢ ἀναλλοιώτων ἢ βραδέως ἀλλοιόμε-  
νον, ἀτεράμον. τοιοῦτον δὲ ἐκάτερον, εἴ τὸ μὲν  
μανὸν εἶη καὶ μαλακόν, τὸ δὲ, πυκνὸν καὶ σκλη-

<sup>1</sup> U<sup>r</sup> N aP: -as U<sup>ar</sup>.

<sup>2</sup> u: δ' εἰργούσης U.

<sup>3</sup> U<sup>r</sup> N aP: ατεράμονα U<sup>ar</sup>.

<sup>1</sup> Cf. *HP* 8 8. 7: "Again a certain settled state of the air causes this sort of difference (*i.e.*, that between ready and stubborn seeds); proof of this is that the same farms, worked in the same way, now produce ready seeds, now

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farming has been the same<sup>1</sup>; and that of adjoining fields, separated by the breadth of a furrow, the one bears stubborn seeds, the other ready<sup>2</sup>; and, turning to the seeds, that the stubborn seeds sometimes produce ready ones, the ready sometimes stubborn ones. In emergence from the seed and sprouting, and in the stoutness and productivity of the plant, nothing distinguishes the stubborn sort as having suffered from any disease or hardship.

### *A Preliminary to Solution: The Meaning of the Terms*

About these matters and any others that touch 12.2 on this difficulty we must begin by saying that the distinction of ready and stubborn is made with reference to the exposure of the seed to fire and the loosening of its structure, and broadly speaking with reference to human consumption, the seed that is easily loosened and quickly altered by boiling being ready, the seed not loosened or altered or altered only slowly being stubborn. Each will have this character under the following conditions: the one if it is open in texture and soft, the other if it is

stubborn."

<sup>2</sup> Cf. *HP* 8 8. 7: "... and of farms some lying next to each other and similarly situated and with no difference in soil bear the one ready seeds, the other stubborn, sometimes with a furrow's breadth between them."



ρόν· οὕτως ἂν τὸ μὲν δέχοιτο τὴν θερμότητα καὶ ὑγρότητα δι' ὧν ἡ διάχυσις, τὸ δ' οὐδέχοιτο, ἀλλ' ἀποστέγοι τῆς πυκνότητι καὶ σκληρότητι.

12.3 δαιρουμένου δ' οὕτω τοῦ τεράμονος καὶ ἀτεράμονος, σκεπτέον παρὰ τίνος καὶ ποίας τινὰς αἰτίας ταῦτα συμβαίνει.

τὸ μὲν οὖν ἀπλοῦν ἐκεῖνο, καὶ ἀληθές (ὃ καὶ ἐπὶ τῶν πρότερον εἰρηται)· διότι παρὰ τὴν τροφήν τὰ τοιαῦτα γίνεται πάντα, τῷ ποίαν<sup>1</sup> τε καὶ ποσὴν<sup>2</sup> εἶναι· μεθίστησι γὰρ αὕτη.<sup>3</sup> συμβαίνει γὰρ τὰ μὲν ἐν τοῖς ἀλεινοῖς καὶ διακόπροις καὶ λεπτογείοις καὶ ἠλιοβόλοις κούφην τε τὴν τροφήν καὶ εὐκατέργαστον ἔχειν, ὥστε καὶ τὰ ξυριστάμενα μανὰ καὶ μαλακὰ γίνεσθαι.

διὰ τοῦτο γὰρ καὶ τὰ Λήμνια<sup>4</sup> τεράμονα, διότι τοιαῦτα τὰ ἐδάφη (τὸ γὰρ ὄλον τὴν γῆν τεράμονά τινες καλοῦσιν τὴν τοιαύτην, ἐν δὲ τῇ τεράμονί φασι γίνεσθαι <τεράμονα><sup>5</sup>)· τεράμονα δὲ καὶ τὰ

<sup>1</sup> u: ποίαν U. <sup>2</sup> u: πόσην U. <sup>3</sup> aP: αὐτὴν U<sup>ac</sup> (-ῆν U<sup>c</sup>): αὐτῆ u: αὐτῆ N. <sup>4</sup> U<sup>cc</sup>: λι- U<sup>ac</sup>.

<sup>5</sup> added by Schneider (following Gaza) after τεράμονι: placed here by me.

<sup>1</sup> The causes are different characters in ground, air and seed.

close in texture and hard; for the former will then admit the heat and fluid that bring about the loosening, and the latter will not admit them but keeps them out by its close texture and hardness.

The "ready" and the "stubborn" being distinguished in this way, we must consider the nature and character<sup>1</sup> of the causes that bring them about. 12.3

### (1) Causes in the Types of Ground

Now that bald statement (which we also applied<sup>2</sup> to earlier problems) is not only bald but true, that all such differences<sup>3</sup> arise from difference in quality and quantity of food, since it is the food that changes the character. For it happens that in warm, well-manured, light and sunny ground the plants get light and easily processed food, so that the seeds that are formed are open in texture and soft.

So the reason why Lemnian seeds<sup>4</sup> are ready is that the soil of Lemnos is of this character<sup>5</sup> (some persons even go on to call such ground "ready," asserting that seeds "come out ready in ready ground"). The seeds are ready in Egypt too, both

<sup>2</sup> CP 4 9. 4 (explaining lightness and heaviness), CP 3 17. 7 (explaining the change from acid to sweet).

<sup>3</sup> Difference of character in the same plant, not differences that make another plant.

<sup>4</sup> Not mentioned elsewhere.

<sup>5</sup> The ground of Lemnos is covered with volcanic ash.

ἐν Αἰγύπτῳ διὰ τε τὸ ἕδαφος καὶ διὰ τὸν ἀέρα, τὸ γὰρ θερμὸν οἰκεῖον τῇ τεραμότητι (καὶ ὅλως τῇ πέψει· διὸ καὶ τὰ κοπριζόμενα προτερεῖν φασὶ τῶν ἀκοπρίστων σχεδὸν εἴκοσιν ἡμέραις).

12.4 τὰ μὲν οὖν ἐν τῇ ἀλεεινῇ καὶ κούφῃ διὰ τὰς αὐτὰς αἰτίας τεράμονα· τὰ δ' ἐν τῇ ψυχρῇ καὶ πιείρα<sup>1</sup> καὶ γλίσρα καὶ ὡσπερ κεραμέα,<sup>2</sup> καὶ ἔτι δὴ τῇ λειμωνίᾳ καὶ ἐφύδρω καὶ ἐλώδει, πάντα [τεράμονα]<sup>3</sup> διὰ τε τὸ πλήθος καὶ τὴν ἰσχυρὰν τῆς τροφῆς πυκνά τε<sup>4</sup> καὶ βαρέα καὶ σκληρά, τοῦ γεώδους τε πολλοῦ καὶ τοῦ ψυχροῦ καταμιγνυμένων (ἢ γὰρ δὴ πῆξις καὶ ἡ πύκνωσις ἐκ τούτων, ἐξ ὧν περ καὶ ἡ σκληρότης)· ἐν δὲ τοῖς ἐλώδεσιν καὶ ἐφύδροις ἀχρεῖα τὸ ὅλον· οὐ γὰρ ἐνδιδοὶ βρεχόμενα,

<sup>1</sup> Coray (*spissa Gaza*): πικρὰ U.

<sup>2</sup> ego: κεραμία U.

<sup>3</sup> ego (*Omnia haec incoctilia Gaza*): πάντα (πάντ' Schneider) ἀτεράμονα Scaliger.

<sup>4</sup> U: δὲ Schneider.

<sup>1</sup> That is, the warm climate.

<sup>2</sup> Manure is hot: cf. CP 3 6. 1.

<sup>3</sup> That make them open in texture and soft (CP 4 12. 3); except for the seeds of Lemnos and Egypt they have not yet been actually termed "ready."

<sup>4</sup> The stiffening comes from the cold, the closing of texture from the earthy.

because of the ground and because of the air,<sup>1</sup> since heat is favourable to readiness (and to concoction in general, which is why plants receiving manure are asserted to mature some twenty days ahead of those receiving none).<sup>2</sup>

The seeds, then, in warm and light ground are for the same reasons<sup>3</sup> ready; whereas the seeds in cold and rich and viscous ground, that consists (as it were) of potter's clay, and again in meadow land and land with surface water and swampy, are all of them, owing to the great quantity and strong quality of their food, close in texture, heavy and hard, since a great deal of the earthy and cold has entered into their composition (for the stiffening and closing of texture come from these,<sup>4</sup> and from these in turn comes their hardness), and in swampy land and land with surface water are simply useless,<sup>5</sup> since they do not give when immersed in water,<sup>6</sup> and this

12.4

<sup>5</sup> Useless that is for cooking (and human food), and hence stubborn; the ones just mentioned have only been called close in texture, heavy and hard, and this may not have excluded the possibility of cooking some of them.

<sup>6</sup> That is, the amount and strength of the fluid in them is so great that it is not affected by the water in which they are boiled. Cf. Aristotle, *Meteorologica*, iv. 3 (380 b 20–21) (the fluid in things boiled is brought out of them by the heat in the cooking water); iv. 3 (381 a 4–8) (to be capable of being boiled things must be capable of being thickened or becoming smaller in amount or heavier).

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διὸ καὶ καταχρῶνται πρὸς τὰς ὕς.

αἱ μὲν οὖν ἐκ τῶν ἔδαφῶν αἰτίαι σχεδὸν αὐταί.<sup>1</sup>

12.5 ἐπεὶ δὲ καὶ τὰ ὕδατα τὰ οὐράνια καὶ ὁ ἀήρ συνεργεῖ ταῖς τροφαῖς, διὰ τοῦτο ταῖς τε<sup>2</sup> ἐπομβρίας ἀτεράμονα μᾶλλον γίνεται, πλέονος οὐσῆς καὶ ἀπεπτοτέρας τῆς τροφῆς (σχεδὸν γὰρ ταυτὸ<sup>3</sup> συμβαίνει καὶ εἰ<sup>4</sup> ἐκ τῆς τοιαύτης γῆς), καὶ εἰ τοιαύτη τοῦ ἀέρος ἢ ψυχρότης ὥστε ἔνυδρός τις εἶναι καὶ μὴ πνευματική· πῆξιν γὰρ οὕτω ποιήσει καὶ πύκνωσιν.

διηρημένων<sup>5</sup> δὲ εἰς ταῦτα τῶν αἰτίων,<sup>6</sup> οὐδὲν κωλύει καὶ τὸ αὐτὸ χωρίον ὅτε μὲν τεράμονα φέρειν, ὅτε δὲ ἀτεράμονα, μὴ ὁμοίων<sup>7</sup> ἀλλ' ἐναντίων γινομένων τῶν ἐκ Διός, καὶ τῶν διειρηγμένων αὐλάκι τὰ μὲν τεράμονα, τὰ δὲ ἀτεράμονα γίνεσθαι,

§ 5 lines 12–13 Plutarch, *Quaest. Conv.*, vii. 2. 3 (701 C-D): οὐ δεῖ δὲ θαυμάζειν ἀκούοντας τῶν γεωργῶν ὅτι καὶ δυεῖν ἀλάκων ἢ μὲν ἀτεράμονας <ἢ δὲ τεράμονας> ἐκφέρει τοὺς καρπούς.

<sup>1</sup> u: αὐταί U.      <sup>2</sup> UN: γε aP.

<sup>3</sup> ego: τοῦτο U.      <sup>4</sup> u: ἡ U.

<sup>5</sup> u aP: διειρημένων UN.

<sup>6</sup> u: αἰτίων U: αἰτιῶν N aP.

<sup>7</sup> u: ὁμοίωι U.

## DE CAUSIS PLANTARUM IV

is why they are fed to the pigs.

These, then, are the causes (one might say) that come from the types of ground.

### (2) Causes in the Types of Air

Since rain and the air also cooperate in the type of feeding, the seeds tend more to become stubborn in rainy spells, the food being then more copious and so more unconcocted (for the same result, one might say, occurs then as when the food comes from ground with surface water)<sup>1</sup>; again the seeds are more stubborn when the coldness of the air is of a damp sort and not windy, since under these conditions the air will produce stiffening<sup>2</sup> and closing of texture.

### *The Problem Solved by the Two Kinds of Causes*

Now that the causes have been distinguished into these two<sup>3</sup> there is nothing to prevent (1) the same field from bearing ready seeds at one time and stubborn at another,<sup>4</sup> when the weather conditions are not similar but the opposite, and (2) crops separated by a furrow's breadth from becoming the one ready, the other stubborn,<sup>4</sup> when the ground is

<sup>1</sup> CP 4 12. 4.

<sup>2</sup> Cf. CP 5 12. 7 and CP 4 12. 4 with note 4.

<sup>3</sup> From the ground and from the air.      <sup>4</sup> CP 4 12. 1.

12.6 εἴπερ τοῦ μὲν τοιόνδε, τοῦ δὲ τοιόνδε τὸ ἔδαφος.  
 ὥσπερ γὰρ ἐν τοῖς μετάλλοις ῥάβδους, οὕτως  
 κὰν<sup>1</sup> τοῖς ἐργασίμοις ὑπολαβεῖν χρῆ διατετάσθαι  
 τὴν μὲν τοιάνδε, τὴν δὲ τοιάνδε, παρ' ἀλλήλας,  
 ὥστε, τῶν αὐτῶν ἐκ τοῦ ἀέρος γινομένων, ταῖς  
 ἰδίαις δυνάμεσι ποιεῖν τὰς διαφοράς, ὅτε δὲ καὶ  
 τοῦ αὐτοῦ χωρίου μικρὸν τι μέρος εἶναι τοιοῦτον·  
 ὡσαύτως δὲ καὶ εἴ τις ἀέρος ἢ πνεύματος προσπέ-  
 σοι τοιαύτη ψυχρότης ὥστε ποιῆσαι πῆξις ἢ καθ'  
 ὄλον ἢ κατὰ μῦριον (ὃ καὶ κατὰ τὴν φθορὰν συμ-  
 βαίνει, τῷ τὰ μὲν παραλλάττειν, τὰ δὲ ἐπιβαί-  
 νειν).

καὶ εἴ τις ἐν αὐτοῖς τοῖς σπέρμασιν ἀνομοία διά-  
 θεσις ὑπάρχει· τὰ γὰρ ἀσθενέστερα δηλον ὡς εὐ-  
 παθέστερα, τὸ δ' ἀσθενὲς κὰν φύσει γίνοιτο, τῷ  
 λαμβάνειν τινὰ μεταβολὴν ἐν ἑαυτῷ.

12.7 διὸ καὶ τῶν ἐπὶ τοῦ καυλοῦ κνάμων οὐδὲν κω-  
 λυεῖ τὸν<sup>2</sup> μὲν<sup>3</sup> ἀτεράμονα τῶν λοβῶν<sup>4</sup> εἶναι, καὶ

§ 7 lines 1-4 Cf. Plutarch, *Quaest. Conv.*, vii 2. 3 (701 D)  
 (continued from CP 4 12. 8): καὶ ὁ μέγιστόν ἐστι, τοῦ κνάμου  
 (τοὺς κνάμους Wyttenbach) τῶν λοβῶν οἱ μὲν τοίους, οἱ δὲ τοίους,  
 δηλονότι τοῖς μὲν ἦττον τοῖς δὲ μᾶλλον ἢ πνεύματος ψυχροῦ  
 <προσ>πεσόντος <ἢ> ὕδατος.

of the one character in the one field, of the other in  
 the other. For just as with veins in a mine, so in cultivated  
 12.6 land we must suppose that different kinds of  
 soil extend alongside one another, so that although  
 the weather conditions are the same, the different  
 soils, by the powers that distinguish them, produce  
 the difference in the seeds; and that sometimes even  
 in the same field a small portion belongs to such a  
 different vein. So too if coldness of air or wind  
 should strike of a sort to produce stiffening in the  
 whole field (or in a portion, this also happening  
 when the cold kills, because the wind by-passes one  
 spot and overflows another).<sup>1</sup>

(3) *A Cause in the Seed Itself*

Again there might be a dissimilar disposition in  
 the seeds themselves. For the weaker ones are evi-  
 dently the more easily affected, and weakness could  
 also arise naturally, by the seed's undergoing a cer-  
 tain change within itself.<sup>2</sup>

This is why there is nothing to prevent, among  
 12.7 beans on the same stalk, the one podful from being

<sup>1</sup> Cf. CP 5 12. 10.<sup>2</sup> And not attributable to the soil or air.<sup>1</sup> aP: καὶ U N.<sup>2</sup> ego: τῶν U.<sup>3</sup> μὲν <τεράμονα, τῶν δὲ> Itali (after Gaza).<sup>4</sup> U: τὸν λοβὸν u.

ἐν τῷ αὐτῷ λοβῷ (καθάπερ τινές φασιν, εἶπερ λέγουσιν ἀληθῆ) · τὸν μὲν γὰρ ἀσθενέστερον εἶναι, τὸν δὲ ἰσχυρότερον ἐνδέχεται (τῆς<sup>1</sup> ἀσθενείας τοῦ κυάμου κἀκεῖνο σημεῖον ἂν τις λάβοι · μόνος γὰρ δοκεῖ μεταβάλλειν τὴν χροῶν ἐκ λευκοῦ μέλας).

12.8 ὅτι δὲ πῆξις τις καὶ πύκνωσις ἐστὶν ὑπὸ τοῦ ψυχροῦ δι' ἣν ἀτεράμονα γίνεται, μαρτυρεῖ καὶ τὸ περὶ Φιλίππους συμβαῖνον περὶ τοὺς κυάμους · πνεῖ<sup>2</sup> γὰρ σφόδρα ψυχρὸν<sup>3</sup> καὶ λικνωμένοις ἐπιγινόμενον ·<sup>4</sup> ἔαν δ' ἐν<sup>5</sup> τοῖς ἀχύροις ἀπηλοημένοις<sup>6</sup> ἐν τῇ ἄλω καὶ καθαροῖς οὔσιν, οὐ μεταβάλλουσιν, ἀλλὰ τεράμονες,<sup>7</sup> ὅτε μὲν γὰρ ὑπὸ τῶν ἀχύρων, ὅτε δὲ ὑπὸ τῆς πρὸς ἀλλήλους συναφῆς σκεπάζονται, καὶ ἅμα τῆς γῆς θερμότητος · ὅταν

§ 8 lines 2–8 Plutarch, *Quaest. Conv.*, vii 2. 3 (701 C): ἐνιαχοῦ δὲ καὶ πνεῦμα λικνωμένοις ἐπιγινόμενον ἀτεράμονας ποιεῖ διὰ τὸ ψύχος, ὡς περ ἐν Φιλίπποις τῆς Μακεδονίας ἰστοροῦσι · τοῖς δ' ἀποκειμένοις βοηθεῖ τὸ ἄχυρον.

lines 2–15 Pliny, *N. H.* 18. 155: circa Philippos ateramum nominant in pingui solo herbam, qua faba necatur, teramum, qua in macro, cum udam quidam ventus adflavit.

<sup>1</sup> τῆς <δ'> aP.

<sup>2</sup> ego (ἐκεῖ Heinsius): ἐστι U.

<sup>3</sup> ψυχρὸν <ἐκεῖ τὸ πνεῦμα> Itali (after Gaza).

stubborn, and so with the beans in the same pod, as some assert (supposing the assertion true); for it is possible for the one bean or podful to be weaker, the other stronger. As for the weakness of the bean, one could take the following as further proof: that the bean alone, it is believed, changes its colour from light to dark.

*Other Cases of Readiness and Stubbornness  
Explained by These Causes*

But that what makes the seeds stubborn is a stiffening and closing of texture brought about by cold is attested by what occurs to the beans at Philippi. A very cold wind rises there and blows on the beans during the winnowing too.<sup>1</sup> If it blows on them as they lie threshed on the threshing floor among the chaff and stripped of the pod, they do not change but remain ready, for they are sheltered partly by the chaff and partly by their contact with one another, and then too by the warmth of the ground. Whereas

12.8

<sup>1</sup> Cf. *HP* 8 8. 7: "At Philippi if the bean when it is being winnowed is caught by a local wind, ready beans become stubborn."

<sup>4</sup> λικνωμένοις ἐπιγινόμενον Plutarch: ἀτεράμονες τι γινόνται U.

<sup>5</sup> U<sup>c</sup>: ἔ U<sup>ac</sup>.

<sup>6</sup> Schneider: ἀπῆθλωμένοις U: ἀποκειμένοις Plutarch.

<sup>7</sup> P: ἀλλὰτεράμονες U: ἀλλ' ἀτεράμονες u N a.

δὲ μετέωροι ληφθῶσι, τό τε πνεῦμα μᾶλλον ἰσχύει καί, οὐδαμόθεν ἐχόντων σκέπην, εἰσδύεται καὶ πήγνυσιν· ἅμα δὲ καὶ ἀσθενέστατοι τότε γίνονται, γυμνούμενοι πρῶτον τῶν ἀχύρων καὶ τῆς θερμότητος<sup>1</sup> τῆς περιεχούσης· αἱ δὲ μεγάλαι μεταβολαὶ μάλιστα κινουσιν.

12.9 ἐπιγενομένου δὲ χρόνου (καὶ ὡς περ ἤδη συνεστηκότων) ἐὰν δικμῶνται, πάλιν μηδὲν πάσχειν ὑπὸ τοῦ πνεύματος· ἰσχυρότερον [τε]<sup>2</sup> γὰρ ἤδη καὶ τὸ κέλυφος τὸ περιέχον.

τὸ δὲ πλείω χρόνον ἐᾶν<sup>3</sup> ἠλοημένους ὑπαιθρίους, ποιεῖν<sup>4</sup> ἀτεράμονας (ὡς περ τινές φασιν) οὐκ ἄλογον· ἀποψύχονται γὰρ δῆλον ὅτι μᾶλλον τοῦ συμέτρου καὶ ἅμα κατασκληρύνονται.

ἀκόλουθον δὲ πως τούτω καὶ ὅτι τὸ μετὰ τὴν σπορὰν εὐθὺς ἐπιγινόμενον ὕδωρ ἀτεράμονας ποιεῖ· ἀσθενῆ γὰρ αὐτὸν λαβὸν<sup>5</sup> ἐν τῷ διαβλαστάνειν ὄντα, κατέψυξεν· ὃ πρὸς μὲν τὴν φύσιν<sup>6</sup>

§9 lines 5–6 Cf. Plutarch, *Quaest. Conv.*, vii 2. 3 (701 C): τοὺς δὲ καρπούς, κἄν ἐπὶ τῆς ἄλλω διαμείνωσι πλείω χρόνον ὑπαιθριοὶ καὶ γυμνοί, μᾶλλον ἀτεράμονας γίνεσθαι λέγουσιν τῶν εὐθὺς αἰρομένων.

<sup>1</sup> u: θερμότητος U. <sup>2</sup> Schneider.

<sup>3</sup> u aP: ἐὰν U: ἐὰν N. <sup>4</sup> u: ποιεῖ U.

<sup>5</sup> u: λαβῶν U aP: λοβῶν N.

if the wind catches them off the ground, the wind has greater strength and enters and stiffens them when they have no shelter on any side; and at the same time the seeds then reach their weakest state, since they are now for the first time divested of the chaff and of the warmth that had hitherto enveloped them, and it is the great changes that have the greatest effect.<sup>1</sup>

But if the beans are winnowed after an interval and have had time to become (as it were) firm after the threshing, the wind now does them no harm, since even the skin round them has got stronger. 12.9

But that leaving the threshed beans lie in the open much longer makes them stubborn (as some assert) is not unreasonable, since they evidently cool off more than is good for them and at the same time get too hard.<sup>2</sup>

It accords in a way with this that rain right after the sowing makes them stubborn, for it catches the seed at a weak moment, engaged in sprouting, and chills it; and although the occurrence does no harm

<sup>1</sup> One may suspect that the labourers preferred to await a warmer wind for the task of winnowing and devised this excuse for the delay.

<sup>2</sup> The cold wind carries the fluid away with the heat: cf. CP 5 12. 6. The hardening is observable; the cooling is inferred.

<sup>6</sup> U: ἔκφυσιν Gaza (*exortum*), Heinsius.

12.10 οὐκ ἔβλαπτε, πρὸς δὲ τὴν ἔψησιν. ἐν ἑτέροις δὲ καὶ δι' ἄλλα τῆς δυνάμεως οὐσης, οὐκ ἄλογον τὸ μὲν ὑπάρχειν, τὸ δὲ μὴ· τότε γὰρ ἀβλαστὲς καὶ ἄγονον, ἢ καὶ δυσαιξές, ὅταν κακωθῆ<sup>1</sup> πρὸς τὴν γέννησιν.

οὐκ ἄλογον οὐδὲ ἐξ ἀτεραμόνων τεράμονα<sup>2</sup> γίνεσθαι σπαρέντα πάλιν· ὑπὸ γὰρ τῶν αὐτῶν ἐναντίως διατιθεμένων<sup>3</sup> (ὡσπερ εἶπομεν) οὐκ ἄλογος ἡ τεραμότης. ὡστ' εἰ ὁ ἀήρ καὶ τὰ ὕδατα καὶ τὰ ἐδάφη τοιαῦτα, τί κωλύει καὶ τὰ σπέρματα μεταβάλλειν;

12.11 εἰ δὲ συμβαίνει τὰ μὲν τεράμονα μᾶλλον ἐν-δεδωκέναι, τὰ δὲ ἀτεράμονα περιτετάσθαι τῷ<sup>4</sup> κελύφει (καθάπερ τινές φασιν), καὶ καταχασμω-μένων τὰ μὲν μεταβάλλειν τὴν χροάν, τὰ δὲ μὴ, καὶ τὰ ἐγχυλότερα<sup>5</sup> θεριζόμενα τεραμονέστερα γί-νεσθαι (καὶ γὰρ τοῦτο λέγουσιν), οὐθὲν ἄτοπον· ἢ

<sup>1</sup> Schneider : κακωθῆ U.

<sup>2</sup> Heinsius : ἀτεράμονα U.

<sup>3</sup> Gaza (*dispositis*), Schneider : δι (i from ε [?] U<sup>cc</sup>) τιθεμε-νων U.

<sup>4</sup> τῷ u : το U.

<sup>5</sup> Schneider : ἐκλυτότερα U.

<sup>1</sup> Of the bean-plant; powers cannot be observed directly, and must be seen in their results (CP 1 21. 4).

to the productivity of the crop, it spoils the crop for cooking purposes. But the power<sup>1</sup> works on different results<sup>2</sup> and for different ends,<sup>3</sup> and so it is not unreasonable that one character should be present, the other not,<sup>4</sup> since only then does the seed fail to sprout and fail to bear (or else grows poorly) when the damage affects its power of repro-duction.

12.10

Nor is it unreasonable that stubborn seeds should at the next sowing produce ready ones, since readiness is no unreasonable result of the same causes when they have taken on (as we said)<sup>5</sup> the opposite character; hence, if air, rain and ground are in the opposite state, what is to prevent the seeds from changing too?

If it so happens that ready seeds are more shrunken in the skin, whereas the stubborn ones are fitted tightly by it (as some assert), and if when the pods open the ready seeds change colour whereas the others do not, and if the seeds that are harvested in a more succulent condition turn out to be readier (for this too is asserted), there

12.11

<sup>2</sup> Production in the one case of a fertile, in the other of a cookable, bean.

<sup>3</sup> A fertile seed serves the plant, a ready seed serves man.

<sup>4</sup> That is, that the seed should have the character of being fertile, but not that of being ready.

<sup>5</sup> CP 4 12. 5.

τε γὰρ περίτασις<sup>1</sup> σκληρότητος καὶ πήξεως καὶ ἀδρύνσεως, οὐθὲν δὲ τούτων ἀλλότριον τοῖς ἀτεράμοσι· τό τε μὴ ἀλλοιοῦσθαι καταπνεόμενα σημαίνει σκληρότητά τινα καὶ ἀπάθειαν, θάτερον<sup>2</sup> δὲ τοῦναντίον· καὶ τὸ μὴ ἔγχυλα<sup>3</sup> θερίζεσθαι, σκληρότητα πλέω καὶ πήξιν, τὸ δὲ ἄγαν σκληρὸν οὐκ εὐδιάχτου.

12.12 ὁ καὶ ἐπὶ τῆς ἄλω φασὶ τινες ἄν συμβῆ, γίνεσθαι ἀτεράμονα,<sup>4</sup> οὐκ ἄγαν τοῦτό γε λέγοντες πιθανόν· ἢ γὰρ ἀπὸ τοῦ ἡλίου ξηρότης ἀχυλότερα μὲν ποιεῖ καὶ ἦττον ἡδέα,<sup>5</sup> εὐεψητότερα <δὲ><sup>6</sup> οὐδὲν ἦττον, ἀλλὰ μᾶλλον (τὰ γούν ἐρίγματα<sup>7</sup> διηλωθέντα θᾶττον διαχεῖσθαι<sup>8</sup>)· εἰ δ' ἄρα καὶ τοῦτ' ἀληθές, οὐκ ἐναντιοῦται τοῖς πρότερον.

οὐδ' εἰ παλαιούμενα γίνεται μᾶλλον ἀτεράμονα· καὶ<sup>9</sup> οὕτως ξηρότερα συμβαίνει γίνεσθαι διὰ τε τοῦ περιέχοντος καὶ ὑπὸ τῆς διεκπνοῆς

<sup>1</sup> Gaza (*obtentio*), Scaliger: *περίτασις* U.

<sup>2</sup> aP: *θατερον* (-έ- u N) U.

<sup>3</sup> Schneider: *ἐκλυτα* U.

<sup>4</sup> Gaza, Scaliger: *τεράμονα* U.

<sup>5</sup> u: *ηδε* U.

<sup>6</sup> u.

<sup>7</sup> U: *-ή- u*.

<sup>8</sup> U: *διαχεῖται* Schneider.

<sup>9</sup> καὶ <γὰρ> Itali.

is nothing odd. For the tight fit of the skin is a matter of hardness and stiffening and plumpness, and none of these characters is out of place in stubborn seeds; and undergoing no alteration<sup>1</sup> when exposed to the wind points to a certain hardness and immunity to being affected, whereas to undergo it points to the opposite; and not to be harvested in a succulent condition points to a greater hardness and stiffness, and what is very hard is not easily loosened by boiling.

Some say that if this non-succulence also occurs 12.12 on the threshing floor the seeds become stubborn, but here at least the assertion is not very convincing, for dryness from exposure to the sun makes the seeds less succulent and palatable to be sure, but does not make them the less easy to boil, but easier: thus bruised seeds after being set out in the sun are said to be more quickly softened by cooking. Still, even if this further assertion is true, it does not conflict with what was said before.<sup>2</sup>

Nor is there a contradiction if seeds kept long in storage tend more to become stubborn: under these conditions too it happens that they get drier, both through the agency of the surrounding air<sup>3</sup> and by the evaporation of their fluid, which takes their heat

<sup>1</sup> That is, alteration of colour.

<sup>2</sup> CP 4 12. 11 *ad fin.*

<sup>3</sup> Which chills and thereby dries them.



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[τοῦ θερμοῦ],<sup>1</sup> ὃ συνεξάγει καὶ τὸ θερμόν.<sup>2</sup>

εὐλογον δὲ καὶ θάττον καὶ μᾶλλον κόπτεσθαι τὰ τεράμονα· καὶ γὰρ γλυκύτερα (ταῦτα <δὲ><sup>3</sup> μᾶλλον ζωοποιεῖ) καὶ πεπεμμένα (μεταβολὴ δὲ καὶ τούτων θάττων).

καὶ ταῦτα μὲν ἂν ἔχοι τὰς εἰρημένας αἰτίας.

12.13 τὸ<sup>4</sup> δὲ μόνα τῶν ὀσπρίων, ἣ καὶ τοῦ παντὸς σίτου, κύαμον καὶ φακὸν ἀτεράμονα γίνεσθαι, ψευδὸς ὑποληπτέον· ἀλλὰ μάλιστα διαπειρώμενοι τούτων διὰ τὴν χρείαν, ταῦτα μόνα φαμέν, ὅτι τοῖς μὲν ἀλήθοντες χρώμεθα, τοῖς δ' ὄλοις. αὕτη δ' οὐ μικρὰ διαφορὰ· καὶ γὰρ ἐπ' ἐκείνων, εἰ λεπύνοντες, οὐκ ἂν ὁμοίως ἐνδηλον ἦν. ἐκφαίνεται

<sup>1</sup> ego.

<sup>2</sup> U N P<sup>ac</sup> (?): ὑγρόν aP<sup>c</sup>.

<sup>3</sup> Wimmer: <καὶ> Basle ed. of 1541 after Gaza.

<sup>4</sup> U aP: τὰ u N.

<sup>1</sup> Cf. CP 1 1. 3.

<sup>2</sup> Cf. CP 4 14. 5; 5 18. 2.

<sup>3</sup> They must change to something worse because they cannot get better; they have as it were reached the end of the line. Cf. CP 5 18. 2.

<sup>4</sup> Cf. HP 8 8. 6: "The terms 'ready' and 'stubborn' are used only of pulses, but it is not unreasonable that the like

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along with it.<sup>1</sup>

It is reasonable that the ready seeds among them should also get worm-eaten sooner and to a greater extent, since they are not only sweeter than the rest (and sweet things breed worms),<sup>2</sup> but they are also concocted (and concocted things too are quicker to change to something else).<sup>3</sup>

These matters too, then, would have the causes mentioned.

*Two Notions about Readiness and Stubbornness Are False, and These Causes Do Not Apply*

That bean and lentil are the only pulses (or 12.13 indeed the only grains) that become stubborn we must take to be false. The truth is that we test bean and lentil most of all by our way of using them for food and so assert that they alone get stubborn, because we prepare the rest by grinding but use these seeds entire.<sup>4</sup> This is no small difference, since if we reduced bean and lentil to meal, like the rest, their stubbornness would not be so evident;

or the same should also occur in cereals, but is not so evident there because we do not prepare them in the same way. Indeed it is not equally apparent in all pulses, but is mainly spoken of in connexion with beans and lentils, whether these are the seeds most affected or whether the effect is more apparent because of our way of preparing them."

γουν καὶ ἐπὶ τῶν ἐρεβίνθων καὶ ἐπὶ τῶν ἄλλων ἐφομένων ὄλων<sup>1</sup> τὸ ἀτέραμον. εἰ δ' ἔτι μᾶλλον ἐν τούτοις,<sup>2</sup> οὐδὲ τοῦτο ἄλογον· ἀσθενέστερα γὰρ (ὡς εἰπεῖν), τὸ δ' ἀσθενὲς παθητικώτερον.

ὁ δὲ λέγουσιν οἱ πολλοί, διότι<sup>3</sup> τὸ κερασβόλον ἀτέραμον γίνεται, μὴ ποτ' ἄγαν εὐηθες ἦ· σκληρότερος γὰρ ὁ λίθος, πρὸς ὃν πολλάκις προσπίπτει τὰ σπέρματα, κἂν μὴ προσκόψη, μηδὲ βουσὶν ἀροτριᾷ τις, οὐδὲν ἦττον ἀτέραμον γίνεται.

περὶ μὲν οὖν τούτων ἰκανῶς εἰρήσθω.

- 13.1 ὅσα δὲ τῶν ὁμογενῶν μὴ ἅμα διαβλαστάνει τοῖς ἄλλοις, ἀλλ' ὕστερον πολλῶ (καθάπερ ἐλέχθη περὶ τοῦ τευτλίου), παραπλησία τις ἢ αἰτία ταύτης (καθάπερ εἵπομεν) ἔστιν· ὡσπερ γὰρ πρὸς ἐψησιν καὶ ὄλων πύρωσιν ἀτεράμονα, καὶ πρὸς ἔκφυσιν οὕτω καὶ πρὸς βλάστησιν· ἢ γὰρ τοιαύτη, ἀτέλειά τις τῶν σπερμάτων, ὁμοίως δ' ἐπὶ πάντων ὧν τοῦτο συμβαίνει.<sup>4</sup>

<sup>1</sup> Schneider: ὄλων U.

<sup>2</sup> δ' ἔτι μᾶλλον ἐν τούτοις ego (*ceterum [si quis] illa tantummodo incoctilia [esse contendat]*) Gaza: δὲ τὸ ἀτέραμον μόνον ἐν τούτοις Schneider: δ' ἀτεράμονα μόνον ταῦτα Wimmer): δ' ἀτέραμον ἐν τούτοις U.

<sup>3</sup> Schneider: διατι U. <sup>4</sup> U\* NaP: συμβαίνει U<sup>ar</sup>.

stubbornness in any case is apparent in chickpea too and the rest when they are boiled whole. If it is still more apparent in bean and lentil, this too is not unreasonable, since these are weaker (one may say) than the rest,<sup>1</sup> and what is weak is more susceptible.

The popular notion that a seed "that strikes the hoof" becomes stubborn<sup>2</sup> is, one fears, much too naive. Thus a stone, and the seeds often collide with them, is harder than a hoof; and even if there is no collision with a hoof, no oxen being used by the farmer in his ploughing, the seed becomes stubborn none the less.

Let this suffice for the discussion of these points.

#### *Stubbornness For Sprouting*

In plants of the same kind where some do not 13.1 come up with the rest, but much later (as we said of beet),<sup>3</sup> the cause is similar to stubbornness: just as some seeds are stubborn about boiling (and cooking in general), so some are stubborn about germination and sprouting, the stubbornness here being a certain immaturity of the seeds (and similarly with all plants in which the delay occurs).

<sup>1</sup> For the weakness of bean cf. CP 2 12. 5.

<sup>2</sup> Cf. Plato, *Laws*, ix, 853 D; Plutarch, *Table-Talk*, vii. 2. 1-3 (700 C-701 D); *Geoponica*, ii. 19. 4; xv. 1. 27.

<sup>3</sup> CP 4 3. 2; cf. CP 2 17. 7; 4 6. 7.

## THEOPHRASTUS

περὶ μὲν οὖν τούτων ἐπισκεπτέον.

13.2 περὶ δὲ τοῦ ἰσχυρότερα καὶ εὐχυλότερα γίνεσθαι, καὶ νοστιμώτερα ἢ ἀνοστότερα, καὶ πρὸς τὴν σίτησιν βελτίω ἢ χείρω,

τὰ μὲν τοῖς τόποις διαφέρει (καθάπερ εἴρηται), τῷ ξηρότερα ποιεῖν καὶ πυκνότερα καὶ ξυνεστηκότα μᾶλλον, οἷον τὰ ὄρεινὰ τῶν πεδινῶν, καὶ ἔτι μᾶλλον τῶν ἐπόμβρων, εὐπνούστερά τε γάρ, καὶ ἐν τροφῇ συμμετροτέρα.<sup>1</sup>

νοστιμώτερα δ' ἐκ τῆς αὐτῆς παρὰ τὴν τοῦ ἀέρος κρᾶσιν· οὐ γὰρ πάντως ὅταν πλεῖστος καὶ ἀδρότατος γένηται, καὶ νοστιμώτατος, ἀλλ'

<sup>1</sup> ego: -οτερα U: -ότερα u.

<sup>1</sup> The yield in meal is calculated by comparing the volume of meal or flour with the volume of grain from which it was ground. This is distinct from what we render as "a big yield" or a "small yield," since these are

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These matters need investigation.

*Seed Crops: Differences in Consistency,  
Yield of Meal and Excellence as Food*

We pass to greater strength and succulence, 13.2  
greater or smaller yield in meal<sup>1</sup> and superiority or inferiority as food.

### (1) *Due to the Country*

In some plants the difference is due to the country (as we said),<sup>2</sup> because the country makes them drier, of closer texture and more compact, as mountain districts do this more than the plains and still more than rainy districts, since they are better ventilated and more nearly provide the right amount of food.

### (2) *Due to the Air*

In grain from the same country the greater yield of meal depends on the tempering of the air, since it does not necessarily follow, when the crop has kernels of the greatest number and size, that the yield in meal is greatest too, but for this a different

computed by comparing the amount of grain sown with the amount harvested and winnowed.

<sup>2</sup> CP 3 21. 1.

ἐτέραν δεῖ διάθεσιν ἔχειν.

- 13.3 δοκεῖ δὲ μεγάλα συμβάλλεσθαι<sup>1</sup> καὶ ἡ σκάλισι πρὸς τὸ νοστιμώτερον ποιεῖν, καὶ τὸ ἐγχυλότερα<sup>2</sup> θερίζειν (ἐξαναλωθέντος γὰρ παντός τοῦ ὑγροῦ καὶ χείρω πρὸς τὴν σίτησιν καὶ ἐλάττω). τὰ δ' ὄσπρια θερίζουσιν ἐγχυλότερα καὶ πρὸς τὸ δύνασθαι συλλέγειν, ξηρανθέντα<sup>3</sup> γὰρ καταρρεῖν.<sup>4</sup> τὸν δὲ θέρμον<sup>5</sup> ἤδη λήγοντος τοῦ θέρου<sup>6</sup> [δὲ],<sup>7</sup> ἀνυγραιομένου<sup>8</sup> τοῦ ἀέρος<sup>9</sup> κατὰ τὸ ἐωθινόν· ἂν γὰρ πρότερον θίγη τις, ἐκπηδᾷ<sup>10</sup> καὶ οὐκ ἔστι<sup>11</sup> λαβεῖν.

καὶ ταῦτα μὲν ὡς γεωργικά.

- 13.4 τὰ δὲ τῆς φύσεως, οἷον τὸ ἀδρύνειν τὰ πνεύ-

<sup>1</sup> N aP: συμβάλεσθαι U.

<sup>2</sup> Itali (*vegetiora* Gaza): ἐγγύτερα U. <sup>3</sup> B: ξηραθέντα U.

<sup>4</sup> U<sup>c</sup>: καταρρεῖν U<sup>ac</sup>: καταρρεῖ Heinsius (*defluunt* Gaza).

<sup>5</sup> δε θέρμον U<sup>c</sup>: δέρμον U<sup>ac</sup>. <sup>6</sup> Itali: ἀέρος U.

<sup>7</sup> N aP. <sup>8</sup> N aP: -μένουσ (-μενος U<sup>ac</sup>?) U.

<sup>9</sup> τοῦ ἀέρος N aP omit.

<sup>10</sup> ego (*ἐκπίπτει* u): ἐκπῆν (-v uncertain) U.

<sup>11</sup> u aP: οὐκέτι U: οὐκέτι N.

<sup>1</sup> Cf. HP 8 8. 2: "When there has been a year with good weather the grain also yields more meal. At all events the barley at Athens yields the most meal, Athens being the best barley producer. This happens not when the barley is

condition is required.<sup>1</sup>

(3) *Due to the Farmer*

Hoeing too is held to contribute much to a greater 13.3 yield in meal, and so too the harvesting of the seeds when they are still juicy, since after all the fluid has been exhausted they are not only inferior as food but smaller. Farmers harvest pulse when it is still juicy also to be able to gather it, since they say that the seed falls out when dry.<sup>2</sup> Lupine on the other hand is harvested in the early morning, when summer is already at an end and the air is getting rainy, for if you handle it before this time the seed jumps out and cannot be found.<sup>3</sup>

These are matters for the farmer.

*Seed-Crops: Special Effects of Wind and Rain*

To the realm of nature on the other hand pertain 13.4

most plentiful but when it gets weather with a certain blend of qualities."

<sup>2</sup> Cf. HP 8 11. 3: "They harvest legumes when still juicy to collect them more efficiently and easily, for the seeds quickly drop out otherwise and get dry and broken; and they do the same with wheat and a certain kind of barley because they make better meal when not dried out."

<sup>3</sup> Cf. HP 8 11. 4: "When left unharvested wheat keeps best, and lupine still more; for they do not even harvest it before there has been rain, because otherwise the seed jumps out when you harvest it and is lost."

ματα, καὶ τὸ<sup>1</sup> βόρεια μᾶλλον, καὶ ὅλως οἷς ἕκαστα<sup>2</sup> ψυχρά, καὶ τὰναντία δὴ φθείρειν, καὶ ὅσα δὴ τοῖς ὕδασι ἢ τοῖς πνεύμασι ἀπόλλυνται τοῖς παρώροις (ὡσπερ ἐλέχθη περὶ ἐρεβίνθων τῶν ἀνθούτων<sup>3</sup>)· ὁ δὲ κύαμος, ἐὰν πνεῦμα ἐπιγένηται λαμπρόν· καὶ ὁ πυρὸς καὶ ἡ κριθή, κἂν<sup>4</sup> ἀπηυθηκότα, ὑγρὰ δ' ἔτι<sup>5</sup> ληφθῆ, διαπνεῖται γάρ, καὶ κοπτόμενα πρὸς ἄλληλα κενοῦται.

τελευτούμενων<sup>6</sup> δὲ ἐπιγινόμενον ὕδωρ, ἐναντίως τὴν μὲν κριθὴν βλάπτει, τὸν δὲ πυρὸν ὠφελεῖ μᾶλλον· καὶ <γὰρ><sup>7</sup> γυμνή, καὶ τὸ ὅλον ἀσθενής, ὁ δὲ καὶ ἐν χιτῶσι, καὶ πυκνότερον καὶ ἰσχυρότερον, ὡστε τὴν μὲν ὀλίγησ δειῖσθαι τροφῆς (καὶ σχεδὸν ἀπὸ<sup>8</sup> τοῦ ἀέρος μόνης), τὸν δὲ πλείονος· ἔτι δέ,<sup>9</sup> ἰσχυρότερος ὢν, καὶ κατακρατεῖ καὶ συμπέτ-

<sup>1</sup> U: τὰ Schneider.

<sup>2</sup> οἷς ἕκαστα U: ἅ ἐκάστοις Wimmer.

<sup>3</sup> N aP: ἀθούτων (-ού- u) U.

<sup>4</sup> ego: καὶ U.

<sup>5</sup> ego (δ' ἔτι ἂν Wimmer): δέ τινα U.

<sup>6</sup> Wimmer: κενουμένων U<sup>c</sup> (-ού- U<sup>ac</sup>).

<sup>7</sup> καὶ <γὰρ> Wimmer (ἢ <μὲν γὰρ> Itali): καὶ U.

<sup>8</sup> U: τῆς ἀπὸ Schneider.

<sup>9</sup> ego (ἐκπίπτει U: ἐκπῆν (-ν uncertain) U).

<sup>1</sup> CP 4 8. 4; cf. HP 8 6. 5.

such matters as these: that winds make the seeds plump, and northerly winds do so more than the rest, and so in general whatever regional winds are cold, the winds of the opposite kind destroying them; and the cases where the crop is lost from unseasonable rain or wind (as was said<sup>1</sup> about the chickpea in flower). The bean crop is lost if a strong and steady wind comes up while the bean is in flower, wheat and barley even after shedding their flower if the wind catches them while the seeds are still fluid,<sup>2</sup> for the fluid evaporates and the plants are shaken empty of their grain by being buffeted against one another.

When rain comes as the seeds are reaching maturity it has opposite effects on wheat and barley: it injures barley but helps wheat instead. For barley is naked and in general weak, but wheat has several coats and is closer in texture and stronger; so that barley needs little food, indeed (one might say) only what comes from the air, whereas wheat needs more. Furthermore, since wheat is stronger, it succeeds better not only in mastering the food<sup>3</sup> but

13.5

<sup>2</sup> Cf. HP 8 10. 3: "Both wheat and barley are also killed by winds, when caught either in flower or just after they have shed the flower and are weak, and barley more especially, and often when it is already getting plump, if great winds arise and last for some time, for they dry and wither it, and some call this getting 'wind-blown.'"

<sup>3</sup> That is, the rain water.

τει μᾶλλον, καὶ τὸ ὄλον οὐδὲ πολλὴν δέχεται διὰ τὴν πυκνότητα καὶ τοὺς χιτῶνας.<sup>1</sup> ἢ δέ, πλείω τε ἔλκει, μανῆ τὴν φύσιν οὔσα,<sup>2</sup> καὶ ταύτην οὐ καταπέττει δι' ἀσθένειαν, καὶ ὑγρᾶς γενομένης, ὃ ἥλιος ἅμα τῇ ἐπιγενομένη συνεξάγει τὴν οἰκείαν ὑγρότητα<sup>3</sup> συνεφελκομένην,<sup>4</sup> καὶ τὰ πνεύματα δὲ κόπτοντα φθείρει μᾶλλον διὰ τὴν ἀσθένειαν.

13.6 ἀπορεῖται δὲ καὶ διὰ τί, ἄδρου ὄντος τοῦ σίτου (καὶ σχεδὸν ὡσπερ ξηροῦ), ἐφύσαντος,<sup>5</sup> οὐχ ὅτι βελτίων, ἀλλὰ καὶ χειρῶν<sup>6</sup> γίνεται· ἐὰν δὲ θερισθεῖς εἰς θωμοὺς<sup>7</sup> συντεθῆ, ἄδρότερος καὶ βελτίων, ἔνιοι δὲ καὶ ραίνουσιν.

αἴτιον δ' ὅτι τότε<sup>8</sup> μὲν ἀνυγραίνεται καὶ ὃ ἥλιος<sup>9</sup> ὅταν ἀναλάμψῃ συνεξάγει τὴν οἰκείαν

<sup>1</sup> Scaliger: χεμῶνας U.

<sup>2</sup> U<sup>r</sup> N aP: οὔσαν U<sup>ar</sup>.

<sup>3</sup> U<sup>cc</sup> (-τη U<sup>ac</sup>).

<sup>4</sup> Heinsius: -η U.

<sup>5</sup> ego (ἐφυσθεῖς Wimmer: ὅταν ἐφύσῃ Schneider): ἔκφυσις U.

<sup>6</sup> u aP: χείρω U (-εί N).

<sup>7</sup> Heinsius: θωσμ- U.

<sup>8</sup> Gaza, Schneider: τὸ U.

<sup>9</sup> ὃ ἥλιος u: ὀλιος U.

in concocting it, and indeed does not even absorb much of it because of its close texture and coats; whereas barley absorbs it in a greater amount, being in its nature of open texture, and is too weak to concoct properly what it absorbs; and when it has thus become fluid, the sun extracts together with the added fluid the native fluid, which is drawn away with it; and again, the winds by their buffeting are more destructive to it because of its weakness.

#### *A Problem about the Mature Wheat and Barley*

Another problem<sup>1</sup> is this: why, when the cereal is 13.6 plump and one might say dry (as it were),<sup>2</sup> rain, far from improving the crop, makes it worse; but cereal that has been reaped and heaped into piles gets plumper and so improves, and some farmers even sprinkle the pile?

#### *Solution*

The reason is this: in the first case the cereal gets drenched and the sun comes out again and removes

<sup>1</sup> The first problem (though not called one) was dealt with in the second paragraph of CP 4 13. 4 and the chapter following.

<sup>2</sup> After shedding the flower wheat and barley were "fluid" (not firm or rigid): CP 4 13. 4, first paragraph *ad fin.*

ὕγροτητα καὶ ἰσχνάινει.<sup>1</sup> ὅταν δὲ εἰς θωμοὺς<sup>2</sup> συντεθῆ, συνικμάζεται τε, καὶ ἡ ἀναγομένη ἀτμὶς, λεπτή καὶ πνευματώδης οὔσα, παρεισδύεται καὶ ἀδρύνει τοὺς ὄγκους.

13.7 ταῦτο δὲ τοῦτο συμβαίνει καὶ ὅταν εἰς τὰ οἰκία<sup>3</sup> τεθῆ χύδην, διὸ καὶ τὸ ἐπίμετρον ποιεῖ· τὸν γὰρ ἀτμὸν τὸν ἀνιόντα, λεπτὸν ὄντα, δέχεται, καὶ διὰ τοῦτο εἰς βάθος καταβάλλουσιν, ὅπως πλέον ἀνίη.<sup>4</sup> πάντα δὲ ταῦτα διασημαίνει, καὶ ἔτι πρὸς τούτοις ἡ ἐμβαλλομένη γῆ καὶ ἄκοπον παρέχουσα καὶ ἀνοιδίσκουσα, καὶ ὅτι δύναται τινα δι' αὐτῶν ἔλκειν<sup>5</sup> τροφήν ἄνευ τῶν ριζῶν, ὅθεν καὶ ἡ ὑπὸ τῶν πνευμάτων καὶ τοῦ ἀέρος οὐκ ἄλογος.

§ 7 lines 2–7 Cf. Plutarch, *Quaest. Conv.* v. 5. 1 (676 B) (after a reference to Theophrastus): ἔτι δὲ καὶ καταμιγνυμένη (sc. ἄργιλος) πρὸς σίτον ἐπίμετρον ποιεῖ δαφιλές, ἀδρύνουσα καὶ διογκοῦσα τῇ θερμότητι τὸν πυρὸν.

<sup>1</sup> Scaliger: ἰσχάνει U.

<sup>2</sup> v: θωμοὺς UN aP.

<sup>3</sup> u P: οἰκεία U: οἰκεία N a.

<sup>4</sup> ἀνίη u: ἀν εἴη UN aP.

<sup>5</sup> u: ἔλκει U.

the native fluid with the rain and so shrinks the kernels; in the second case dampness is produced in the pile and the vapor that arises, which is thin and like *pneuma*,<sup>1</sup> penetrates the kernels and makes them plumper.<sup>2</sup>

13.7 The same thing also happens when the grain is dumped in store rooms, and this is why it gives “good measure”: it absorbs the vapour that arises, which is thin, and for this reason the grain is piled deep, to let the vapour rise further. All this and the further circumstance that earth<sup>3</sup> thrown on the grain keeps it from getting worm-eaten<sup>4</sup> and makes it swell indicates that the kernels can also attract a certain amount of food by themselves, without their roots, and hence their also being fed by the winds and the air is not unreasonable.

<sup>1</sup> Warm and expansive gas.

<sup>2</sup> Cf. *HP* 8 11. 4: “This is why they heap both wheat and barley in piles, and they are considered to get plumper in a pile and left unwinnowed.”

<sup>3</sup> In this connexion Theophrastus (according to Plutarch, *Quaest. Conv.* v. 5. 1 [676 B]) speaks of clay: “furthermore when it (sc. clay) is mixed in with grain it produces abundant ‘good measure,’ making the wheat plump and bulky by its heat.”

<sup>4</sup> Cf. *HP* 8 11. 7: “There is also held to be a kind of earth in certain countries that when sprinkled on the wheat preserves it, as the earth at Olynthus and at Cerinthus in Euboea . . .”

- 14.1 τὸ<sup>1</sup> δὲ τῆς ἐρυσίβης κοινὸν οὐχ ἦττον, ἀλλὰ μᾶλλον ἄπτεται τῶν σιτωδῶν, κριθῆς δὲ καὶ μᾶλλον καὶ<sup>2</sup> πυροῦ, διὰ τε τὸ γυμνοτέραν<sup>3</sup> εἶναι (τὸν δ' ἐν<sup>4</sup> χιτῶσι πλείοσιν), καὶ διὰ τὸ ἐγγυτέρω τοῦ στάχυος ἔχειν τὸ φύλλον ὅθεν ἡ ἀπόχυσις, ἐν ᾧ μένει καὶ ἡ ὑγρότης, ὥστε σαπέισα μᾶλλον ἄπτεται· καὶ διὰ τὸ τὸν<sup>5</sup> στάχυν ὀρθὸν εἶναι καὶ πυκνότερον, ἀπορρεῖ γὰρ ἦττον (διὸ καὶ ἐπικύπτειν ξυμφέρει), καὶ ἀπολλύει τὸ συνεχὲς θᾶττον (ἐν δὲ τῷ μανῶ,<sup>6</sup> πρὸς τοῖς ἄλλοις, καὶ διεκπίπτει ἡ ὑγρότης). ἡ αὐτὴ δ' αἰτία καὶ τῇ λευκῇ<sup>7</sup> πρὸς τὰς ἄλλας· ἅπαντα γὰρ μάλιστα ἔχει τῶν ἄλλων.
- 14.2 τῶν δ' ὀσπρίων μάλιστα ἐρυσιβᾶ κύαμος, καὶ διὰ τὸ πολύφυλλος εἶναι πολλαχόθεν, καὶ διὰ τὸ πυκνοσπορεῖσθαι, καὶ διὰ τὸ τὴν ὑγρότητα μά-

<sup>1</sup> Schneider: τα U.

<sup>2</sup> U: ἡ Schneider.

<sup>3</sup> Wimmer (τὴν μὲν γυμνοτέραν Schneider): γυμνοτέρα U.

<sup>4</sup> δ' ἐν Wimmer: δε U.

<sup>5</sup> διὰ τὸ τὸν Schneider (*quod Gaza*: ἔτι τὸν Wimmer): ἄτοπον U.

<sup>6</sup> Wimmer: ἄνω U.

<sup>7</sup> λευκῇ U: Ἀχιλληῶδι (?) ego.

<sup>1</sup> Cf. HP 8 10. 1-2: "Of diseases of seed-crops some are common to all, as rust . . . Broadly speaking cereals are

*Seed-Crops. Diseases: (1) Rust*

Rust is no less common to the rest but attacks 14.1 cereals more. Further it attacks barley more than wheat<sup>1</sup> for several reasons: barley is more naked (whereas wheat has several coats); barley leaf is closer to the place in the ear from which it heads, and the leaf is where the rain water remains, so that when the fluid decomposes it is better able to infect this part; the barley ear is (1) more erect and (2) of closer texture, so (1) the water does not run off so easily (which is why it is good for the ear to bend),<sup>2</sup> and (2) the disease destroys more quickly what is of continuous texture, whereas open texture, besides its other advantages,<sup>3</sup> lets the water through. The same cause that makes barley more susceptible than wheat makes white barley more susceptible than the other kinds, since it has all these characters to a greater extent than they do.

Of pulses bean gets rust most, both because it 14.2 has many leaves coming from many parts, and because it is sown thick, and because it most of all

more liable to rust than pulses, and among cereals barley more than wheat; and among barleys some kinds more than others, and most of all (one might say) Achilles barley.<sup>2</sup>

<sup>2</sup> Cf. CP 3 22. 1.

<sup>3</sup> It is not so quickly destroyed and is (cf. CP 1 8. 2) in general conducive to growth and feeding.



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λισθ' ἔλκειν εἰς ἑαυτὸν διὰ τὴν μάνωσιν, καὶ ἔτι διὰ τὸ πρὸς τῇ γῆι μάλιστα τὸν καρπὸν ἔχειν (σῆπεται γὰρ μάλιστα τὰ κάτω διὰ τὴν ἀπνοίαν). καὶ ὅλως δὲ τῶν χεδροπῶν<sup>1</sup> τὰ τοιαῦτα.

14.3 ἐρυσίβη <δὲ><sup>2</sup> σῆψις τίς ἐστι τοῦ ἐφισταμένου ὑγροῦ, διὸ πολλῶ μὲν ὕσαντος οὐ γίνεται (καταπλύνεται γάρ), ἐὰν δὲ ψεκάδες ἢ καὶ δρόσοι πλείους γένωνται, καὶ ὁ ἥλιος ἐπιλάβῃ καὶ ἀπνοία, τότε σῆπεται (διὸ καὶ ἐν τοῖς εὐπνοῖς καὶ μετεώροις ἦττον, ἐν δὲ τοῖς κοίλοις καὶ δροσοβόλοις μᾶλλον). καὶ πανσελήνοις δὲ μᾶλλον, ὅτι συνεργεῖ καὶ ἡ τῆς σελήνης θερμότης, καὶ ὅλως ὁ ἀῆρ ὑγρότερος.

14.4 πάντων δ' ἐπικηρότατον ὁ πίσος, πρὸς μὲν τὰς ἐρυσίβας, ὅτι πολυφύλλον καὶ χαμαισχιδές καὶ εὐαξές (συμπληροῖ γὰρ τὸν τόπον, κἂν ἀραιὸς ᾖ)· πρὸς δὲ τὰ ψύχη καὶ τοὺς πάγους, ὅτι ἀσθενόριζον.

σκοληκοῦται δὲ μάλιστα <ἢ><sup>3</sup> μόνα πυρὸς καὶ

<sup>1</sup> u: χεδροπῶν U.      <sup>2</sup> aP.

<sup>3</sup> Schneider.

<sup>1</sup> Cf. CP 3 22. 2.

<sup>2</sup> Cf. HP 8 10. 2, cited in note 2 on CP 3 22. 1.

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draws the water into itself because of its open texture, and furthermore because it has its fruit closest to the ground (for the lower parts of a plant get rust the most because of the lack of ventilation). And this holds of all legumes in general that have these characters.

Rust is a kind of decomposition<sup>1</sup> of the fluid that 14.3 collects on the surface. For this reason it does not occur after heavy rain, since the fluid washes off; but if there have been drizzles and heavy dews followed by sunshine and no wind, decomposition takes place (which is why there is less rust in well ventilated<sup>1</sup> and high ground, more in hollows and where there is dew). Again there is more at the full moon,<sup>2</sup> because the heat of the moon also contributes<sup>1</sup> and the air is in general moister.

Of all seed-crops the pea is the most delicate. It 14.4 is susceptible to rust because it is many-leaved, branches out at the ground, and grows well (filling out the space round it even when sown thin); and it is susceptible to cold spells and frost because it has weak roots.

*Seed-Crops. Diseases: (2) Grubs*

It is wheat<sup>3</sup> and chickpea that only or mainly

<sup>3</sup> Cf. HP 8 10. 4: "Wheat is also destroyed by the grubs, one set as soon as produced devouring the roots . . ."; cf. also CP 3 22. 4.

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14.5 ἐρέβινθος,<sup>1</sup> οὐκ ἐν τοῖς αὐτοῖς δὲ ἐκάτερος, ἀλλ' ὁ μὲν ἐν τῷ καρπῷ, ὁ δὲ ἐν ταῖς ῥίζαις, ἄμφω δὲ διὰ γλυκύτητα. ὁ μὲν ἐρέβινθος, ὅταν<sup>2</sup> ἢ ἄλμη περιπλυθῆ<sup>3</sup> (καθάπερ εἴρηται), ὁ δὲ πυρός, ὅταν ἢ ῥίζα ὑγραυθῆ. ζωοποιεῖ δὲ σηπόμενα τὰ γλυκέα, γλυκύτερον γὰρ ὁ πυρός κριθῆς (διὸ καὶ τὸ ἄχυρον ἥδιον). ὁ δὲ ἀπόλλυται<sup>4</sup> γινόμενος<sup>5</sup> <ἦ><sup>6</sup> ὅταν ἐξαναλωσῇ τὴν ἐν τῷ καλάμῳ τροφὴν ἄτερος<sup>7</sup> [ἦ]<sup>7</sup> ὥστε ὄλον ἐξαπολλύναι τὸν στάχυν ἢ κατὰ θάτερον μέρος.

ταῦτα μὲν οὖν καὶ τὰ τοιαῦτα καθάπερ νοσήματος ἔχει χώραν, ὑπὲρ ὧν οὐ χαλεπὸν τὰς αἰτίας ἰδεῖν.

15.1 περὶ δὲ τῶν θερινῶν σπερμάτων (οἶον σησάμου,

<sup>1</sup> U<sup>r</sup> N aP : ἐρέβινθος U<sup>ar</sup>.

<sup>2</sup> Scaliger after Gaza : ἔστ' ἂν U.

<sup>3</sup> Gaza, Schneider : περιπλυθῆ U.

<sup>4</sup> ἀπόλλυται ego : σκαληῆς U<sup>c</sup> (from -ιξ from -ηξ).

<sup>5</sup> U : γινόμενος Scaliger.

<sup>6</sup> ego.

<sup>7</sup> ego : αὐτός U.

<sup>1</sup> Cf. HP 8 1. 5 and CP 3 22. 3; in both passages Theophrastus speaks of "caterpillars." Cf. also HP 8 10. 1: "The diseases of seed-crops are some common to all, as rust,

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get grubs.<sup>1</sup> But the two do not get them in the same parts, chickpea getting them in its fruit, wheat getting them in its roots, and both getting them because of their sweetness; chickpea when the brine is washed off (as we said),<sup>2</sup> wheat when the root gets wet.<sup>3</sup> Sweet things as they decompose breed animals, for wheat is sweeter than barley (which is why its bran is more palatable). The wheat perishes in the process of birth or when the second grub has consumed the food in the haulm so as to destroy the whole ear or one side of it.<sup>4</sup>

These occurrences and the like count (as it were) as diseases. It is not hard to see their causes.

*Summer Seeds: Their Weakness and Rapid Growth*

As for summer seeds,<sup>5</sup> such as sesame, hedge- 15.1

some peculiar to certain plants, as gangrene in chickpea and being devoured by caterpillars . . ."

<sup>2</sup> CP 3 22. 3; 4 8. 4. <sup>3</sup> Cf. CP 3 22. 4.

<sup>4</sup> Cf. CP 3 22. 4 and HP 8 10. 4: "Wheat is also destroyed by the grubs, one devouring its roots as soon as the wheat starts to grow, and the other occurs when the wheat, owing to drought, is unable to head, for the grub is produced in it then and eats the haulm as it is played out. It eats it as far as the ear, and after consuming it perishes. And if it devours the whole haulm the wheat itself perishes, but if it eats one side of the haulm and the wheat manages to head, this part of the ear is withered and the other sound."

<sup>5</sup> Cf. HP 8 1. 1, 4 for summer seeds.

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ἐρυσίμου, κέγχρου, ἐλύμων) ἐπὶ τοσοῦτον μὲν εἰ-  
πεῖν ἐστι<sup>1</sup> παντὶ πρόχειρον, ὅτι δι' ἀσθένειαν ταύ-  
την τὴν ὥραν σπείρεται, καὶ διὰ τὸ ταχὺ τελεοῦν·  
ἢ δὲ φύσις αὐτῶν, ποία τις ἂν εἴη, σκεπτέον. οὐδὲ  
γὰρ γεώδης ὡσπερ τῶν ὀσπρίων, οὔτε πάντη κού-  
φη, τὸ γὰρ σήσαμον λιπαρὸν καὶ δεόμενον πέ-  
ψεως. καὶ τοῦτο μὲν μονόρριζον· ὁ δὲ κέγχρος καὶ  
πολύρριζον<sup>2</sup> καὶ βαθύρριζον, καὶ πολυκάλαμον,  
ὥστε, εἰς ἀμφοτέρα μεριζομένης τῆς τροφῆς καὶ  
τῆς δυνάμεως, χρονιώτερον ἐχρῆν εἶναι· τὸ γὰρ  
σήσαμον, ἐπεὶ μονόρριζον καὶ βαθύρριζον, ἄνω πᾶ-  
σαν ἀφήσιν τὴν δύναμιν. ἀλλ' ἀντίκειται τούτῳ  
τὸ λιπαρὸν· τὰ γὰρ αὖ γλίσχρα πλείονος πέψεως  
δεῖται, ταῦτα δ' (ὡσπερ εἴρηται) πάντα πολύ-  
καρπα.

περὶ μὲν οὖν τούτων σκεπτέον.

15.2 ἐπεὶ δ' ὅλως εἰπεῖν τὰ μικρόκαρπα πολυκαρπό-

<sup>1</sup> Gaza, Itali: ὅτι U.

<sup>2</sup> Wimmer: πολύριζος U<sup>c</sup> from -υρίζος.

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mustard, millet and Italian millet, anyone can readily say this much: they are sown at that season because of their weakness and rapid maturing. But of what description their nature is requires investigation. For it is not earthy either, as in pulse,<sup>1</sup> nor yet entirely light, for sesame is oily, and to be oily it requires concoction. Again, whereas sesame is single-rooted, millet is not only many-rooted and deep-rooted, but also many-haulmed,<sup>2</sup> and in consequence, since its food and power are apportioned both upward and downward, the plant should take longer to mature than it does, since sesame, being single-rooted and deep-rooted, directs all its power upwards. But to this is opposed its oiliness, for viscous things in turn require more concoction, and all these plants (as we said)<sup>3</sup> have an abundant crop.

These matters, then, require investigation.

*Summer Seeds: Their Large Yield*

Since on the whole plants with small fruit pro- 15.2

<sup>1</sup> So legumes make heavier food than cereals (since they are earthy) and yet spend less time in the ground (CP 4 9. 1).

<sup>2</sup> Cf. HP 8 9. 3: "Of summer seeds sesame is held to be hardest on the soil and to exhaust it most; yet millet has more and thicker haulms and more roots."

<sup>3</sup> CP 2 12. 1.

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τερα, καθάπερ τά τε νῦν εἰρημένα, καὶ οἱ φακοὶ δὴ καὶ ὅσα τοιαῦτα, καὶ ἐπὶ πᾶσι τὰ πολυχούστατα λεγόμενα, κύμινόν τε καὶ μήκων, καὶ ὄλως δὴ τὰ λαχανώδη πάντα καὶ τὰ ἐναγγειόσπερμα πολύχοα, τίς ἂν οὖν αἰτία τούτων εἴη; πότερον ὅτι τὰ μικρὰ ῥᾶον ποιῆσαι; καὶ γὰρ ζῶα φαμεν ἔνια τοιαῦτα, καὶ μάλιστα δὴ τὰ ὑποτόκα καὶ σκωληκοτόκα.

ἢ αὐτὴ μὲν ἕξωθεν, ἄλλην δέ τιν' <sup>1</sup> οἰκειότεραν ζητητέον; ἐπεὶ καὶ τῆδε διαφέρει τῶν περὶ τὰ ζῶα · τῶν μὲν γὰρ ἐκτρέφει τὰ ὑὰ καὶ τελειοί, καὶ ὄλως ζωογονεῖ, τὸ περιέχον (ὥσπερ καὶ ἐν τοῖς πρότερον εἴρηται) · τῶν δὲ καρπῶν ἐν αὐτοῖς τοῖς φυτοῖς ἢ ἐκτροφῇ καὶ τελείωσις, ὥστε πλείονος ἀεὶ <sup>2</sup> δυνάμειος.

15.3 πρὸς δὲ θησαυρισμὸν ἄριστα μὲν κέγχρος καὶ

<sup>1</sup> τῶν U<sup>ac</sup>: τῶνα U<sup>c</sup>.

<sup>2</sup> U: δεῖ Scaliger.

<sup>1</sup> Cf. CP 2 12. 1-6 and HP 8 3. 4-5: "In general legumes have more fruit and the greater yield, and still more than these the summer seeds millet and sesame, and among legumes lentil most of all. Put broadly, one might say that the plants with smaller seeds produce

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duce it in abundance,<sup>1</sup> as the summer seeds just now mentioned,<sup>2</sup> lentils and the like, and last but not least the plants that are said to have the biggest yield, cummin and poppy; and since in general all vegetables and all plants with seeds in capsules have a large yield—what would be the reason for this? Is the reason that it is easier to produce what is small? Certain animals too, we say, bring forth a small and numerous progeny, especially the oviparous and larviparous.<sup>3</sup>

Or is this cause one that is found outside plants, and we should look for another belonging more especially to them? Since what happens with the plants differs also as follows from what happens with the animals: it is the surroundings<sup>4</sup> that rear the eggs of the animals and mature them and in a word make animals of them (as we also said earlier),<sup>5</sup> whereas the rearing and maturing of the fruit takes place in the plants themselves, and so always involves more power.

*Seed-Crops that Keep in Storage*

Millet, Italian millet, sesame, lupine and chick- 15.3

more of them, as cummin among vegetables, though all produce many." <sup>2</sup> CP 4 15. 1.

<sup>3</sup> Cf. Aristotle, *On the Generation of Animals*, iv. 4 (771 a 17-b 14). <sup>4</sup> That is, the air or water.

<sup>5</sup> CP 4 6. 4.

ἔλυμος καὶ σήσαμον καὶ θέρμος καὶ ἐρέβινθος, τὰ μὲν ὅτι πολυχίτωνα<sup>1</sup> καὶ ξηρά, τὸ δ' ὅτι λιπαρόν, ὁ δὲ θέρμος καὶ ὁ ἐρέβινθος<sup>2</sup> ὅτι πικρότητα τινὰ ἔχουσι καὶ δριμύτητα, διατηροῦσι δ' αὐταὶ<sup>3</sup> τὸ ἀπαθές (ὡσπερ εἴρηται), ὅθεν καὶ διαφθειρόμενα <μόνα><sup>4</sup> τῶν σιτωδῶν οὐ ζωοῦται (καθάπερ οὐδὲ τὰ τῶν λαχάνων · καὶ γὰρ ταῦτα ἄζωα ἢ ἀπαθῆ<sup>5</sup> τῇ ξηρότητι ἢ τῇ δριμύτητι), συμβαίνει γὰρ ὡσπερ ἀνάμειξιν τινὰ γίνεσθαι τοῦ ἕξωθεν.

15.4

σκεπόμενον<sup>6</sup> δὲ ἕκαστον ἰδιά τινὰ ποιεῖ τὴν<sup>7</sup> μορφήν<sup>8</sup> ἐκ τῆς οἰκείας ὑγρότητος, οἷον οἱ μὲν πυροὶ καὶ αἱ κριθαὶ τοὺς κίας, οἱ δὲ κύαμοι τὸν ὑπὸ τινων καλούμενον μίδα· ὡσαύτως δὲ καὶ οἱ φακοὶ καὶ αἱ ἀφάκαι καὶ πίσοι καὶ ἄλλα. τὸ δ' αἴτιον κοινὸν πλειόνων, οὐ γὰρ μόνον ἐν τοῖς καρποῖς,

<sup>1</sup> U<sup>c</sup> from πολυτινα.

<sup>2</sup> ὁ ἐ. υ: ἐρέβινθος U<sup>cc</sup> from -ν.

<sup>3</sup> Gaza, Schneider: αὐταὶ U.

<sup>4</sup> Schneider.

<sup>5</sup> ego: ὅσα δὴ U.

<sup>6</sup> U: σηπόμενον Itali.

<sup>7</sup> ego: ἰδιαν τινὰ ποιεῖται U.

<sup>8</sup> Dalecampius (*animal Gaza*): τροφήν U.

<sup>1</sup> Cf. CP 4 2. 2.

<sup>2</sup> CP 4 2. 2.

pea keep best in storage,<sup>1</sup> the first two because they are many-coated and dry, sesame because it is oily, lupine and chickpea because they have a certain bitterness and pungency. Bitterness and pungency, as we have said,<sup>2</sup> preserve things from being affected, and for this reason these alone of seed-crops do not on decomposing breed animals. No more do the seeds of vegetables, for these too by reason of their dryness or pungency breed no animals (or are unaffected by the decomposition that breeds them, since what happens instead is a kind of intermingling with them of what is outside them).

15.4

*Seed-Crops: On Getting Worm-Eaten in Storage*

Each kind of seed-crop when put under a roof produces from its proper fluidity certain animals of a form peculiar to itself: so wheat and barley produce their weevils, beans the creature that some call "midas,"<sup>3</sup> and so with lentils, tares, peas and others.<sup>4</sup> The cause is common to a number of things, for it applies not only to seed-crops, but also to

<sup>3</sup> Perhaps the movement of its antennae resembled that of an ass's ears.

<sup>4</sup> Cf. HP 8 11. 2: "There arise in seed-crops as they decompose creatures peculiar to each, as we said (cf. *ibid.* 8 10. 5), except in chickpea, for chickpea is the only seed-crop not to breed animals. And all things that decompose can breed a grub, but when seeds get worm-eaten each breeds a creature of its own."

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ἀλλὰ καὶ ἐν τοῖς δένδροις καὶ μετὰ ταῦτα τοῖς ξύλοις · καὶ ὅλως ὅσα τῶν ἀψύχων ζωογονεῖται διαφόρους ποιεῖ πάσας τὰς μορφάς, ὡσὰν ἐξ ἑτέρας ὕλης.

- 16.1 ὁ δὲ κοινορτώδης σίτος θᾶπτον σήπεται, καὶ ὁ ἐν τοῖς κονιατοῖς ἢ ἀκονιάτοις<sup>1</sup> οἰκήμασιν,<sup>2</sup> διὰ τὸ πλείω θερμότητα ἔχειν (καὶ γὰρ [ἦ]<sup>3</sup> κοινορτὸς θερμός, ἄτε ξηρὸς ὢν, καὶ τὸ κοῖσμα, ὅταν ἀναδέξῃται, τηρεῖ τὴν θερμότητα) · ἐπεὶ καὶ ἀθρόος καὶ κατὰ βάθους ὢν, πλείων γὰρ ἢ θερμότης. θᾶπτον δὲ πολὺ κόπτεται κριθῆ πυροῦ διὰ τὸ μανότερον εἶναι καὶ γυμνότερον · τάχιστα δ' ὁ κύαμος, θερισθεὶς γὰρ εὐθὺς καὶ συντεθεὶς ἐνιαχοῦ, καθάπερ ἐν
- 16.2 Θετταλίᾳ. φαίνεται δὲ κατὰ τοὺς τόπους · παρ' ἐνίοις γὰρ ἀσηπτότατος (ὡσπερ ἐν ταῖς ἱστορίαις εἴρηται περὶ Ἀπολλωνίαν · περὶ<sup>4</sup> Τάραντα καὶ ἀναπληροῦσθαι δὲ φασι κοπέντα). τοῦτο μὲν οὖν σκεπτέον.

<sup>1</sup> Gaza (*non levigatis*), Itali : κονιατοῖς U.

<sup>2</sup> u : ἦ κήμασιν U.

<sup>3</sup> ego : ἦ from ἦ U<sup>c</sup> (?) : ἦ N : ὁ aP.

<sup>4</sup> <καὶ> περὶ Schneider.

<sup>1</sup> Cf. CP 3 22. 3–6; 5 10. 5.

<sup>2</sup> Cf. HP 5 4. 4–5. <sup>3</sup> Cf. HP 8 11. 1.

<sup>4</sup> Cf. HP 8 11. 3: "It appears that one country and one

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trees<sup>1</sup> and to the wood<sup>2</sup> that is later derived from them; and in general all inanimate things in which animals are bred produce different shapes in each case, since each animal comes from a different matter.

- Dusty cereals decompose faster, and cereals stored in plastered rooms<sup>3</sup> because in these cases the cereals have more heat (for not only is dust hot, since it is dry, but plaster retains heat that it has once absorbed); indeed cereals also decompose faster when piled deep, since their heat is then greater. Barleycorns get worm-eaten much faster than wheat kernels because the barleycorn is more open in texture and more naked. Bean gets worm-eaten fastest, for in some countries (as in Thessaly) this happens directly after harvesting and storage. This appears to depend on the district, for in some places the bean is very free from decomposition, as at Apollonia, as we said in our History<sup>4</sup>; and in Tarentum it is said that the bean after getting worm-eaten can even regenerate the lost part<sup>5</sup>—a matter we must investigate.
- 16.1
- 16.2

kind of weather differs from another in the matter of whether seed-crops get worm-eaten or not. Thus they assert that at Apollonia on the Ionian Sea beans never get worm-eaten at all, and are therefore stored away; and beans keep at Cyzicus for a considerable time."

<sup>5</sup> Not mentioned elsewhere.

ἀκόπως δὲ ἔχει τάδε · θερμὸς κέγχρος αἰγίλωψ αἶρα σήσαμον ἐρέβινθος (καὶ ὄλως τὰ δριμέα). ὁ μὲν οὖν αἰγίλωψ πολυχίτων, ἡ δ' αἶρα γυμνή · διὸ καὶ ἄλλη τιῶν δυνάμει. τὸ δ' ὄλον ἄκοπα τὰ μὲν ξηρότητι (διὸ καὶ ἡ κάχυρος χρονώτερον), τὰ δὲ ἀμιξία καὶ καθαρότητι<sup>1</sup> (καθάπερ ὁ χόνδρος), τὰ μὲν<sup>2</sup> χυμῶν φύσει καὶ δυνάμει φυσικῇ (καθάπερ ἐρέβινθος θερμὸς σήσαμον), τὰ δὲ τῷ πολὺ τὸ ἀποστέγον ἔχειν (ὥσπερ ὁ ὠχρος · ἅμα δὲ τοῦτό γε καὶ ξηρὸν καὶ θερμόν). τῷ δὲ σίτῳ<sup>3</sup> κοπέντι βοήθεια ταχίστη τὸ εἰς τὴν ἄλω φέροντας ἀπικμῆσαι.

καὶ τούτων μὲν σχεδὸν ἐνταῦθά που τὸ αἴτιον.

- 16.3 ὁ δὲ παρά τινων ζητεῖται, διὰ τί ποτε ὁ κεκομμένος σίτος καὶ παλαιός, ὕδατος μὲν ἐπιχειομένου θερμοῦ, διαβλαστάνει (ταύτην<sup>4</sup> γὰρ δὴ διάπειραν λαμβάνουσι εἰ φύσιμος, ὅταν ἐμβάλλοντες<sup>5</sup> εἰς σκάφιον ἐπιχέωσι), σηπόμενος δ' οὐ διαβλαστάνει — καίτοι καὶ ἡ σῆψις ὑπὸ θερμοῦ, καὶ ἀνυ-

<sup>1</sup> aP<sup>c</sup>: καθαρὸν τι UNP<sup>ac</sup> (?).

<sup>2</sup> U: δὲ Itali.

<sup>3</sup> δὲ σίτῳ Scaliger (frumento Gaza: σίτῳ Itali): σίτω U.

<sup>4</sup> U<sup>ac</sup>: -γι U<sup>c</sup>. <sup>5</sup> U<sup>cc</sup> (α from λ): ἐμβαλόντες Schneider.

The following do not get worm-eaten: lupine, millet, haver-grass, darnel, sesame, chickpea (and all pungent seeds in general). Now aegilops has many coats, darnel none; darnel therefore has some other power of resistance. In general some seeds escape getting worm-eaten by reason of their dryness (which is why parched barley keeps longer), whereas others do so by staying clear of mixture and remaining pure (like groats), some doing this by the nature of their flavour and their natural<sup>1</sup> power, as chickpea, lupine and sesame, others by their thick insulation against the outside, as bird's pease (but this seed is at the same time also dry and hot). When cereal gets worm-eaten the quickest remedy is to take it to the threshing-floor and winnow it.

The causation of all this, then, lies (I may say) somewhere here.

#### *An Easy Question about Worm-Eaten Cereal*

The question raised by some, why old and worm-eaten cereal sprouts when warm water is poured on it (this being the test that people use to decide whether it can germinate), whereas decomposing cereal does not, although decomposition too is produced by heat and involves liquefaction, would

16.3

<sup>1</sup> Internal.

16.4 γράινεται — κομιδῇ δόξειεν ἂν παρ' ὁμωνυμίαν<sup>1</sup> εἶναι. διαφέρει γὰρ ἢ τε φθαρτικῆ, καὶ ἢ γόνιμος, θερμότης, καὶ ἢ ὑγρότης δ' ὡσαύτως · ἔστι δ' ἢ μὲν σήπουσα ἀλλοτρία καὶ φθαρτικῆ, ἢ δὲ<sup>2</sup> τοῦ ὕδατος τοῦ θερμοῦ, συμμετρίαν τινὰ ἔχουσα (δεῖται γὰρ τοιαύτης πρὸς τὴν βλάστησιν). ἐπεὶ τρόπον τινὰ παρόμοιον καὶ εἴ τις ἀποροίη διὰ τί ἢ θερμότης καὶ ἢ ὑγρότης καὶ ὑγίαιαν ἐν τοῖς σώμασι ποιοῦσι<sup>3</sup> καὶ νόσον · δῆλον οὐχ ὡς αἱ αὐταί, ἀλλ' ὡς ἕτεροι καὶ ἐναντία. θερμὸν δ' ἐπιχέουσιν διὰ τὴν ἀσθένειαν τῶν σπερμάτων<sup>4</sup> (ὅπως μὴ καθάπερ ἐκπαγῆ) διὰ<sup>5</sup> τὸ θάττον ἀποδηλοῦν · ἐπεὶ οἱ γὰρ μὴ παντελῶς διεφθαρμένοι καὶ ψυχρῶ<sup>6</sup> διαβλαστάνουσιν · συμβαίνει δὲ καὶ κόπτεσθαι καὶ σήπεσθαι δι' ἀλλοτρίας θερμότητος. [τῶν ἐν τοῖς δένδροις καὶ φυτοῖς τα μὲν αὐτοματα γίνονται · τα δε ἐκ παρασκευῆς καὶ θεραπείας]<sup>7</sup>

<sup>1</sup> P: παρομωνυμ(μ from a U<sup>cc</sup>)ίαν U<sup>ac</sup> N: παρομωνύμια U<sup>c</sup>: παρομοίαν a.

<sup>2</sup> δὲ <γόνιμος> Schneider.

<sup>3</sup> Gaza (faciant), Itali: ποιοῦσα U.

<sup>4</sup> u: σπερμά | U.

<sup>5</sup> <καὶ> διὰ Schneider: διὰ <τε> Wimmer.

<sup>6</sup> <ἐν> ψυχρῶ Heinsius.

<sup>7</sup> [τῶν — θεραπείας] aP.

subscriptio: θεοφραστου περι φυτων αιτιων δ U.

16.4 appear to be simply a matter of homonymy. For the heat that destroys and the heat that generates differ, and so too does the fluid; and the heat that causes decomposition is alien and destructive, whereas that of the warm water has a certain rightness in its amount, for the seed needs heat of this character for sprouting. Indeed it would be much the same if one should wonder why heat and fluid produce not only health in the body but also disease, for it is evident that they do not do so as the same, but as distinct and opposite. Warm water is poured on the seeds owing to their weakness (to keep them from getting as it were frozen) to make them show more quickly whether they will sprout (in fact wheat that is not completely spoilt sprouts in cold water as well). Both getting worm-eaten and decomposing, on the other hand, are brought about through alien heat.