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BOOK I

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CHAPTER II

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CHAPTER IX

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CHAPTER VI

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In the last resort, the ultimate living elements (Erasistratus's simple vessels) must draw in their food by virtue of an inherent attractive faculty like that which the lodestone exerts on iron. Thus the process of anadosis, from beginning to end, can be explained without assuming a horror vacui.

CHAPTER VIII

Erasistratus's disregard for the humours. In respect to excessive formation of bile, however, prevention is better than cure; accordingly we must consider its pathology. Does blood pre-exist in the food, or does it come into existence in the body? Erasistratus's purely anatomical explanation of dropsy. He entirely avoids the question of the four qualities (e.g. the importance of innate heat) in the generation of the humours, etc. Yet the problem of blood-production is no less important than that of gastric digestion. Proof that bile does not pre-exist in the food. The four fundamental qualities of Hippocrates and Aristotle. How the humours are formed from food taken into the veins: when heat is in proportionate amount, blood results; when in excess, bile; when deficient, phlegm. Various conditions determining cold or warm temperaments. The four primary diseases result each from excess of one of the four qualities. Erasistratus unwillingly acknowledges this when he ascribes the indigestion occurring in fever to impaired function of the stomach. For what causes this functio laesa? Proof that it is the fever (excess of innate heat).

If, then, heat plays so important a part in abnormal functioning, so must it also in normal (i.e. causes of eucrasia involved in those of dyscrasia, of physiology in those of pathology). A like argument explains the genesis of the humours. Addition of warmth to things already warm makes them bitter; thus honey turns to bile in people who are already warm; where warmth deficient, as in old people, it turns to useful blood. This is a proof that bile does not pre-exist, as such, in the food.

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The functions of organs also depend on the way in which the four qualities are mixed—e.g. the contracting function of the stomach. Treatment only possible when we know the causes of errors of function. The Erasistrateans practically Empiricists in this respect. On an appreciation of the meaning of a dyscrasia follows naturally the Hippocratic principle of treating opposites by opposites (e.g. cooling the overheated stomach, warming it when chilled, etc.). Useless in treatment to know merely the function of each organ; we must know the bodily condition which upsets this function. Blood is warm and moist. Yellow bile is warm and (virtually, though not apparently) dry. Phlegm is cold and moist. The fourth possible combination (cold and dry) is represented by black bile. For the clearing out of this humour from the blood, Nature has provided the spleen—an organ which, according to Erasistratus, fulfils no purpose. Proof of the importance of the spleen is the jaundice, toxaemia, etc., occurring when it is diseased. Erasistratus's failure to mention the views of leading authorities on this organ shows the hopelessness of his position. The Hippocratic view has now been demonstrated deductively and inductively. The classical view as to the generation of the humours. Normal and pathological forms of yellow and black bile. Part played by the innate heat in their production. Other kinds of bile are merely transition-stages between these extreme types. Abnormal forms removed by liver and spleen respectively. Phlegm, however, does not need a special excretory organ, as it can undergo entire metabolism in the body.

Need for studying the works of the Ancients carefully, in order to reach a proper understanding of this subject.
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BOOK III

CHAPTER I

A recapitulation of certain points previously demonstrated. Every part of the animal has an attractive and an alterative (assimilative) faculty; it attracts the nutrient juice which is proper to it. Assimilation is preceded by adhesion (prosphysis) and that again, by application (prosthesis). Application the goal of attraction. It would not, however, be followed by adhesion and assimilation if each part did not also possess a faculty for retaining in position the nutriment which has been applied. *A priori* necessity for this retentive faculty.

CHAPTER II

The same faculty to be proved *a posteriori*. Its corresponding function (*i.e.* the activation of this faculty or potentiality) well seen in the large hollow organs, notably the uterus and stomach.

CHAPTER III

Exercise of the retentive faculty particularly well seen in the uterus. Its object is to allow the embryo to attain full development; this being completed, a new faculty—the expulsive—hitherto quiescent, comes into play. Characteristic signs and symptoms of pregnancy. Tight grip of uterus on growing embryo, and accurate closure of os uteri during operation of the retentive faculty. Dilatation of os and expulsive activities of uterus at full term, or when foetus dies. Prolapse from undue exercise of this faculty. *Rôle* of the midwife. Accessory muscles in parturition.

CHAPTER IV

Same two faculties seen in stomach. *Gurglings* or *borborygmi* show that this organ is weak and is not gripping its contents tightly enough. Undue delay of food in a weak
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stomach proved not to be due to narrowness of pylorus: length of stay depends on whether digestion (another instance of the characteristically vital process of alteration) has taken place or not. Erasistratus wrong in attributing digestion merely to the mechanical action of the stomach walls. When digestion completed, then pylorus opens and allows contents to pass downwards, just as os uteri when development of embryo completed.

CHAPTER V

If attraction and elimination always proceeded pari passu, the content of these hollow organs (including gall-bladder and urinary bladder) would never vary in amount. A retentive faculty, therefore, also logically needed. Its existence demonstrated. Expulsion determined by qualitative and quantitative changes of contents. "Diarrhoea" of stomach. Vomiting.

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CHAPTER VII

Interaction between two bodies; the stronger masters the weaker; a deleterious drug masters the forces of the body, whereas food is mastered by them; this mastery is an alteration, and the amount of alteration varies with the different organs; thus a partial alteration is effected in mouth by saliva, but much greater in stomach, where not only gastric juice, but also bile, pneuma, innate heat (i.e. oxidation?), and other powerful factors are brought to bear on it; need of considerable alteration in stomach
SYNOPSIS OF CHAPTERS

as a transition-stage between food and blood; appearance of faeces in intestine another proof of great alteration effected in stomach. Asclepiades's denial of real qualitative change in stomach rebutted. Erasistratus's denial that digestion in any way resembles a boiling process comes from his taking words too literally.

CHAPTER VIII

Erasistratus denies that the stomach exerts any pull in the act of swallowing. That he is wrong, however, is proved by the anatomical structure of the stomach—its inner coat with longitudinal fibres obviously acts as a vis a fronte (attraction), whilst its outer coat exercises through the contraction of its circular fibres a vis a tergo (propulsion); the latter also comes into play in vomiting. The stomach uses the oesophagus as a kind of hand, to draw in its food with. The functions of the two coats proved also by vivisection. Swallowing cannot be attributed merely to the force of gravity.

CHAPTER IX

These four faculties which subserve nutrition are thus apparent in many different parts of the body.

CHAPTER X

Need for elaborating the statements of the ancient physicians. Superiority of Ancients to Moderns. This state of affairs can only be rectified by a really efficient education of youth. The chief requisites of such an education.

CHAPTER XI

For the sake of the few who really wish truth, the argument will be continued. A third kind of fibre—the oblique—suberves retention; the way in which this fibre is disposed in different coats.
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CHAPTER XII

The factor which brings the expulsive faculty into action is essentially a condition of the organ or its contents which is the reverse of that which determined attraction. Analogy between abortion and normal parturition. Whatever produces discomfort must be expelled. That discomfort also determines expulsion of contents from gall-bladder is not so evident as in the case of stomach, uterus, urinary bladder, etc., but can be logically demonstrated.

CHAPTER XIII

Expulsion takes place through the same channel as attraction (e.g., in stomach, gall-bladder, uterus). Similarly the delivery (anadosis) of nutriment to the liver from the food-canal via the mesenteric veins may have its direction reversed. Continuous give-and-take between different parts of the body; superior strength of certain parts is natural, of others acquired. When liver contains abundant food and stomach depleted, latter may draw on former; this occurs when animal can get nothing to eat, and so prevents starvation. Similarly, when one part becomes over-distended, it tends to deposit its excess in some weaker part near it; this passes it on to some still weaker part, which cannot get rid of it; hence depositus of various kinds. Further instances of reversal of the normal direction of anadosis from the food canal through the veins. Such reversal of functions would in any case be expected a priori. In the vomiting of intestinal obstruction, matter may be carried backwards all the way from the intestine to the mouth; not surprising, therefore, that, under certain circumstances, food-material might be driven right back from the skin-surface to the alimentary canal (e.g. in excessive chilling of surface); not much needed to determine this reversal of direction. Action of purgative drugs upon terminals of veins; one part draws from another until whole body participates; similarly in intestinal obstruction, each part passes on the irritating substance to its weaker
SYNOPSIS OF CHAPTERS

neighbour. Reversal of direction of flow occurs not merely on occasion but also constantly (as in arteries, lungs, heart, etc.). The various stages of normal nutrition described. Why the stomach sometimes draws back the nutriment it had passed on to portal veins and liver. A similar ebb and flow in relation to the spleen. Comparison of the parts of the body to a lot of animals at a feast. The valves of the heart are a provision of Nature to prevent this otherwise inevitable regurgitation, though even they are not quite efficient.

CHAPTER XIV

The superficial arteries, when they dilate, draw in air from the atmosphere, and the deeper ones a fine, vaporuous blood from the veins and heart. Lighter matter such as air will always be drawn in in preference to heavier; this is why the arteries in the food-canal draw in practically none of the nutrient matter contained in it.

CHAPTER XV

The two kinds of attraction—the mechanical attraction of dilating bellows and the "physical" (vital) attraction by living tissue of nutrient matter which is specifically allied or appropriate to it. The former kind—that resulting from horror vacui—acts primarily on light matter, whereas vital attraction has no essential concern with such mechanical factors. A hollow organ exercises, by virtue of its cavity, the former kind of attraction, and by virtue of the living tissue of its walls, the second kind. Application of this to question of contents of arteries; anastomoses of arteries and veins. Foramina in inter-ventricular septum of heart, allowing some blood to pass from right to left ventricle. Large size of aorta probably due to fact that it not merely carries the pneuma received from the lungs, but also some of the blood which percolates through septum from right ventricle. Thus arteries carry not merely pneuma, but also some light vaporous blood, which certain parts need more
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than the ordinary thick blood of the veins. The organic parts must have their blood-supply sufficiently near to allow them to absorb it; comparison with an irrigation system in a garden. Details of the process of nutrition in the ultimate specific tissues; some are nourished from the blood directly; in others a series of intermediate stages must precede complete assimilation; for example, marrow is an intermediate stage between blood and bone.

From the generalisations arrived at in the present work we can deduce the explanation of all kinds of particular phenomena; an instance is given, showing the co-operation of various factors previously discussed.
GALEN

ON THE NATURAL FACULTIES

BOOK I
ГАЛΗΝΟΥ
ΠΕΡΙ ΦΥΣΙΚΩΝ ΔΤΝΑΜΕΩΝ

Α

I

Κ. Π. Ἐπεὶ δὴ τὸ μὲν αἰσθάνεσθαι τε καὶ κινεῖσθαι
κατὰ προαιρεσίν ἵδια τῶν ζῷων ἐστὶ, τὸ δ’
αὐξάνεσθαι τε καὶ τρέφεσθαι κοινά καὶ τοῖς
φυτοῖς, εἰ ἂν τὰ μὲν πρότερα τῆς ψυχῆς, τὰ δὲ
δεύτερα τῆς φύσεως ἔργα. εἰ δὲ τὰς καὶ τοῖς
φυτοῖς ψυχῆς μεταδίδοσι καὶ διαπρομένους αὐτὰς
ὄνομάζει φυτικὴν μὲν ταῦτα, αἰσθητικὴν δὲ τὴν
ἐτέραν, λέγει μὲν οὐδ’ οὔτος ἄλλα, τῇ λέξει δ’
οὐ πάνι τῇ συνήθει κέχρηται. ἀλλ’ ἡμεῖς γε
μεγίστην λέξεως ἀρετὴν σαφῆνειν εἶναι πε-
2 πεισμένοι καὶ ταῦτα εἰδότες \( \text{πρ. \ οὐδὲνος \ οὔτως}

\text{ως \ υπὸ \ τῶν \ ἀσυνήθων \ ὀνομάτων \ διαφθειρόμενην,}

\text{ως \ τοῖς \ πολλοῖς \ έθος,} \text{όοτος \ ὀνομάζοντες \ \ υπὸ \ μὲν}

\text{ψυχῆς \ θ’ \ ἀμα \ καὶ} \text{φύσεως \ τὰ \ ξφα \ διοικεῖσθαι}

\text{φαμέν, \ υπὸ \ δὲ} \text{φύσεως \ μόνης \ τὰ} \text{φυτὰ \ καὶ} \text{τὸ} \gamma

\text{αὐξάνεσθαι \ τε} \text{καὶ} \text{τρέφεσθαι} \text{φύσεως \ ἔργα} \text{φαμέν,}

\text{οὐ} \text{ψυχῆς.}

1 That is, “On the Natural Powers,” the powers of the
Physis or Nature. By that Galen practically means what
we should call the physiological or biological powers, the
characteristic faculties of the living organism; his Physis
is the subconscious vital principle of the animal or plant.

2
Since feeling and voluntary motion are peculiar to animals, whilst growth and nutrition are common to plants as well, we may look on the former as effects of the soul and the latter as effects of the nature. And if there be anyone who allows a share in soul to plants as well, and separates the two kinds of soul, naming the kind in question vegetative, and the other sensory, this person is not saying anything else, although his language is somewhat unusual. We, however, for our part, are convinced that the chief merit of language is clearness, and we know that nothing detracts so much from this as do unfamiliar terms; accordingly we employ those terms which the bulk of people are accustomed to use, and we say that animals are governed at once by their soul and by their nature, and plants by their nature alone, and that growth and nutrition are the effects of nature, not of soul.

Like Aristotle, however, he also ascribes quasi-vital properties to inanimate things, cf. Introduction, p. xxvii.

2 Ergon, here rendered an effect, is literally a work or deed; strictly speaking, it is something done, completed, as distinguished from energeia, which is the actual doing, the activity which produces this ergon. cf. p. 13, and Introduction, p. xxx.

3 Gk. psyche, Lat. anima. 4 Gk. physis, Lat. natura.
Καὶ ζητήσομεν κατὰ τόνδε τὸν λόγον, ὑπὸ τίνων γίγνεται δυνάμεων αὐτὰ δὴ ταῦτα καὶ εἰ δὴ τι ἄλλο φύσεως ἔργον ἔστιν.

'Αλλὰ πρῶτον γε διελέσθαι τε χρῆ καὶ μηνύσαι σαφῶς ἐκαστὸν τῶν ὄνομάτων, οἷς χρησόμεθα κατὰ τόνδε τὸν λόγον, καὶ ἐφ’ ὦ τι φέρομεν πράγμα. γενήσεται δὲ τοῦτ’ εὐθὺς ἔργων φυσικῶν διδασκαλία σὺν ταῖς τῶν ὄνομάτων εξηγήσεων.

"Ὅταν οὖν τί σῶμα κατὰ μηδέν ἔξαλλάττηταί τῶν προὔπαρχόντων, ἡσυχάζειν αὐτὸ φαμεν’ εἰ δ’ ἐξίστατο τη, κατ’ ἐκεῖνο κινεῖσθαι. καὶ τοῖς ἐπεὶ πολυεἰδῶς ἐξίσταται, πολυεἰδῶς καὶ κινηθήσεται. καὶ γὰρ εἰ λευκῶν ὑπάρχον μελαῖνοιτο καὶ εἰ μέλαν λευκαίνοιτο, κινεῖται κατὰ χρῶν, 3 καὶ εἰ γλυκὺ τέως ὑπάρχον αὕθις || αὐστηρῶν ἢ ἐμπαλιν ἔξ αὐστηροῦ γλυκύ γένοιτο, καὶ τοῦτ’ ἀν κινεῖσθαι λέγοιτο κατὰ τὸν χυμόν. ἀμφὸ δὲ ταῦτά τε καὶ τὰ προειρημένα κατὰ τὴν ποιώτητα κινεῖσθαι λεχθήσεται καὶ οὐ μόνον γε τὰ κατὰ τὴν χρόαν ἢ τὸν χυμόν ἔξαλλαττόμενα κινεῖσθαι φαμεν, ἀλλὰ καὶ τὸ θερμότερον ἢ ψυχρότερον γενόμενον ἢ ψυχρότερον ἢ θερμότερον κινεῖσθαι καὶ τοῦτο λέγομεν, ὥσπερ γε καὶ εἰ τι ξηρὸν ἐξ
ON THE NATURAL FACULTIES, I. II

II

Thus we shall enquire, in the course of this treatise, from what *faculties* these effects themselves, as well as any other effects of nature which there may be, take their origin.

First, however, we must distinguish and explain clearly the various terms which we are going to use in this treatise, and to what things we apply them; and this will prove to be not merely an explanation of terms but at the same time a demonstration of the effects of nature.

When, therefore, such and such a body undergoes no change from its existing state, we say that it is *at rest*; but, if it departs from this in any respect we then say that in this respect it *undergoes motion*. Accordingly, when it departs in various ways from its pre-existing state, it will be said to undergo various kinds of motion. Thus, if that which is white becomes black, or what is black becomes white, it undergoes motion in respect to *colour*; or if what was previously sweet now becomes bitter, or, conversely, from being bitter now becomes sweet, it will be said to undergo motion in respect to *flavour*; to both of these instances, as well as to those previously mentioned, we shall apply the term *qualitative motion*. And further, it is not only things which are altered in regard to colour and flavour which, we say, undergo motion; when a warm thing becomes cold, and a cold thing becomes warm, here too we speak of its undergoing motion; similarly also when any-

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1 *Motion* (kinesis) is Aristotle's general term for what we would rather call *change*. It includes various kinds of change, as well as movement proper. *cf.* Introduction, p. xxix.
ΓΑΛΕΝ

υγροῦ ἢ υγροῦ ἐκ ξηροῦ γίγνοιτο. κοινῶν δὲ κατὰ
tούτων ἀπάντων ὄνομα χέρομεν τὴν ἀλλοίωσιν.

"Εν τι τούτο γένος κινήσεως. έτερων δὲ γένος
ἐπὶ τοὺς τὰς χώρας ἑμείσθησι σώμασι καὶ τόπουν
ἐκ τόπου μεταλλάττειν λεγόμενοις, ὄνομα δὲ καὶ
tούτῳ φορά.

Αὐταὶ μὲν οὖν αἱ δύο κινήσεις ἀπλαὶ καὶ
πρῶται, σύνθετοι δὲ ἔξιν αὐτῶν αὐξησίς τε καὶ
φθίσις, ὅταν ἔξιν ἐλάττωσιν τὸ μείζων ἢ ἐκ μείζωνος
ἐλαττών γένηται φυλάττων τὸ οἶκειον εἴδος. έτεραι
δὲ δύο κινήσεις γένεσις καὶ φθορά, γένεσις μὲν ἢ
eos οὐσίαν ἀγωγή, φθορά δὲ ἡ ἔναντια.

Πάσαις δὲ ταῖς κινήσεις κοινῶν ἐξάλλαξις
4 τοῦ || προὐπάρχοντος, ὡσπερ οὖν καὶ ταῖς ἱσυχίαις
ἡ φυλακὴ τῶν προὐπαρχόντων. ἀλλ' ὅτι μὲν
ἐξαλλάττεται καὶ πρὸς τὴν ὀψιν καὶ πρὸς τὴν
γεύσιν καὶ πρὸς τὴν ἀφήν αἴμα γιγνόμενα τὰ
σιτία, συγχωροῦσιν ὅτι δὲ καὶ κατ' ἀλήθειαν,
ουκέτι τοῦθ᾽ ὁμολογοῦσιν οἱ σοφισταί. οἱ μὲν
γὰρ τινὲς αὐτῶν ἀπαντα τὰ τοιαῦτα τῶν ἡμετέρων
αισθήσεων ἀπάτας τινὰς καὶ παραγωγὰς νομί-
ζουσιν ἀλλοτ' ἀλλῶς πασχοῦσων, τῆς ὑποκει-
μένης οὐσίας μηδὲν τούτων, οἷς ἐπονομάζεται,
δεχομένης. οἱ δὲ τινὲς εἶναι μὲν ἐν αὐτῇ βουλοῦνται
tὰς ποιότητας, ἀμεταβλήτους δὲ καὶ ἀτρέπτους

1 "Conveyance," "transport," "transit"; purely mechani-
cal or passive motion, as distinguished from alteration (quali-
tative change).

2 "Waxing and waning," the latter literally phthisis, a
"distension," "decline;" cf. Scotch dwining, Dutch verdwijnen.

3 Becoming and perishing: Latin, generatio et corruptio.

4 "Ad substantiam productio seu ad formam processus" (Lynacre).
thing moist becomes dry, or dry moist. Now, the common term which we apply to all these cases is alteration.

This is one kind of motion. But there is another kind which occurs in bodies which change their position, or as we say, pass from one place to another; the name of this is transference.¹

These two kinds of motion, then, are simple and primary, while compounded from them we have growth and decay,² as when a small thing becomes bigger, or a big thing smaller, each retaining at the same time its particular form. And two other kinds of motion are genesis and destruction,³ genesis being a coming into existence,⁴ and destruction being the opposite.⁵

Now, common to all kinds of motion is change from the pre-existing state, while common to all conditions of rest is retention of the pre-existing state. The Sophists, however, while allowing that bread in turning into blood becomes changed as regards sight, taste, and touch, will not agree that this change occurs in reality. Thus some of them hold that all such phenomena are tricks and illusions of our senses; the senses, they say, are affected now in one way, now in another, whereas the underlying substance does not admit of any of these changes to which the names are given. Others (such as Anaxagoras)⁵ will have it that the qualities do exist in it, but that they

⁵ "Preformationist" doctrine of Anaxagoras. To him the apparent alteration in qualities took place when a number of minute pre-existing bodies, all bearing the same quality, came together in sufficient numbers to impress that quality on the senses. The factor which united the minute quality-bearers was Nous. "In the beginning," says Anaxagoras, "all things existed together—then came Nous and brought them into order."
GREEK

έξ αἰώνοις εἰς αἰώνα καὶ τὰς φαινομένας ταύτας ἀλλοιώσεις τῇ διακρίσει τε καὶ συγκρίσει γίγνεσθαι φασιν ὡς Ἀναξαγόρας.

Εἰ δὲ τούτους ἑκτραπόμενος ἐξελέγχομι, μείζον ἄν μοι τὸ πάρεργον τοῦ ἐργοῦ γένοιτο. εἰ μὲν γὰρ οὐκ ἔσασιν, ὅσα περὶ τῆς καθ’ ὅλην τὴν οὐσίαν ἀλλοιώσεως Ἀριστοτέλει τε καὶ μετ’ αὐτὸν Χρυσίππῳ γέγραπται, παρακαλέσαι χρὴ τοῖς ἐκείνων αὐτοῦ ὁμιλήσαι γράμμασιν εἰ δὲ γνωσκοῦντες ἐπειθ’ ἐκόντες τὰ χεῖρο πρὸ τῶν βελτιώνων ἃ αἱροῦνται, μάταια δῆπον καὶ τὰ ἡμέτερα νομοθεν. ὅτι δὲ καὶ Ἰπποκράτης οὐτῶς ἐγόγγυσκεν Ἀριστοτέλεους ἔτι πρότερος οὐν, ἐν ἑτέροις ἡμῖν ἀποδέικται. πρῶτος γὰρ οὕτως ἀπάντων ἄν ἰσομεν ἰατρῶν τε καὶ φιλοσοφῶν ἀποδεικνύειν ἐπιστήμης τέτταρας εἶναι τὰς πάσας δραστικὰς εἰς ἀλληλας ποιότητας, ύφ’ ὅν γίγνεται τε καὶ φθείρεται πάνθ’, ὅσα γενέσθαι τε καὶ φθοράν ἐπιδέχεται. καὶ μέντοι καὶ τὸ κεραννυσθαὶ δ’ ἀλληλῶν αὐτὰς ὅλας δ’ ὅλων Ἰπποκράτης ἀπάντων πρῶτος ἔγνω καὶ τὰς ἀρχὰς γε τῶν ἀποδείξεων, ὅν ὑστερον Ἀριστοτέλης μετεχειρίσατο, παρ’ ἐκείνω πρῶτῳ γεγραμμένας ἐστίν εὐρεῖν.

Εἰ δ’ ὑστερ πᾶς ποιότητας οὕτω καὶ τὰς οὐσίας δ’ ὅλων κεραννυσθαί χρὴ νομίζειν, όσ’ ὑστερον ἀπεφήματο Ζήνων ό Κιππιεύς, οὐχ ἠγούμαι δεῖν ἔτι περὶ τούτου κατὰ τοῦτον τοῦ λόγου ἐπεξείναι. μόνην γὰρ εἰς τὰ παρόντα δέομαι γιγνώσκεσθαι

1 “De ea alteratione quae per totam fit substantiam” (Linacre).
2 The systematizer of Stoicism and successor of Zeno.
3 Note characteristic impatience with metaphysics. To Galen, as to Hippocrates and Aristotle, it sufficed to look on
are unchangeable and immutable from eternity to eternity, and that these apparent alterations are brought about by separation and combination.

Now, if I were to go out of my way to confute these people, my subsidiary task would be greater than my main one. Thus, if they do not know all that has been written, "On Complete Alteration of Substance" by Aristotle, and after him by Chrysippus, I must beg of them to make themselves familiar with these men's writings. If, however, they know these, and yet willingly prefer the worse views to the better, they will doubtless consider my arguments foolish also. I have shown elsewhere that these opinions were shared by Hippocrates, who lived much earlier than Aristotle. In fact, of all those known to us who have been both physicians and philosophers Hippocrates was the first who took in hand to demonstrate that there are, in all, four mutually interacting qualities, and that to the operation of these is due the genesis and destruction of all things that come into and pass out of being. Nay, more; Hippocrates was also the first to recognise that all these qualities undergo an intimate mingling with one another; and at least the beginnings of the proofs to which Aristotle later set his hand are to be found first in the writings of Hippocrates.

As to whether we are to suppose that the substances as well as their qualities undergo this intimate mingling, as Zeno of Citium afterwards declared, I do not think it necessary to go further into this question in the present treatise; for immediate purposes we only the qualitative differences apprehended by the senses as fundamental. Zeno of Citium was the founder of the Stoic school; on the further analysis by this school of the qualities into bodies cf. p. 144, note 3.
τὴν δὴ ὅλης τῆς οὐσίας ἄλλοιςιν, ἦν μὴ τις ὁστοῦ καὶ σαρκὸς καὶ νέρου καὶ τῶν ἄλλων ἐκάστοι μορίων οἶονεὶ μισγάγκειαν τινα τῷ ἄρτῳ νομίσῃ περιέχεσθαι καπετί ἐν τῷ σῶματι διακρινόμενον ὡς τὸ ὀμόφυλον ἐκαστον ἴναι. καὶ τοι πρὸ γε τῆς διακρίσεως αἷμα φαίνεται γιγνόμενος ὁ πᾶς ἄρτος. εἰ γοῦν παμπόλλῳ τις χρόνῳ μηδὲν ἄλλῳ εἰς σιτίον προσφερόμενος, οὐδὲν ἦττον ἐν ταῖς φλεψίν αἷμα περιεχόμενον ἔξει. καὶ φανερῶς τούτο τὴν τῶν ἁμετάβλητα τὰ στοιχεία τιθεμένων ἔξελέγχει δόξαν, ὡστερ οἴμαι καὶ τούλαιον εἰς τὴν τοῦ λύχνου φλόγα καταναλισκόμενον ἄπαν καὶ τὰ ἔξωλα πῦρ μικρὸν υστερον γιγνόμενα.

Καὶ τοῦ τοῦ γ' ἀντιλέγεων αὐτοῖς ἡρυπάμην, ἀλλ' ἐπεὶ τῆς ἱστρικῆς ὕλης ἦν τὸ παράδειγμα καὶ χρήζω πρὸς τὸν παρόντα λόγον αὐτοῦ, διὰ τοῦτ' ἐμνημόνευσα. καταληφόντες οὖν, ὡς ἔφην, τὴν πρὸς τούτους ἀντιλογίαν, ἐν' ὑπὸ τοῖς βουλομένοις τὰ τῶν παιδιῶν ἐκμαθάνειν κὰ ὁ ἡμεῖς ἴδια περὶ αὐτῶν ἐπεσκέμμεθα.

Τὸν ἐφεξῆς λόγον ἀπαντά ποιησόμεθα ζητούντες ὑπὲρ ὃν ἐξ ἀρχῆς προῳδήμεθα, πόσαι τε καὶ τίνες εἰσίν αἱ τῆς φύσεως δυνάμεις καὶ τί ποιεῖν ἔργον

1 A rallying-ground: lit. a place where two glens meet.
2 Thus according to Gomperz (Greek Thinkers), the hypothesis of Anaxagoras was that "the bread... already contained the countless forms of matter as such which the human body displays. Their minuteness of size would withdraw them from our perception. For the defect or 'weakness' of the senses is the narrowness of their receptive area.
need to recognize the complete alteration of substance. In this way, nobody will suppose that bread represents a kind of meeting-place for bone, flesh, nerve, and all the other parts, and that each of these subsequently becomes separated in the body and goes to join its own kind; before any separation takes place, the whole of the bread obviously becomes blood; (at any rate, if a man takes no other food for a prolonged period, he will have blood enclosed in his veins all the same). And clearly this disproves the view of those who consider the elements unchangeable, as also, for that matter, does the oil which is entirely used up in the flame of the lamp, or the faggots which, in a somewhat longer time, turn into fire.

I said, however, that I was not going to enter into an argument with these people, and it was only because the example was drawn from the subject-matter of medicine, and because I need it for the present treatise, that I have mentioned it. We shall then, as I said, renounce our controversy with them, since those who wish may get a good grasp of the views of the ancients from our own personal investigations into these matters.

The discussion which follows we shall devote entirely, as we originally proposed, to an enquiry into the number and character of the faculties of Nature, and what is the effect which each naturally

These elusive particles are rendered visible and tangible by the process of nutrition, which combines them."

3 Therefore the blood must have come from the bread. The food from the alimentary canal was supposed by Galen to be converted into blood in and by the portal veins. cf. p. 17.

4 By "elements" is meant all homogeneous, amorphous substances, such as metals, &c., as well as the elementary lines.
GALEN

ἐκάστη πέφυκεν. ἔργον δὲ δηλονότι καλῶ τὸ 7 γεγονός ἦδη καὶ συμπεπλήρωμένον ύπὸ τῆς ἐνεργείας αὐτῶν, οἶον τὸ αἷμα, τὴν σάρκα, τὸ νεῦρον ἐνέργειαν δὲ τὴν δραστικὴν ὀνομάξω κίνησιν καὶ τὴν ταύτης αἰτίαν δύναμιν. ἐπεί γὰρ ἐν τῷ τὸ σιτίου αἷμα γίγνεσθαι παθητικὴ μὲν ἢ τοῦ σιτίου, δραστικὴ δὲ ἡ τῆς φλεβῶς γίγνεται κίνησις, ὡσαύτως δὲ κἂν τῷ μεταφέρειν τὰ κῶλα κινεῖ μὲν ὁ μῆς, κινεῖται δὲ τὰ ὀστᾶ, τὴν μὲν τῆς φλεβῶς καὶ τῶν μυῶν κίνησιν ἐνέργειαν εἶναι φήμι, τὴν δὲ τῶν σιτίων τε καὶ τῶν ὀστῶν σύμπτωμα τε καὶ πάθημα: τὰ μὲν γὰρ ἀλλοιοῦται, τὰ δὲ φέρεται. τὴν μὲν οὖν ἐνέργειαν ἐγχωρεῖ καλείν καὶ ἔργον τῆς φύσεως, οἶον τὴν πέψιν, τὴν ἀνάδοσιν, τὴν αἰμάτωσιν, οὐ μὴν τὸ γ' ἔργον ἐξ ἀπαντος ἐνέργειας· ἢ γὰρ τοι σὰρξ ἔργον μὲν ἐστὶ τῆς φύσεως, οὐ μὴν ἐνέργεια γε. δῆλον οὖν, ὡς θάτερον μὲν τῶν ὀνομάτων διχῶς λέγεται, θάτερον δ' οὐ.

III

'Εμοὶ μὲν οὖν καὶ ἡ φλέψ καὶ τῶν ἄλλων ἀπαντῶν ἐκαστὸν διὰ τὴν ἐκ τῶν τεττάρων ποιὰν

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2 Operation, activation, or functioning. Lat. *actio*. cf. *loc. cit.*
3 i.e. a concomitant (secondary) or passive affection. Galen is contrasting active and passive "motion." cf. p. 6, note 1.
4 As already indicated, there is no exact English equivalent for the Greek term *phasis*, which is a principle immanant
produces. Now, of course, I mean by an effect that which has already come into existence and has been completed by the activity of these faculties—for example, blood, flesh, or nerve. And activity is the name I give to the active change or motion, and the cause of this I call a faculty. Thus, when food turns into blood, the motion of the food is passive, and that of the vein active. Similarly, when the limbs have their position altered, it is the muscle which produces, and the bones which undergo the motion. In these cases I call the motion of the vein and of the muscle an activity, and that of the food and the bones a symptom or affection, since the first group undergoes alteration and the second group is merely transported. One might, therefore, also speak of the activity as an effect of Nature—for example, digestion, absorption, blood-production; one could not, however, in every case call the effect an activity; thus flesh is an effect of Nature, but it is, of course, not an activity. It is, therefore, clear that one of these terms is used in two senses, but not the other.

III

It appears to me, then, that the vein, as well as each of the other parts, functions in such and such a way according to the manner in which the four quali-

in the animal itself, whereas our term “Nature” suggests something more transcendent; we are forced often, however, to employ it in default of a better word. cf. p. 2, note 1.

5 In Greek anadosis. This process includes two stages: (1) transmission of food from alimentary canal to liver (rather more than our “absorption”); (2) further transmission from liver to tissues. Anadosis is lit. a yielding-up, a “delivery;” it may sometimes be rendered “dispersal.” “Distribution” (diadosis) is a further stage; cf. p. 163, note 4.
κράσιν ὧδί πως ἐνεργεύειν δοκεῖ. εἰσὶ δὲ γε μὴν οὐκ ὁλίγοι τινὲς ἄνδρες || οὐδ' ἄδοξοι, φιλόσοφοι τε καὶ ιατροὶ, τῷ μὲν θερμῷ καὶ τῷ ψυχρῷ τῷ δρᾶν ἀναφέροντες, ὑποβάλλοντες δ' αὐτοῖς παθητικὰ τὸ ξηρὸν τε καὶ τὸ υγρὸν. καὶ πρῶτος γ' Ἀριστοτέλης τὰς τῶν κατὰ μέρος ἀπάντων αἰτίας εἰς ταύτας ἀνάγειν πειρᾶται τὰς ἀρχὰς, ἱκολουθήσας δ' ὑστερον αὐτῷ καὶ οὐ ἀπὸ τῆς στοάς χορὸς. καὶ τοι τούτων μὲν, ὡς ἄν καὶ αὐτῶν τῶν στοιχείων τὴν εἰς ἀλλήλα μεταβολὴν χύσει τέ τισι καὶ πιλῆσειν ἀναφέρουσιν, εὐλογον ὡν ἀρχὰς δραστικὰς ποιήσασθαι τὸ θερμὸν καὶ τὸ ψυχρὸν, Ἀριστοτέλει δ' οὐχ οὕτως, ἀλλὰ ταῖς тέτταρσι ποιότητι εἰς τὴν τῶν στοιχείων γένεσιν χρωμένην βελτίων ἢν καὶ τὰς τῶν κατὰ μέρος αἰτίας ἀπάσας εἰς ταύτας ἀνάγειν. τὸ δὴπτ' οὖν ἐν μὲν τοῖς περὶ γενέσεως καὶ φθορᾶς ταῖς τέτταρσι χρῆται, ἐν δὲ τοῖς μετεωρολογικοῖς καὶ τοῖς προβλήμασι καὶ ἀλλοθὰ πολλαχόθι ταῖς δύο μόναις; εἴ μὲν γὰρ ὡς ἐν τοῖς ξύσοις τε καὶ τοῖς φυτοῖς μᾶλλον μὲν δρᾶ τὸ θερμὸν καὶ τὸ ψυχρὸν, ἦττον δὲ τὸ ξηρὸν καὶ τὸ υγρὸν ἀποφαίνοντο τις, ἵσως ἄν ἔχοι καὶ τὸν Ἰπποκράτην σύμψηφον: εἴ δ' ὡσαύτως ἐν ἐπισκέψεις, οὐκέτ' οἴμαι συγχωρήσειν τούτῳ μὴ ὅτι τὸν Ἰπποκράτην ἀλλὰ μὴν αὐτὸν τὸν Ἀριστοτέλην μεμνῄσθαι γε βουλόμενον ὅν ἐν τοῖς περὶ γενέσεως καὶ φθορᾶς οὐχ ἀπλῶς ἀλλὰ μετ' ἀποδείξεων αὐτὸς ἡμᾶς ἐδιδαξεν. ἀλλὰ περὶ μὲν τούτων κἂν τοῖς περὶ κράσεων, εἰς ὅσον ἰατρῷ χρήσιμον, ἐπεσκεψάμεθα.

1 cf. p. 9.
lies\textsuperscript{1} are mixed. There are, however, a considerable number of not undistinguished men—philosophers and physicians—who refer action to the Warm and the Cold, and who subordinate to these, as passive, the Dry and the Moist; Aristotle, in fact, was the first who attempted to bring back the causes of the various special activities to these principles, and he was followed later by the Stoic school. These latter, of course, could logically make active principles of the Warm and Cold, since they refer the change of the elements themselves into one another to certain \textit{diffusions} and \textit{condensations}.\textsuperscript{2} This does not hold of Aristotle, however; seeing that he employed the four qualities to explain the genesis of the elements, he ought properly to have also referred the causes of all the special activities to these. How is it that he uses the four qualities in his book "On Genesis and Destruction," whilst in his "Meteorology," his "Problems," and many other works he uses the two only? Of course, if anyone were to maintain that in the case of animals and plants the Warm and Cold are \textit{more} active, the Dry and Moist \textit{less} so, he might perhaps have even Hippocrates on his side; but if he were to say that this happens in all cases, he would, I imagine, lack support, not merely from Hippocrates, but even from Aristotle himself—if, at least, Aristotle chose to remember what he himself taught us in his work "On Genesis and Destruction," not as a matter of simple statement, but with an accompanying demonstration. I have, however, also investigated these questions, in so far as they are of value to a physician, in my work "On Temperaments."

\textsuperscript{2} Since heat and cold tend to cause diffusion and condensation respectively.
IV

'Ἡ δ’ οὖν δύναμις ἢ ἐν ταῖς φλεψίν ἡ αἰματοποιητικὴ προσαγορευμένη καὶ πᾶσα δ’ ἄλλη δύναμις ἐν τῷ πρῶτῳ τι νεώθηται πρῶτως μὲν γὰρ τῆς ἐνεργείας αἰτία, ἣδη δὲ καὶ τοῦ ἔργου κατὰ συμβεβηκός. ἄλλ’ εἶπερ ἡ αἰτία πρὸς τι, τοῦ γὰρ ὑπ’ αὐτής γενομένου μόνου, τῶν δ’ ἄλλων οὐδενός, εὖδηλον, ὅτι καὶ ἡ δύναμις ἐν τῷ πρῶτῳ τι. καὶ μέχρι γ’ ἂν ἁγιοῦμεν τὴν οὐσίαν τῆς ἐνεργούσης αἰτίας, δύναμιν αὐτῆς ὁνομάζομεν, εἶναι τινὰ λέγοντες ἐν ταῖς φλεψίν αἰματοποιητικῶν, ὥσαυτος δὲ καὶ τῇ κοιλίᾳ πεπτικήν καὶ τῇ καρδίᾳ σφυγμικήν καὶ καθ’ ἐκαστὸν τῶν ἄλλων ἰδίαν τινὰ τῆς | κατὰ τὸ μόριον ἐνεργείας. εἶπερ οὖν μεθόδος μέλλοιμεν ἐξευρήσειν, ὅποσαι τε καὶ ὁποῖαι τινὲς αἱ δυνάμεις εἰσίν, ἀπὸ τῶν ἔργων αὐτῶν ἄρκτεν ἐκαστὸν γὰρ αὐτῶν ὑπὸ τῶν ἐνεργείας γίγνεται καὶ τούτων ἐκάστης προηγεῖται τῆς αἰτίας.

V

'Εργα τούτων τῆς φύσεως ἔτι μὲν κνοικεῖνον τε καὶ διαπλαττομένου τοῦ ξύλου τὰ σύμπαντ’ ἔστι τοῦ σώματος μόρια, γεννηθέντος δὲ κοινὸν ἐφ’ ἀπασίν ἔργον ἢ εἰς τὸ τέλειον ἐκάστῳ μέγεθος ἀγωγὴ καὶ μετὰ ταῦθ’ ἡ μέχρι τοῦ δυνατοῦ διαμόνη.

'Ενεργείαι δ’ ἐπὶ τρισὶν τοῖς εἰρημένοις ἔργοις τρεῖς ἐξ ἀνάγκης, ἐφ’ ἐκάστῳ μία, γένεσις τε καὶ
IV

The so-called blood-making faculty in the veins, then, as well as all the other faculties, fall within the category of relative concepts; primarily because the faculty is the cause of the activity, but also, accidentally, because it is the cause of the effect. But, if the cause is relative to something—for it is the cause of what results from it, and of nothing else—it is obvious that the faculty also falls into the category of the relative; and so long as we are ignorant of the true essence of the cause which is operating, we call it a faculty. Thus we say that there exists in the veins a blood-making faculty, as also a digestive faculty in the stomach, a pulsatile faculty in the heart, and in each of the other parts a special faculty corresponding to the function or activity of that part. If, therefore, we are to investigate methodically the number and kinds of faculties, we must begin with the effects; for each of these effects comes from a certain activity, and each of these again is preceded by a cause.

V

The effects of Nature, then, while the animal is still being formed in the womb, are all the different parts of its body; and after it has been born, an effect in which all parts share is the progress of each to its full size, and thereafter its maintenance of itself as long as possible.

The activities corresponding to the three effects mentioned are necessarily three—one to each—

1 Lit. haematopoietic. cf. p. 11, note 3.  
2 Lit. peptic.  
3 Lit. sphygmic.
αὐξησις καὶ θρέψις. ἀλλ' ἡ μὲν γένεσις φύχ ἀπλὴ τις ἐνέργεια τῆς φύσεως, ἀλλ' ἐξ ἀλλοιώσεως τε καὶ διαπλάσεως ἐστὶ σύνθετος. ἵνα μὲν γὰρ ὅστιν γένηται καὶ νεκρὸν καὶ φλέψ καὶ τῶν ἄλλων ἔκαστον, ἀλλοιοῦσθαι χρή τὴν ύποβεβλημένην οὐσίαν, ἐξ ἣς γίγνεται τὸ ἄρον· ἵνα δὲ καὶ σχῆμα τὸ δέον καὶ θέσιν καὶ κοιλότητας τινας καὶ ἀποψυκτικὴς καὶ συμφύσεως καὶ ἄλλα || τὰ τοιαῦτα κτήσηται, διαπλάτησθαι χρὴ τὴν ἀλλοιομένην οὐσίαν, ἣν δὴ καὶ ὅλην τοῦ ἄρου καλῶν, ὡς τῆς νεώς τὰ ξύλα καὶ τῆς εἰκόνος τὸν θηρόν, οὐκ ἂν ἀμάρτοις.

Ἡ δ' αὐξησις ἐπίδοσις ἐστὶ καὶ διάστασις κατὰ μήκος καὶ πλάτος καὶ βάθος τῶν στερεῶν τοῦ ἄρου μορίων, ὅπερ καὶ ἡ διάπλασις ἢν, ἢ δὲ θρέψις πρόσθεσις τοῖς αὐτοῖς ἂνευ διαστάσεως.

VI

Περὶ πρώτης οὖν τῆς γενέσεως εἰπωμεν, ἢν ἐξ ἀλλοιώσεως θ' ἀμα καὶ διαπλάσεως ἐλέγομεν γίγνεσθαι.

Καταβληθέντος δὴ τοῦ σπέρματος εἰσ τὴν μήτραν ἢ εἰς τὴν γῆν, οὐδὲν γὰρ διαφέρει, χρόνοις τισὶν ὁρισμένοις πάμπολλα συνίσταται μόρια τῆς γεννωμένης οὐσίας υγρότητι ἐνεργότητι καὶ ψυχρότητι καὶ θερμότητι καὶ τοῖς ἀλλοις ἀπασίν,

1 Genesis corresponds to the intrauterine life, or what we may call embryogeny. Alteration here means histogenesis or tissue-production; shaping or moulding (in Greek diaplasia) means the ordering of these tissues into organs (organogenesis).
namely, Genesis, Growth, and Nutrition. Genesis, however, is not a simple activity of Nature, but is compounded of alteration and of shaping. That is to say, in order that bone, nerve, veins, and all other tissues may come into existence, the underlying substance from which the animal springs must be altered; and in order that the substance so altered may acquire its appropriate shape and position, its cavities, outgrowths, attachments, and so forth, it has to undergo a shaping or formative process. One would be justified in calling this substance which undergoes alteration the material of the animal, just as wood is the material of a ship, and wax of an image.

Growth is an increase and expansion in length, breadth, and thickness of the solid parts of the animal (those which have been subjected to the moulding or shaping process). Nutrition is an addition to these, without expansion.

VI

Let us speak then, in the first place, of Genesis, which, as we have said, results from alteration together with shaping.

The seed having been cast into the womb or into the earth (for there is no difference), then, after a certain definite period, a great number of parts become constituted in the substance which is being generated; these differ as regards moisture, dryness, coldness and warmth, and in all the other qualities

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2 cf. p. 25, note 4.
3 Note inadequate analogy of semen with fertilised seeds of plants (i.e. of gamete with zygote). Strictly speaking, of course, semen corresponds to pollen. cf. p. 130, note 2.
4 i.e. the four primary qualities; cf. chap. iii. supra.
GALEN

όσα τούτοις ἐπεται, διαφέροντα. τὰ δ’ ἐπόμενα
gυνώσκεις, εἰπέρ ὅλως ἐφιλοσόφησις τι περὶ
γενέσεως καὶ θυράς; αἱ λοιπαι γὰρ τῶν ἀπτῶν
ὄνομαξομένων διαφορῶν ταῖς εἰρημέναις ἐπονται
πρῶται καὶ μάλιστα, μετὰ δὲ ταῦτας αἱ γενσταῖ
τε καὶ ὀσφρηται καὶ ὅραται. σκληρότης μὲν οὖν
καὶ μαλακότης καὶ γυνάχροτης καὶ κραυρότης καὶ
κοψότης καὶ βαρύτης καὶ πυκνότης καὶ ἀραιότης
καὶ λείατης καὶ τραχύτης καὶ παχύτης καὶ λεπτό-
tης ἀπταὶ διαφοραὶ καὶ εἰρημεῖ περὶ πασῶν
Ἀριστοτέλει καλῶς. οἰσθα δὲ δήποτε καὶ τὰς
γενστά τε καὶ ὀσφρητας καὶ ὅρατας διαφοράς.
ὅστ’, εἰ μὲν τὰς πρῶτας τε καὶ στοιχεῖωδεις
ἀλλοιωτικὰς δυνάμεις ξητοίς, ύγρότης ἐστὶ καὶ
ξηρότης καὶ ψυχρότης καὶ θερμότης· εἰ δὲ τὰς ἐκ
τῆς τούτων κράσεως γενομένας, τοσαῦται καθ’
έκαστον ἐσοφται ἵππον, ὅσαπερ ἄν αὐτοῦ τὰ
αἴσθητα στοιχεῖα υπάρχη καλεῖται δ’ αἴσθητα
στοιχεία τὰ ὁμοιομερή πάντα τοῦ σώματος μόρια·
καὶ ταῦτ’ οὐκ ἐκ μεθόδου τινὸς ἀλλ’ αὐτόπτην
γενόμενον ἐκμαθεῖν χρὴ διὰ τῶν ἀνατομῶν.

'Οστούν δὴ καὶ χόνδρον καὶ νέφρον καὶ ὑμένα
καὶ σύνδεσμον καὶ φλέβα καὶ πάνθ’ ὅσα τοιαῦτα
κατὰ τὴν πρώτην τοῦ ζώου γενέσιν ἡ φύσις
ἀπεργάζεται δυνάμει χρωμένη καθόλου μὲν
εἰπεῖν τῇ γεννητικῇ τε καὶ ἄλλοιωτικῇ, κατὰ
μέρος δὲ θερμαντικῇ τε καὶ ψυκτικῇ καὶ ἔξεραν-

1 Various secondary or derivative differences in the tissues.
Note pre-eminence of sense of touch.
2 De Anima, ii. et seq.
3 Lit. homoemeros=of similar parts throughout, “the
same all through.” He refers to the elementary tissues,
conceived as not being susceptible of further analysis.
ON THE NATURAL FACULTIES, I. vi

which naturally derive therefrom. These derivative qualities, you are acquainted with, if you have given any sort of scientific consideration to the question of genesis and destruction. For, first and foremost after the qualities mentioned come the other so-called tangible distinctions, and after them those which appeal to taste, smell, and sight. Now, tangible distinctions are hardness and softness, viscosity, friability, lightness, heaviness, density, rarity, smoothness, roughness, thickness and thinness; all of these have been duly mentioned by Aristotle. And of course you know those which appeal to taste, smell, and sight. Therefore, if you wish to know which alterative faculties are primary and elementary, they are moisture, dryness, coldness, and warmth, and if you wish to know which ones arise from the combination of these, they will be found to be in each animal of a number corresponding to its sensible elements. The name sensible elements is given to all the homogeneus parts of the body, and these are to be detected not by any system, but by personal observation or dissections.

Now Nature constructs bone, cartilage, nerve, membrane, ligament, vein, and so forth, at the first stage of the animal's genesis, employing at this task a faculty which is, in general terms, generative and alterative, and, in more detail, warming, chilling, drying, or moistening; or such as spring from the

4 That is, by the bodily eye, and not by the mind's eye. The observer is here called an autoptes or "eye-witness." Our medical term autopsy thus means literally a persona inspection of internal parts, ordinarily hidden.
5 i.e. "alteration" is the earlier of the two stages which constitute embryogeny or "genesis." cf. p. 18, note 1.
τική καὶ ὑγραντική καὶ ταῖς ἐκ τῆς τούτων κράσεως γενομέναις, οἷον ὀστοποιητική τε καὶ
νευροποιητική καὶ χονδροποιητική· σαφήνειας
γὰρ ἐνεκα καὶ τούτως τοῖς ὄνωμασι χρηστέοιν.

Ἐστὶ γοῦν καὶ ἡ ἰδία σάρξ τοῦ ἡπατος ἐκ
toῦ τούτου τοῦ γένους καὶ ἡ τοῦ σπληνὸς καὶ ἡ τῶν
νεφρῶν καὶ ἡ τοῦ πνεύμονος καὶ ἡ τῆς καρδίας
οὕτω δὲ καὶ τοῦ ἐγκεφάλου τὸ ἱδιον σῶμα καὶ
τῆς γαστρὸς καὶ τοῦ στομάχου καὶ τῶν ἐντέρων
καὶ τῶν ύστερῶν αἰσθητῶν στοιχείων ἐστὶν ὅμοιο-
μερές τε καὶ ἀπλοῦν καὶ ἀσύνθετον· ἐὰν γὰρ
ἐξέλησι ἐκάστου τῶν εἰρημένων τὰς ἀρτηρίας τε
καὶ τὰς φλέβας καὶ τὰ νεῦρα, τὸ ὑπόλοιπον
σῶμα τὸ καθ᾽ ἐκαστὸν ὄργανον ἀπλοῦν ἐστὶ καὶ
στοιχείωδες ὡς πρὸς αἰσθησιν. ὡσὶ δὲ τῶν
τοιούτων ὄργανων ἐκ δυνών σύγκειται χιτώνων
οὕχ ὁμολογήτως μὲν ἀλλήλοις, ἀπλοῦ ὡς ἐκαστέρου,
tοιοῦτοι οἱ χιτώνεσε εἰσὶ τὰ στοιχεία καθάπερ τῆς
tῆς γαστρὸς καὶ τοῦ στομάχου καὶ τῶν ἐντέρων
καὶ τῶν ἀρτηρίων, καὶ καθ᾽ ἐκαστέρου γε τῶν
χιτώνων ἰδίως ἡ ἀλλοιωτική δύναμις ἢ ἐκ τοῦ
παρὰ τῆς ἡμῖν τὸ εἰμί περί σεισάς τὸ
μόριον, ὡστε τὰς κατὰ μέρος ἀλλοιωτικὰς δυνά-
μεις τοσαύτας εἰναι καθ᾽ ἐκαστὸν ἔτσι, ὡσαπερ
ἀν ἔχῃ τὰ στοιχείωδη μόρια. καὶ μὲν γε καὶ
τὰς ἐνεργείας ἰδίας ἐκάστῳ τῶν κατὰ μέρος
ἀναγκαῖοι ὑπάρχειν ὡσπερ καὶ τὰς χρείας, οἷον
καὶ τῶν ἀπὸ τῶν νεφρῶν εἰς τὴν κύστιν διηκοντῶν
πόρων, οὐ δὴ καὶ ὑφρητῆρες καλοῦνται. οὕτωι

1 The terms Galen actually uses are: ostopoietic, neuro-
poietic, chondropoietic.

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blending of these, for example, the bone-producing, nerve-producing, and cartilage-producing faculties\(^1\) (since for the sake of clearness these names must be used as well).

Now the peculiar \(^2\) flesh of the liver is of this kind as well, also that of the spleen, that of the kidneys, that of the lungs, and that of the heart; so also the proper substance of the brain, stomach, gullet, intestines, and uterus is a sensible element, of similar parts all through, simple, and uncompounded. That is to say, if you remove from each of the organs mentioned its arteries, veins, and nerves,\(^3\) the substance remaining in each organ is, from the point of view of the senses, simple and elementary. As regards those organs consisting of two dissimilar coats,\(^4\) of which each is simple, of these organs the coats are the elements—for example, the coats of the stomach, oesophagus, intestines, and arteries; each of these two coats has an alterative faculty peculiar to it, which has engendered it from the menstrual blood of the mother. Thus the special alterative faculties in each animal are of the same number as the elementary parts\(^5\); and further, the activities must necessarily correspond each to one of the special parts, just as each part has its special use—for example, those ducts which extend from the kidneys into the bladder, and which are called ureters; for these are not arteries, since they do not pulsate nor do they consist of two coats; and they

\(^2\) As we should say, parenchyma (a term used by Erasistratus).

\(^3\) These were all the elementary tissues that Aristotle, for example, had recognized; other tissues (e.g. flesh or muscle) he believed to be complexes of these.

\(^4\) Or tunics.

\(^5\) i.e. tissues.


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γάρ οὖτ' ἀρτηρίαι εἰσίν, ὅτι μῆτε σφύζουσι μήτ' ἐκ δυοῖν χιτῶνων συνεστήκασιν, οὔτε φλέβες, ὅτι μῆθ' αἷμα περιέχουσι μήτ' ἔοικεν αὐτῶν ὁ χιτῶν κατὰ τι τῷ τῆς φλεβὸς ἀλλὰ καὶ νεύρων ἐπὶ πλέον ἀφεστῆκασιν ἢ τῶν εἰρημένων.

Τὰ ποτ' οὖν εἰσίν; ἐρωτά τις, ὅσπερ ἀναγκαῖον διὰ ἄπαν μόριον ἡ ἀρτηρίαν ἡ φλέβα ἡ νεύρων ὑπάρχειν ἢ ἐκ τούτων πεπλέχθαι καὶ μὴ τούτ' αὐτὸ τὸ νῦν λεγόμενον, ὡς ἱδίος ἐκάστῳ τῶν κατὰ μέρος ὀργάνων ἐστὶν ἡ οὐσία. καὶ γάρ καὶ αἱ κύστεις ἐκάτεραι ἢ τε τὸ οὕρον ὑποδεχομένη καὶ ἡ τὴν ξανθὴν χολήν οὐ μόνον τῶν ἄλλων ἀπάντων ἀλλὰ καὶ ἄλληλων διαφέρουσι καὶ οἱ εἰς τὸ ἡπαρ ἀποψινομενοὶ πόροι, καθάπερ στόμαχοι τινες ἀπὸ τῆς χοληδόχου κύστεως, οὔτεν οὔτ' ἀρτηρίας οὔτε φλεβὴν οὔτε νεύροις ἑοίκασιν. ἀλλὰ περὶ μὲν τούτων ἐπὶ πλέον ἐν ἄλλοις τέ τισι καὶ τοῖς περὶ τῆς Ἱπποκράτους ἀνατομῆς εἰρηται.

Αἱ δὲ κατὰ μέρος ἀπασαι δυνάμεις τῆς φύσεως αἱ ἀλλοιωτικαὶ αὐτὴν μὲν τὴν οὐσίαν τῶν χιτῶνων τῆς κοιλίας καὶ τῶν ἐντέρων καὶ τῶν υστερῶν ἀπετέλεσαν, οὕπατερ ἐστὶν τὴν δὲ σύνθεσιν αὐτῶν καὶ τὴν τῶν ἐμφυομένων πλοκῆν καὶ τὴν εἰς τὸ ἐντερον ἐκφυσιν καὶ τὴν τῆς ἱδάν κοιλότητος ἰδέαν καὶ τὰλλ' ὁσα τοιαῦτα δύναμις τίς ἐτέρα διέπλασεν, ἣν διαπλαστικὴν ὀνομάζομεν, ἣν δὴ καὶ τεχνικὴν εἶναι λέγομεν, μᾶλλον δ' ἀρίστην καὶ ἀκραν τέχνην καὶ πάντα τινὸς ἔνεκα ποιοῦσαν, ὡς μηδὲν ἄργον εἶναι μηδὲ περιττὸν μηδ' ὅλως

1 As, for example, Aristotle had held; cf. p. 28, note 3. Galen added many new tissues to those described by Aristotle.
are not veins, since they neither contain blood, nor do their coats in any way resemble those of veins; from nerves they differ still more than from the structures mentioned.

"What, then, are they?" someone asks—as though every part must necessarily be either an artery, a vein, a nerve, or a complex of these,¹ and as though the truth were not what I am now stating, namely, that every one of the various organs has its own particular substance. For in fact the two bladders—that which receives the urine, and that which receives the yellow bile—not only differ from all other organs, but also from one another. Further, the ducts which spring out like kinds of conduits from the gall-bladder and which pass into the liver have no resemblance either to arteries, veins or nerves. But these parts have been treated at a greater length in my work "On the Anatomy of Hippocrates," as well as elsewhere.

As for the actual substance of the coats of the stomach, intestine, and uterus, each of these has been rendered what it is by a special alterative faculty of Nature; while the bringing of these together,² the combination therewith of the structures which are inserted into them, the outgrowth into the intestine,³ the shape of the inner cavities, and the like, have all been determined by a faculty which we call the shaping or formative faculty⁴; this faculty we also state to be artistic—nay, the best and highest art—doing everything for some purpose, so that

² Lit. synthesis.
³ By this is meant the duodenum, considered as an outgrowth or prolongation of the stomach towards the intestines.
GALEN

οὕτως ἔχουν, ὡς δύνασθαι βέλτιον ἐτέρως ἔχειν. ἀλλὰ τούτῳ μὲν ἐν τοῖς περὶ χρείας μορίων ἀποδείξομεν. ||

VII

16 Ἐπὶ δὲ τὴν αὐξητικὴν ἡδὴ μεταβάντες δύναμιν αὐτὸ τοῦθ' ὑπομνήσωμεν πρῶτον, ὡς ὑπάρχει μὲν καὶ αὐτὴ τοῖς κυνομένοις ὁσπερ καὶ ἡ θρηστητικὴ· ἀλλ' οἶον ὑπηρέτιδες τίνες εἰσὶ τημικαῦτα τῶν προειρημένων δυνάμεων, οὐκ ἐν αὐταῖς ἔχουσαι τὸ πᾶν κύρος. ἔπειδαν δὲ τὸ τέλειον ἀπολάβῃ μέγεθος τὸ ἄξον, ἐν τῷ μετὰ τὴν ἀποκύπησιν χρόνῳ παντὶ μέχρι τῆς ἀκμῆς ἢ μὲν αὐξητικὴ τημικαῦτα κρατεῖ· βοηθοὶ δ' αὐτῆς καὶ οἶον ὑπηρέτιδες ἢ τ' ἀλλοιωτική δυνάμις ἐστὶ καὶ ἡ θρηστητική. τί οὖν τὸ ἱδίον ἐστι τῆς αὐξητικῆς δυνάμεως; εἰς πᾶν μέρος ἑκτείναι τὰ πεφυκότα. καλεῖται δ' οὕτω τὰ στερεά μόρια τοῦ σώματος, ἀρτηρίαι καὶ φλέβες καὶ νεῦρα καὶ ὀστὰ καὶ χόνδροι καὶ ὑμένες καὶ σύνδεσμοι καὶ οἱ χυτῶνες ἄπαντες, οὓς στοιχειώδεις τε καὶ ὁμοιομερεῖς καὶ ἀπλούς ὀλύγον ἐμπροσθὲν ἐκαλοῦμεν. ὅτι δὲ τρόπῳ τὴν εἰς πᾶν μέρος ἐκτασιν ἴσχυσιν, ἐγὼ φράσω παράδειγμα τὶ πρότερον εἰπὼν ἔνεκα τοῦ σαφοῦς. ||

17 Τὰς κύστεις τῶν ύδων λαβόντες οἱ παῖδες πληροῦσι τε πνεύματος καὶ τρίβουσιν ἐπὶ τῆς τέφρας πλησίον τοῦ πυρὸς, ὡς ἀλεαίνεσθαι μὲν, βλάπτεσθαι δὲ μηδὲν καὶ πολλῆ γ' αὐτὴ ἡ

¹ Lit. the auxetic or incremental faculty.
there is nothing ineffective or superfluous, or capable of being better disposed. This, however, I shall demonstrate in my work "On the Use of Parts."

VII

Passing now to the faculty of Growth\(^1\) let us first mention that this, too, is present in the foetus \textit{in utero} as is also the nutritive faculty, but that at that stage these two faculties are, as it were, handmaids to those already mentioned,\(^2\) and do not possess in themselves supreme authority. When, however, the animal\(^3\) has attained its complete size, then, during the whole period following its birth and until the acme is reached, the faculty of growth is predominant, while the alterative and nutritive faculties are accessory—in fact, act as its handmaids. What, then, is the property of this faculty of growth? To extend in every direction that which has already come into existence—that is to say, the solid parts of the body, the arteries, veins, nerves, bones, cartilages, membranes, ligaments, and the various coats which we have just called elementary, homogeneous, and simple. And I shall state in what way they gain this extension in every direction, first giving an illustration for the sake of clearness.

Children take the bladders of pigs, fill them with air, and then rub them on ashes near the fire, so as to warm, but not to injure them. This is a common

\(^1\) i.e. to the alterative and shaping faculties (histogenetic and organogenetic).

\(^2\) If the reading is correct we can only suppose that Galen meant \textit{the embryo}.
παιδιὰ περί τε τὴν Ἰωνίαν καὶ ἐν ἄλλοις ἐθνεσιν οὐκ ὁλόγοις ἔστιν. ἐπιλέγουσι δὲ δὴ καὶ τιν' ἐπὶ τρίβοντες ἐν μέτρῳ τε τῶν καὶ μέλει καὶ ρυθμῷ καὶ ἐστὶ πάντα τὰ ῥήματα ταῦτα παρακέλευσις τῇ κύστει πρὸς τὴν αὐξήσιν. ἐπειδὰν δὲ ίκανοις αὐτοῖς διατετάσθαι δοκῇ, πάλιν ἐμφυσάσθη τε καὶ ἐπιδιατείνουσι καὶ αὐθίς τρίβουσι καὶ τούτῳ πλεονάκις ποιοῦσιν, ἂρχις ἂν αὐτοῖς ἢ κύστις ίκανῶς ἔχειν δοκῇ τῆς αὐξήσεως. ἀλλ' ἐν τούτοις γε τοὺς ἔργους τῶν παῖδων ἑναργῶς, ὥσπερ εἰς μέγεθος ἐπιδίδοσιν ἢ ἐντὸς εὐρυχωρία τῆς κύστεως, τοσοῦτον ἄναγκαιον εἰς λεπτότητα καθαιρεῖσθαι τὸ σῶμα καὶ εἰ γε τῇ λεπτότητα ταύτῃ ἀνατρέψειν οἶοι τῇ ἑσαν οἱ παῖδες, ὅμως ἂν τῇ φύσει τῆς κύστει ἐκ μικρᾶς μεγάλην ἀπειργάζοντο. νυνὶ δὲ τούτ' αὐτοῖς ἐνδεί τὸ ἔργον οὖδέ καθ' ἕνα τρόπον εἰς μίμησιν ἑνδεχόμενον ἀχθήναι μὴ ὅτι τοὺς τὰ παις ἀλλ' οὖδ' ἄλλῳ τινὶ μόνης γὰρ τῆς φύσεως ἰδιὸν ἔστιν.

"Ὡςτ' ἤδη σοι δῆλον, ὡς ἀναγκαῖα τοῖς αὐξανομένοις ἢ θρέψις. εἰ γὰρ διατείνοιτο μένων, ἀνατρέφοιτο δὲ μή, φαντασίαιν ψευδή μᾶλλον, οὐκ αὐξήσιν ἀληθῆ τὰ τοιᾶτα σώματα κτῆσται. καίτοι καὶ τὸ διατείνεσθαι πάντη μόνος τοῖς ὑπὸ φύσεως αὐξανομένοις ὑπάρχει. τὰ γὰρ ὡς ἡμῶν διατεινόμενα σώματα κατὰ μᾶν τινὰ διάστασιν τοῦτο πάσχοντα μειοῦται ταῖς λοιπαῖς, οὖδ' ἐστὶν εὑρέθω καὶ ἵνα τοὺς διαστάσεις ἐπεκτείνα τυνάμεθα. μόνης οὖν τῆς φύσεως τὸ πάντῃ διστάναι συνεχές ἐαυτῷ μένον ἔτι καὶ τὴν ἀρχαίαν ἀπασάν ἰδέαν φυλάττω τὸ σῶμα.

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game in the district of Ionia, and among not a few other nations. As they rub, they sing songs, to a certain measure, time, and rhythm, and all their words are an exhortation to the bladder to increase in size. When it appears to them fairly well distended, they again blow air into it and expand it further; then they rub it again. This they do several times, until the bladder seems to them to have become large enough. Now, clearly, in these doings of the children, the more the interior cavity of the bladder increases in size, the thinner, necessarily, does its substance become. But, if the children were able to bring nourishment to this thin part, then they would make the bladder big in the same way that Nature does. As it is, however, they cannot do what Nature does, for to imitate this is beyond the power not only of children, but of any one soever; it is a property of Nature alone.

It will now, therefore, be clear to you that nutrition is a necessity for growing things. For if such bodies were distended, but not at the same time nourished, they would take on a false appearance of growth, not a true growth. And further, to be distended in all directions belongs only to bodies whose growth is directed by Nature; for those which are distended by us undergo this distension in one direction but grow less in the others; it is impossible to find a body which will remain entire and not be torn through whilst we stretch it in the three dimensions. Thus Nature alone has the power to expand a body in all directions so that it remains unruptured and preserves completely its previous form.
GALEN

Καὶ τοῦτ’ ἐστιν ἡ αὐξησις ἀνευ τῆς ἐπιρρεούσης τε καὶ προσπλαττομένης τροφῆς μὴ δυναμενη γενέσθαι.

VIII

Καὶ τοῖνυν ὁ λόγος ἦκειν ἐστιν ὁ περὶ τῆς θρέψεως, δι’ δὴ λοιπὸν ἐστι καὶ τρίτος ὃν ἔξ ἀρχῆς προθέμεθα. τοῦ γὰρ ἐπιρρέοντος ἐν εἴδει τροφῆς παντὶ μορίῳ τοῦ τρεφομένου σώματος προσπλαττομένου θρέψις μὲν ἡ ἐνέργεια, θρεπτικὴ δὲ δύναμις ἡ αἰτία. ἄλλοιςις μὲν δὴ κανταῦθα τὸ γένος τῆς ἐνεργείας, ἀλλ’ οὐχ οἶαπερ ἢ ἐν τῇ γενέσθη. ἐκεῖ μὲν γὰρ οὐκ ὁ πρῶτον ὄστερον ἐγένετο, κατὰ δὲ τὴν θρέψιν τῷ ἢδη γεγονότι συνεξομοιοῦται τὸ ἐπιρρέον καὶ διὰ τοῦτ’ εὐλόγως ἐκείνην μὲν τὴν ἄλλοισιν γένεσιν, ταύτην δ’ ἐξομοιούσιν ὁμόμασαν.

IX

Ἐπειδὴ δὲ περὶ τῶν τριῶν δυνάμεων τῆς φύσεως αὐτάρκῳς εἶρηται καὶ φαίνεται μηδεμίας ἄλλης προσδείσθαι τὸ ζῷον, ἔχων γε καὶ ὅπως αὐξηθῇ καὶ ὅπως τελειωθῇ καὶ ὅπως ἔως πλείστου διαφυλαχθῇ, δόξειες μὲν ἀν ἵσως ἴκανος ἔχειν ὁ λόγος οὗτος ἢδη καὶ πάσας ἐξηγεῖσθαι τὰς τῆς φύσεως δυνάμεις. ἀλλ’ εὶ τις πάλιν ἐννοήσειν, ὦς οὐ—
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Such then is growth, and it cannot occur without the nutriment which flows to the part and is worked up into it.

VIII

We have, then, it seems, arrived at the subject of Nutrition, which is the third and remaining consideration which we proposed at the outset. For, when the matter which flows to each part of the body in the form of nutriment is being worked up into it, this activity is nutrition, and its cause is the nutritive faculty. Of course, the kind of activity here involved is also an alteration, but not an alteration like that occurring at the stage of genesis.¹ For in the latter case something comes into existence which did not exist previously, while in nutrition the inflowing material becomes assimilated to that which has already come into existence. Therefore, the former kind of alteration has with reason been termed genesis, and the latter, assimilation.

IX

Now, since the three faculties of Nature have been exhaustively dealt with, and the animal would appear not to need any others (being possessed of the means for growing, for attaining completion, and for maintaining itself as long a time as possible), this treatise might seem to be already complete, and to constitute an exposition of all the faculties of Nature. If, however, one considers that it has not

¹ i.e. not the pre-natal development of tissue already described. cf. chap. vi.


dενός οὐδέπω τῶν τοῦ ξίφου μορίων ἐφήψατο, κοιλίας λέγω καὶ ἐντέρων καὶ ἡπατος καὶ τῶν ὁμοίων, οὔδ' ἐξηγήσατο τὰς ἐν αὐτοῖς δυνάμεις, αὐθίς δόξειεν ἄν οἶνον προοίμιον τι μόνον εἰρήσθαι τῆς χρησίμου διδασκαλίας. || τὸ γὰρ σύμπαν ὅδ' ἔχει. γένεσις καὶ αὐξήσις καὶ θρέψις τὰ πρῶτα καὶ οἶνον κεφάλαια τῶν ἐργῶν ἔστι τῆς φύσεως· ὡστε καὶ αἱ τούτων ἐργαστικαί δυνάμεις αἱ πρῶται τρεῖς εἰσὶ καὶ κυριώταται· δέονται δ' εἰς ὑπηρεσίαν, ὥς ἦδη δέδεικται, καὶ ἀλλήλων καὶ ἀλλων. τίνων μὲν οὖν ἡ γεννητικὴ τε καὶ αὐξητικὴ δέονται, εὕρηται, τίνων δ' ἡ θρεπτικὴ, νῦν εἰρῆσεται.

Χ

Δοκῶ γὰρ μοι δείξειν τὰ περὶ τὴν τῆς τροφῆς οἰκονομίαν ὀργανά τε καὶ τὰς δυνάμεις αὐτῶν διὰ ταύτην γεγονότα. ἐπεὶ δὴ ἡ ἐνέργεια ταύτης τῆς δυνάμεως ἐξομοίωσις ἐστίν, ὁμοιούσθαι δὲ καὶ μεταβάλλειν εἰς ἀλληλα πάσι τοῖς οὐσίν ἀδύνατον, εἰ μὴ τινα ἔχοι κοινωνίαν ἦδη καὶ συγγένειαν ἐν ταῖς ποιότησι, διὰ τούτο πρῶτον μὲν οὐκ ἐκ πάντων ἐδεσμάτων πάν ξίφον τρέφεσθαι πέφυκεν, ἐπείτη δ' οὐδ' ἔξ ὅν οἶνον τ' ἐστίν οὖδ' ἐκ τούτων παραχρῆμα, καὶ διὰ ταύτην

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1 Administration, lit. "economy."
2 The activation or functioning of this faculty, the faculty in actual operation. cf. p. 3, note 2.

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yet touched upon any of the parts of the animal (I mean the stomach, intestines, liver, and the like), and that it has not dealt with the faculties resident in these, it will seem as though merely a kind of introduction had been given to the practical parts of our teaching. For the whole matter is as follows: Genesis, growth, and nutrition are the first, and, so to say, the principal effects of Nature; similarly also the faculties which produce these effects—the first faculties—are three in number, and are the most dominating of all. But as has already been shown, these need the service both of each other, and of yet different faculties. Now, these which the faculties of generation and growth require have been stated. I shall now say what ones the nutritive faculty requires.

X

For I believe that I shall prove that the organs which have to do with the disposal\(^1\) of the nutrient, as also their faculties, exist for the sake of this nutritive faculty. For since the action of this faculty\(^2\) is assimilation, and it is impossible for anything to be assimilated by, and to change into anything else unless they already possess a certain community and affinity in their qualities,\(^3\) therefore, in the first place, any animal cannot naturally derive nourishment from any kind of food, and secondly, even in the case of those from which it can do so, it cannot do this at once. Therefore, by reason of

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\(^1\) "Un rapport commun et une affinité" (Daremberg).
\(^2\) "Societatem aliquam cognitionemque in qualitatibus" (Linnaeus).
\(^3\) cf. p. 36, note 2.


21 τὴν ἀνάγκην πλείόνων ὀργάνων ἀλλοιωτικῶν τῆς
trophiēs ἔκαστον || τῶν ζῴων χρήζει. ἦνα μὲν γὰρ
tὸ ἕανθὸν ἐρυθρὸν γένηται καὶ τὸ ἐρυθρὸν ἕανθόν,
ἀπλῆς καὶ μᾶς δεῖται τῆς ἀλλοιώσεως: ἦνα δὲ τὸ
λευκὸν μέλαν καὶ τὸ μέλαν λευκὸν, ἀπασῶν τῶν
μεταξύ. καὶ τοῖνυν καὶ τὸ μαλακῶτατον οὐκ ἂν
ἀθρώως σκληρότατον καὶ τὸ σκληρότατον οὐκ ἂν
ἀθρώως μαλακῶτατον γένοιτο, ὅσπερ οὐδὲ τὸ
dυσωδέστατον εὐωδέστατον οὔτε ἔμπαλιν τὸ εὐω-
dέστατον δυσωδέστατον ἐξαίφνης γένοιτ' ἂν.

Πῶς οὖν ἐξ αἴματος οὕστοιν ἂν ποτε γένοιτο μὴ
παχυνθέντος γε πρότερον ἐπὶ πλείστον αὐτοῦ καὶ
λευκανθέντος ἢ πῶς ἐξ ἄρτου τὸ αἷμα μὴ κατὰ
βραχὺ μὲν ἀποθεμένον τὴν λευκότητα, κατὰ
βραχὺ δὲ λαμβάνοντος τὴν ἐρυθρότητα; σύρκα
μὲν γὰρ ἐξ αἷματος γενέσθαι ῥάστον εἰ γὰρ εἰς
tοσοῦτον αὐτὸ παχύνειν ἡ φύσις, ὡς σύστασιν
tina σχεῖν καὶ μηκέτ' εἶναι ῥυτόν, ἡ πρώτη καὶ
νεοπαγής οὕτως ἄν εἴη σάρξ· ὅστοιν δὲ ἦνα γένη-
tαι, πολλοῖ μὲν δεῖται χρόνου, πολλής δὲ ἐργασίας
cαι μεταβολῆς τῷ αἵματι. ὅτι δὲ καὶ τῷ ἄρτῳ
καὶ πολὺ μᾶλλον θριάδικίνη καὶ τεῦτλῳ καὶ τοῖς
όμοιοις παμπόλλης δεῖται τῆς ἀλλοιώσεως εἰς
αἵματος γένεσιν, οὐδὲ τούττ' ἄδηλον.

"Ἐν μὲν δὴ τούτ' αἴτιον τοῦ πολλὰ γενέσθαι τὰ
περὶ τὴν τῆς τροφῆς ἀλλοιώσεων ὀργανα. δεύτερον
δ' ἡ τῶν περιττωμάτων φύσις. ὡς γὰρ ὑπὸ
βοτανῶν οὐδ' ὅλως δυνάμεθα τρέφεσθαι, κατοί
tῶν βοσκημάτων τρεφομένων, οὕτως ὑπὸ ραφανί-

1 Lit. "necessity"; more restrictive, however, than our
2 His point is that no great change, in colours or in any-
thing else, can take place at one step.
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this law,¹ every animal needs several organs for *altering* the nutriment. For in order that the yellow may become red, and the red yellow, one simple process of alteration is required, but in order that the white may become black, and the black white, all the intermediate stages are needed.² So also, a thing which is very soft cannot all at once become very hard, nor *vice versa*; nor, similarly can anything which has a very bad smell suddenly become quite fragrant, nor again, can the converse happen.

How, then, could blood ever turn into bone, without having first become, as far as possible, thickened and white? And how could bread turn into blood without having gradually parted with its whiteness and gradually acquired redness? Thus it is quite easy for blood to become flesh; for, if Nature thicken it to such an extent that it acquires a certain consistency and ceases to be fluid, it thus becomes original newly-formed flesh; but in order that blood may turn into bone, much time is needed and much elaboration and transformation of the blood. Further, it is quite clear that bread, and, more particularly lettuce, beet, and the like, require a great deal of alteration in order to become blood.

This, then, is one reason why there are so many organs concerned in the alteration of food. A second reason is the nature of the *superfluities*.³ For, as we are unable to draw any nourishment from grass, although this is possible for cattle, similarly we can derive nourishment from radishes, albeit not

³ Not quite our “*waste products,*” since these are considered as being partly synthetic, whereas the Greek *peritomata* were simply superfluous substances which could not be used and were thrown aside.
Δος τρεφόμεθα μὲν, ἀλλ' οὕχ ὡς ὑπὸ τῶν κρεῶν. τούτων μὲν γὰρ ὅλιγου δεῖν ὅλων ἡ φύσις ἡμῶν κρατεῖ καὶ μεταβάλλει καὶ ἄλλοιοὶ καὶ χρηστῶν ἐξ αὐτῶν αἷμα συνίστησιν. ἐν δὲ τῇ βαφανίδι τὸ μὲν οἰκεῖον τε καὶ μεταβληθῆναι δυνάμενον, μόνης καὶ τούτο καὶ σὺν πολλῇ τῇ κατεργασίᾳ, παντα-πασιν ἐλάχιστον ὅλη δ' ὅλιγου δεῖν ἐστὶ περιτ-τωματικὴ καὶ διεξέρχεται τὰ τῆς πέψεως ὅργανα, βραχεῖος ἐξ αὐτῆς εἰς τὰς φλέβας ἀναληφθέντος αἵματος καὶ οὐδὲ τούτου τελέως χρηστοῦ. δευτέ-ρας οὖν αὕτης ἐδέσθη διακρίσεως τῇ φύσει τῶν ἐν ταῖς φλεψὶ περιττωμάτων. καὶ χρεία καὶ τού-τως ὅδων τέ τινων ἐτέρων ἐπὶ τὰς ἐκ||κρίσεις αὐτὰ παραγούσων, ὡς μὴ λυμαίνοιτο τοῖς χρηστοῖς, ὕποδοχῶν τέ τινων οἷον δεξαμενῶν, ἐν αἷς ὀταν εἰς ἰκανὸν πλῆθος ἀφίκεται, τηνικαῦτ' ἐκκριθή-σεται.

Δεύτερον δὴ σοι καὶ τούτο τὸ γένος τῶν ἐν τῷ σώματι μορίων ἐξεύρηται τοῖς περιττώμασι τῆς τροφῆς ἀνακείμενον. ἄλλο δὲ τρίτον ὑπὲρ τοῦ πάντη φέρεσθαι, καθάπερ τινὲς ὁδοὶ πολλαὶ διὰ τοῦ σῶματος ὅλου κατατετμήμεναι.

Μία μὲν γὰρ εἰσόδος ἡ διὰ τοῦ στόματος ἀπασι τοῖς συτίοις, οὕχ ἐν δὲ τὸ τρεφόμενον ἀλλὰ πάμπολλα τε καὶ πάμπολλα διεστῶτα. μὴ τοῖνυν θαύμαζε τὸ πλῆθος τῶν ὅργανων, ὡςαθρέψεως ἐνεκεν ἡ φύσις ἔδημοιργησε. τὰ μὲν γὰρ ἄλλοι-

1 Note "our natures," cf. p. 12, note 4; p. 47, note 1.
2 The term ὀίκειος, here rendered appropriate, is explained on p. 33. cf. also footnote on same page. Linacre often translated it conveniens, and it may usually be rendered proper, peculiar, own special, or own particular in English. Sometimes it is almost equal to akin, cognate, related: cf.
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to the same extent as from meat; for almost the whole of the latter is mastered by our natures; it is transformed and altered and constituted useful blood; but, in the radish, what is appropriate and capable of being altered (and that only with difficulty, and with much labour) is the very smallest part; almost the whole of it is surplus matter, and passes through the digestive organs, only a very little being taken up into the veins as blood—nor is this itself entirely utilisable blood. Nature, therefore, had need of a second process of separation for the superfluities in the veins. Moreover, these superfluities need, on the one hand, certain fresh routes to conduct them to the outlets, so that they may not spoil the useful substances, and they also need certain *reservoirs*, as it were, in which they are collected till they reach a sufficient quantity, and are then discharged.

Thus, then, you have discovered bodily parts of a second kind, consecrated in this case to the [removal of the] superfluities of the food. There is, however, also a third kind, for carrying the pabulum in every direction; these are like a number of roads intersecting the whole body.

Thus there is one entrance—that through the mouth—for all the various articles of food. What receives nourishment, however, is not one single part, but a great many parts, and these widely separated; do not be surprised, therefore, at the abundance of organs which Nature has created for the purpose of nutrition. For those of them which have to do with

p. 319, note 2. With Galen's *oikeios* and *allaotrios* we may compare the German terms *eigen* and *fremd* used by Aberhalden in connection with his theory of defensive ferments in the blood-serum.
οὖντα προπαρασκευάζει τὴν ἐπιτήδειον ἐκάστη
μορίω τροφῆν, τὰ δὲ διακρίνει τὰ περιττώματα,
tὰ δὲ παραπέμπει, τὰ δ’ ὑποδέχεται, τὰ δ’
ἐκκρίνει, τὰ δ’ ὀδοὶ τῆς πάντη φοράς εἰσι τῶν
χρηστῶν χυμῶν, ὡστ’ εἴπερ βούλει τὰς δυνάμεις
τῆς φύσεως ἀπάσας ἐκμαθεῖν, ὑπὲρ ἐκάστου
τοῦ τοῦ ἀν εἶν σοι τῶν ὄργανων ἐπισκεπτέον.

24 Ἀρχὴ δ’ αὐτῶν τῆς διδασκαλίας, ὃσα || τοῦ
τέλους ἐγγὺς ἔργα τε τῆς φύσεως ἐστὶ καὶ μόρια
καὶ δυνάμεις αὐτῶν.

XI

Αὐτοῦ δὲ δὴ πάλιν ἀναμνηστέου ἢμῖν τοῦ
τέλους, ὅπερ ἔνεκα τοσαύτα τε καὶ τοιαύτα τή
φύσει δεδημοῦργηται μόρια. τὸ μὲν οὖν ὄνομα
τοῦ πράγματος, δ’ ὅσπερ καὶ πρότερον εἴρηται,
θρέψεως ὁ δὲ κατὰ τοῦν μόρια λόγος ὀμοίωσις τοῦ
τρέφοντος τῷ τρεφομένῳ. ἦνα δ’ αὕτη γένηται,
προηγήσασθαι χρῆ πρόσφυσιν, ἦνα δ’ ἐκείνη,
πρόσθεσιν. ἐπειδὰν γὰρ ἐκπέσῃ τῶν ἀγγείων
ὁ μέλλων θρέψεως οὕτων τῶν τοῦ ξίφου μορίων
χυμῶς, εἰς ἀπαν αὐτὸ διασπείρεται πρῶτον,
ἐπεὶ προστίθεται κάπεται προσφύται καὶ
tελέως ὀμοιοῦται.

1 Transit, cf. p. 6, note 1.
2 i.e. of the living organism, cf. p. 2, note 1.
3 i.e. with nutrition.
4 We might perhaps say, more shortly, “assimilation of
food to feeder,” or, “of food to fed”; Linacre renders,
“nutrimenti cum nutrito assimilatio.”

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alteration prepare the nutriment suitable for each part; others separate out the superfluities; some pass these along, others store them up, others excrete them; some, again, are paths for the transit\(^1\) in all directions of the *utilisable* juices. So, if you wish to gain a thorough acquaintance with all the faculties of Nature,\(^2\) you will have to consider each one of these organs.

Now in giving an account of these we must begin with those effects of Nature, together with their corresponding parts and faculties, which are closely connected with the purpose to be achieved.\(^3\)

XI

Let us once more, then, recall the actual purpose for which Nature has constructed all these parts. Its name, as previously stated, is *nutrition*, and the definition corresponding to the name is: *an assimilation of that which nourishes to that which receives nourishment.*\(^4\) And in order that this may come about, we must assume a preliminary process of *adhesion*,\(^5\) and for that, again, one of *presentation.*\(^6\) For whenever the juice which is destined to nourish any of the parts of the animal is emitted from the vessels, it is in the first place dispersed all through this part, next it is presented, and next it adheres, and becomes completely assimilated.

\(^5\) Lit. *prosphysis*, *i.e.* attachment, implantation.
\(^6\) Lit. *prosthesis*, "apposition." One is almost tempted to retain the terms *prosthesis* and *prosphysis* in translation, as they obviously correspond much more closely to Galen's physiological conceptions than any English or semi-English words can.
Δηλοῦσι δ’ αἱ καλοῦμεναι λεύκαι τὴν διαφορὰν ὁμοιώσεως τε καὶ προσφύσεως, ὥσπερ τὸ γένος ἑκείνο τῶν υδέρων, ὃ τινες ὀνομάζουσιν ἀνά σάρκα, διορίζει σαφῶς πρόσθεσιν προσφύσεως. οὐ γὰρ ἐνδείᾳ δὴπο τῆς ἐπιρρεόσεις υγρότητος, ὡς ἐναι τῶν ἀτροφῶν τε καὶ φθίσεων, ἢ τοῦ τοιοῦτον γένεσις υδέρου ἀλλὰ συντελεῖται. φαίνεται γὰρ ἴκανος ἢ τε σὰρξ υγρὰ καὶ διάβροχος ἐκαστόν τε τῶν στερεῶν τοῦ σώματος μορίων ὁσαύτως διακείμενον. ἄλλα πρόσθεσις μὲν τις γίγνεται τῆς ἐπιφερομένης τροφῆς, ἢ τὰ ὑδατω- δεστέρας ούσης ἢτοι καὶ μὴ πάνυ τι κεχυμωμένης μηδὲ τὸ γλύσχρον ἑκείνο καὶ κολλώδες, ἢ δὴ τῆς ἐμφύτου θερμασίας οἰκονομία προσγίγνεται, κεκτημένης ἡ πρόσφυσις ἀδύνατός ἐστιν ἐπι- τελεῖσθαι πλήθει λεπτῆς υγρότητος ἀπέπτου διαρρεούσης τε καὶ ῥαδίως ὀλισθαῖνουσης ἀπὸ τῶν στερεῶν τοῦ σώματος μορίων τῆς τροφῆς. ἐν δὲ ταῖς λεύκαις πρόσφυσις μὲν τις γίγνεται τῆς τροφῆς, οὐ μὴν ἐξομοίωσις γε. καὶ δήλον ἐν τῷ ὁ ὑπὸ τὸ μικρὸ πρόσθεν ῥθῆν τὸ ὡς ὅρθος ἔλεγε τὸ δὲ ἄν προσθεσίν μὲν πρῶτον, ἐφεξῆς δὲ πρόσ- φυσιν, ἐπειτ᾽ ἐξομοίωσιν γενέσθαι τὸ μέλλωντι τρέφεσθαι.

Κυρίως μὲν οὖν τὸ τρέφον ἡ τροφή, τὸ δ’ οἴον μὲν τροφή, οὔτω δὲ τρέφον, ὡσπὸν ἐστὶ τὸ προσφύσιμον ἢ προστιθέμενον, τροφή μὲν οὐ

1 Lit. phthisis. cf. p. 6, note 2. Now means tuberculosis only.
2 More literally, “chymified.” In anasarca the subcutaneous tissue is soft, and pits on pressure. In the “white” disease referred to here (by which is probably meant nodular leprosy) the same tissues are indurated and “brawny.” The
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The so-called white [leprosy] shows the difference between assimilation and adhesion, in the same way that the kind of dropsy which some people call anasarca clearly distinguishes presentation from adhesion. For, of course, the genesis of such a dropsy does not come about as do some of the conditions of atrophy and wasting, from an insufficient supply of moisture; the flesh is obviously moist enough,—in fact it is thoroughly saturated,—and each of the solid parts of the body is in a similar condition. While, however, the nutriment conveyed to the part does undergo presentation, it is still too watery, and is not properly transformed into a juice, nor has it acquired that viscous and agglutinative quality which results from the operation of innate heat; therefore, adhesion cannot come about, since, owing to this abundance of thin, crude liquid, the pabulum runs off and easily slips away from the solid parts of the body. In white [leprosy], again, there is adhesion of the nutriment but no real assimilation. From this it is clear that what I have just said is correct, namely, that in that part which is to be nourished there must first occur presentation, next adhesion, and finally assimilation proper.

Strictly speaking, then, nutriment is that which is actually nourishing, while the quasi-nutriment which is not yet nourishing (e.g. matter which is undergoing adhesion or presentation) is not, strictly speaking, nutriment, but is so called only by an equivocation.

principle of certain diseases being best explained as cases of arrest at various stages of the metabolic path is recognized in modern pathology, although of course the instances given by Galen are too crude to stand.

The effects of oxidation attributed to the heat which accompanies it? cf. p. 141, note 1; p. 254, note 1.
κυρίως, ὁμοιώματι δὲ τροφῆς τὸ δ' ἐν ταῖς φλεψίν
26 ἐτὶ περιεχόμενον || καὶ τούτου μᾶλλον ἐτὶ τὸ κατὰ
tὴν γαστέρα τῷ μέλλειν ποτὲ θρέψειν, εἰ καλῶς κατεργασθεῖη, κέκληται τροφῆ. κατὰ ταύτα δὲ καὶ
tῶν ἐδεσμάτων ἐκαστὸν τροφὴν ὁνομάζομεν
οὔτε τῷ τρέφειν ἤδη τὸ ζῦον οὔτε τῷ τοιοῦτον
ὑπάρχειν οἷον τὸ τρέφον, ἀλλὰ τῷ δύνασθαι τε
καὶ μέλλειν τρέφειν, εἰ καλῶς κατεργασθεῖη.

Τούτῳ γὰρ ἦν καὶ τὸ πρὸς Ἰπποκράτους
λεγόμενον. "Τροφῆ δὲ τὸ τρέφων, τροφῆ καὶ τὸ
οἶον τροφῆ καὶ τὸ μέλλον." τὸ μὲν γὰρ ὁμοιού-
μενον ἢδη τροφὴν ὁνόμασε, τὸ δ' οἷον μὲν ἐκεῖνο
προστιθέμενον ἢ προσφυόμενον οἷον τροφῆν. τὸ
δ' ἄλλο πάν, ὅσον ἐν τῇ γαστρὶ καὶ ταῖς φλεψὶ
περιέχεται, μέλλον.

XII

Οτι μὲν οὖν ἀναγκαῖον ὁμοίωσιν τιν' εἶναι τοῦ
τρέφουτος τῷ τρεφομένῳ τὴν θρέψιν, ἀντικρυς
dηλον. οὐ μὴν ὑπάρχουσαν γε ταύτην τὴν ὁμοί-
ωσιν, ἀλλὰ φαίνομεν ἐν μόνον εἰναι φασιν οἱ μῆτε
teχνικὴν οἰόμενοι τὴν φύσιν εἰναι μῆτε προνοη-
tικὴν τοῦ ζῦον μὴθ' ὅλως τινὰς οἰκείας ἔχειν
dυνάμεις, αἰς χρωμένη τὰ μὲν ἄλλοιοι, τὰ δ' 27
ἔλκει, || τὰ δ' ἐκκρίνειν.

Καὶ αὕται δύο γεγόνασιν αἱρέσεις κατὰ γένος
ἐν ἰατρικῇ τε καὶ φιλοσοφίᾳ τῶν ἀποφηγμένων
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Also, that which is still contained in the veins, and still more, that which is in the stomach, from the fact that it is destined to nourish if properly elaborated, has been called “nutriment.” Similarly we call the various kinds of food “nutriment,” not because they are already nourishing the animal, nor because they exist in the same state as the material which actually is nourishing it, but because they are able and destined to nourish it if they be properly elaborated.

This was also what Hippocrates said, viz., “Nutriment is what is engaged in nourishing, as also is quasi-nutriment, and what is destined to be nutriment.” For to that which is already being assimilated he gave the name of nutriment; to the similar material which is being presented or becoming adherent, the name of quasi-nutriment; and to everything else—that is, contained in the stomach and veins—the name of destined nutriment.

XII

It is quite clear, therefore, that nutrition must necessarily be a process of assimilation of that which is nourishing to that which is being nourished. Some, however, say that this assimilation does not occur in reality, but is merely apparent; these are the people who think that Nature is not artistic, that she does not show forethought for the animal’s welfare, and that she has absolutely no native powers whereby she alters some substances, attracts others, and discharges others.

Now, speaking generally, there have arisen the following two sects in medicine and philosophy
Galen

τι περὶ φύσεως ἀνδρῶν, ὡσοι γ’ αὐτῶν γυνω- σκουσιν, ὡ τι λέγονσι, καὶ τῇν ἀκολουθίαν δὲν ὑπέθεντο θεωροῦσι θ’ ἀμα καὶ διαφυλάττουσιν. ὡσοὶ δὲ μη’ αὐτὸ τοῦτο συνιάσιν, ἀλλ’ ἀπλῶς, ὡ τι ἄν ἐπὶ γλῶτταν ἠλθη, ληροῦσιν, εἰν οὐδετέρᾳ τῶν αἱρέσεων ἀκριβῶς καταμένοντες, οὐδὲ μεμ- νήσθαι τῶν τοιούτων προσήκει. 

Τίνες οὖν αἱ δύο αἱρέσεις αὐταὶ καὶ τίς ἢ τῶν ἐν αὐταῖς ὑποθέσεως ἀκολουθία; τῇν ὑποβεβλη- μένην οὐσίαν γενέσει καὶ φθορά πᾶσαν ἰσωμένην θ’ ἀμα καὶ ἀλλοιούσθαι δυναμένην ὑπέθετο θάτερον γένος τῆς αἱρέσεως, ἀμετάβλητον δὲ καὶ ἀνάλλοιωτον καὶ κατατετμημένην εἰς λεπτὰ καὶ κεναῖς ταῖς μεταξὶ χώραις διειλημμένην ἡ λοιπή. 

Καὶ τοῖνυν ὡσοὶ γε τῆς ἀκολουθίας τῶν ὑπο- θέσεων αἰσθάνονται, κατὰ μὲν τὴν δευτέραν αἱρέσιν οὔτε φύσεως οὔτε ψυχῆς ὅδιαν τινὰ νομί- ζουσιν οὐσίαν ἢ δύναμιν ὑπάρχειν, ἢ ἄλλ’ ἐν τῇ ποιᾷ συνόδῳ τῶν πρῶτων ἑκείνων σωμάτων τῶν ἀπαθῶν ἀποτελεῖσθαι. κατὰ δὲ τὴν προτέραν εἰρημένην αἱρέσιν οὐχ ὑστερά τῶν σωμάτων ἢ φύσις, ἀλλὰ πολὺ προτέρα τε καὶ προσβυτέρα. 

καὶ τοῖνυν κατὰ μὲν τούτους αὐτὴ τὰ σώματα τῶν τε φυτῶν καὶ τῶν ἄνθρωπων συνιστήσι δυνάμεις τινὰς ἔχουσα ταῖς μὲν ἐκλεκτικὰς θ’ ἀμα καὶ ὀμοιωτικὰς τῶν οἰκείων, ταῖς δ’ ἀποκριτικὰς τῶν

1 Here follows a contrast between the Vitalists and the Epicurean Atomists. cf. p. 153 et seq.
2 A unity or continuum, an individuum.

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among those who have made any definite pronouncement regarding Nature. I speak, of course, of such of them as know what they are talking about, and who realize the logical sequence of their hypotheses, and stand by them; as for those who cannot understand even this, but who simply talk any nonsense that comes to their tongues, and who do not remain definitely attached either to one sect or the other—such people are not even worth mentioning.

What, then, are these sects, and what are the logical consequences of their hypotheses? The one class supposes that all substance which is subject to genesis and destruction is at once continuous and susceptible of alteration. The other school assumes substance to be unchangeable, unalterable, and subdivided into fine particles, which are separated from one another by empty spaces.

All people, therefore, who can appreciate the logical sequence of an hypothesis hold that, according to the second teaching, there does not exist any substance or faculty peculiar either to Nature or to Soul, but that these result from the way in which the primary corpuscles, which are unaffected by change, come together. According to the first-mentioned teaching, on the other hand, Nature is not posterior to the corpuscles, but is a long way prior to them and older than they; and therefore in their view it is Nature which puts together the bodies both of plants and animals; and this she does by virtue of certain faculties which she possesses—these being, on the one hand, attractive and assimilative of what is appropriate, and, on the other, expulsive of

3 Lit. to the physis or the psyche; that is, a denial of the autonomy of physiology and psychology. 4 Lit. somata.
άλλοτρών, καὶ τεχνικῶς ἀπαντά διαπλάττει τε
gεννώσα καὶ προνοεῖται τῶν γεννωμένων ἐτέρας
αὐθές τις δυνάμεις, στερκτική μὲν τινὶ καὶ
προνοητικὴ τῶν ἔγγονων, κοινωνικὴ δὲ καὶ φιλικὴ
tῶν ὁμογενῶν. κατὰ δὲ αὐ τοὺς ἔτερους οὔτε
tούτων οὐδὲν υπάρχει ταῖς φύσεσιν οὔτ' ἔννοια
tίς ἐστι τῇ ψυχῇ σύμφυτος ἐξ ἀρχῆς οὐκ ἀκο-
λουθίας οὐ μάχης, οὐ διαμέσως οὐ συνθέσεως,
οὐ δικαίως οὐκ ἄδικων, οὐ καλῶν οὐκ αἰσχρῶν,
ἀλλ' ἐξ αἰσθήσεως τε καὶ δ' αἰσθήσεως ἀπαντά
τα τοιαύτα ἥμων ἐγγύνεσθαί φασί καὶ φαντασίας
tισὶ καὶ μνήμαις οἰκάκεισθαι τὰ ἄφα.

29 Ἔνιοι || δ' αὐτῶν καὶ ρητῶς ἀπεφήναντο μηδε-
mιάν εἶναι τῆς ψυχῆς δύναμιν, ἢ λογιζόμεθα, ἂλλ'
ὑπὸ τῶν αἰσθητῶν ἄγεσθαι παθῶν ἡμᾶς καθάπερ
βοσκήματα πρὸς μηδὲν ἀνανεώσαι μηδ' ἀντεπεῖν
dυναμένους. καθ' οὗς δηλοῦστι καὶ ἀνδρεία καὶ
φρόνησις καὶ σωφροσύνη καὶ ἐγκράτεια λήρος
ἔστι μακρὸς καὶ φιλούμενον οὕτ' ἄλληλος οὔτε τὰ
ἔγγονα καὶ τοῖς θεοῖς οὐδὲν ἡμῶν μέλει. κατα-
φρονοῦσι δὲ καὶ τῶν ὀνειράτων καὶ τῶν σωμάτων
καὶ τῶν συμβόλων καὶ πάσης ἀστρολογίας, ὑπὲρ
δὲν ἡμῶς μὲν ἱδία δ' ἐτέρων γραμμάτων ἐπὶ πλέον
ἐσκεφάλμεθα περὶ τῶν Ἀσκληπιάδου τοῦ ἰατροῦ
σκοπούμενοι δογμάτων. ἔνεστι δὲ τοῖς βουλο-
μένοις κάκεινοι μὲν ὀμιλήσαι τοῖς λόγοις καὶ νῦν
δ' ἡδὴ σκοπεῖν, ὡσπερ τινῶν δυοὺς ὄντων ἡμῶν
προκειμένων, ὅποτέραν βέλτιον ἐστι τρέπεσθαι.
Ὑποκράτης μὲν γὰρ τὴν προτέραν ῥηθείσαν
ἐτράπετο, καθ' ἦν ἢνωτα μὲν ἡ οὐσία καὶ ἄλλοι-
ούτα καὶ σύμπνουν ὁλον ἐστὶ καὶ σύρρουν τὸ
what is foreign. Further, she skilfully moulds everything during the stage of genesis; and she also provides for the creatures after birth, employing here other faculties again, namely, one of affection and forethought for offspring, and one of sociability and friendship for kindred. According to the other school, none of these things exist in the natures\(^1\) [of living things], nor is there in the soul any original innate idea, whether of agreement or difference, or separation or synthesis, of justice or injustice, of the beautiful or ugly; all such things, they say, arise in us from sensation and through sensation, and animals are steered by certain images and memories.

Some of these people have even expressly declared that the soul possesses no reasoning faculty, but that we are led like cattle by the impression of our senses, and are unable to refuse or dissent from anything. In their view, obviously, courage, wisdom, temperance, and self-control are all mere nonsense, we do not love either each other or our offspring, nor do the gods care anything for us. This school also despises dreams, birds, omens, and the whole of astrology, subjects with which we have dealt at greater length in another work,\(^2\) in which we discuss the views of Asclepiades the physician.\(^3\) Those who wish to do so may familiarize themselves with these arguments, and they may also consider at this point which of the two roads lying before us is the better one to take. Hippocrates took the first-mentioned. According to this teaching, substance is one and is subject to alteration; there is a consensus in the move-

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1 For "natures" in the plural, involving the idea of a separate nature immanent in each individual, cf. p. 36, note 1.
2 A lost work.
3 For Asclepiades v. p. 49, note 5.
σώμα καὶ ἡ φύσις ἀπαντά τεχνικῶς καὶ δικαίως πράττει δυνάμεις ἔχουσα, καθ’ ὅς ἐκαστον τῶν
30 μορίων ἔλκει μὲν ἃ ἐφ’ ἐαυτῷ τὸν οἰκεῖον ἐαυτῷ χυμόν, ἔλεγαν δὲ προσφύει τε παντὶ μέρει τῶν ἐν
ἀυτῷ καὶ τελέως ἔξωμοι, τὸ δὲ μὴ κρατηθέν ἐν
tούτῳ μηδὲ τὴν παντελῆ δυνήθην ἄλλοισιν τε
καὶ ὁμοίωτητα τοῦ τρεφομένου καταδέξασθαι δὴ
ἐτέρας αὐ τινος ἐκκριτικῆς δυνάμεως ἀποτρίβεται.

XIII

Μαθεῦν δ’ ἔνεστιν οὗ μόνον ἐξ ὧν οἱ τάνατια
tιθέμενοι διαφέρονται τοῖς ἐναργῶς φαινομένοις,
eἰς ὃ σον ἀρθότητος τε καὶ ἀληθείας ἦκει τὰ Ἰππο-
kράτους δόγματα, ἀλλὰ καὶ αὐτῶν τῶν κατὰ
μέρος ἐν τῇ φυσικῇ θεωρίᾳ ξητουμένων τῶν τ’
ἀλλῶν ἀπαντῶν καὶ τῶν ἐν τοῖς ξένοις ἑνεργεῖων.
ὥσιν γὰρ οὐδεμίαν οὐδενὶ μορίῳ νομίζουσιν ὑπάρ-
χειν ἐλεκτικήν τῆς οἰκείας ποιότητος δύναμιν,
ἀναγκάζονται πολλαῖς ἑναντίᾳ λέγειν τοῖς ἐναρ-
γῶς φαινομένοις, ὡσπερ καὶ Ἀσκληπιάδης ὁ
ἰατρὸς ἐπὶ τῶν νεφρῶν ἐποίησεν, οὐς οὗ μόνον
Ἰπποκράτης ἡ Διοκλῆς ἡ Ἡρασίστρατος ἡ

2 i.e. “appropriated”; very nearly “assimilated.”
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ments of air and fluid throughout the whole body;¹ Nature acts throughout in an artistic and equitable manner, having certain faculties, by virtue of which each part of the body draws to itself the juice which is proper to it, and, having done so, attaches it to every portion of itself, and completely assimilates it; while such part of the juice as has not been mastered,² and is not capable of undergoing complete alteration and being assimilated to the part which is being nourished, is got rid of by yet another (an expulsive) faculty.

XIII

Now the extent of exactitude and truth in the doctrines of Hippocrates may be gauged, not merely from the way in which his opponents are at variance with obvious facts, but also from the various subjects of natural research themselves—the functions of animals, and the rest. For those people who do not believe that there exists in any part of the animal a faculty for attracting its own special quality³ are compelled repeatedly to deny obvious facts.⁴ For instance, Asclepiades, the physician,⁵ did this in the case of the kidneys. That these are organs for secreting [separating out] the urine, was the belief not only of Hippocrates, Diocles,

³ "Attractricem convenientis qualitatis vim" (Linacre). cf. p. 36, note 2. ⁴ Lit. "obvious phenomena." ⁵ Asclepiades of Bithynia, who flourished in the first half of the first century B.C., was an adherent of the atomistic philosophy of Democritus, and is the typical representative of the Mechanistic school in Graeco-Roman medicine; he disbelieved in any principle of individuality ("nature") in the organism, and his methods of treatment, in accordance with his pathology, were mechano-therapeutical. cf. p. 64, note 3.
Πραξαγόρας ἡ τις ἄλλος ἵπτρος ἀριστος ὅργανα διακριτικὰ τῶν ούρων πεπιστεύκασιν ὑπάρχειν, ἀλλὰ καὶ οἱ μᾶργειροι σχεδὸν ἀπαντεῖσιν ὶσασιν, ὁςημέραι θεῶμενοι τὴν τε θέσιν αὐτῶν καὶ τὸν ἀφ’ ἐκατέρθων πόρον εἰς τὴν κύστιν ἐμβάλλοντα, τὸν οὐρήτηρα καλοῦμενον, εἶ οὗτής τῆς κατασκεύης ἀναλογιζόμενοι τὴν τε χρείαν αὐτῶν καὶ τὴν δύναμιν. καὶ πρὸ γε τῶν μαγείρων ἀπαντῶν ἀνθρωποι καὶ δυσοφούντες πολλάκις καὶ παντάπασιν ἱσχυοῦντες, ὅταν ἀλγώσι μὲν τὰ κατὰ τὰς ψώσις, ψαμμώθη δὲ ἐξουρώσιν, νεφρικοὺς ὀνομάζουσι σφάς αὐτοὺς.

'Ασκληπιάδην δ’ οἶμαι μηδὲ λίθον οὐρηθέντα ποτὲ θεᾶσασθαι πρὸς τῶν οὔτω πασχόντων μηδ’ ὥς προηγησάτο κατὰ τὴν μεταξὺ τῶν νεφρῶν καὶ τῆς κύστεως χώραν οὖν τὰ ὄξεια διερχομένου τοῦ λίθου τοῦ οὐρητῆρα μηδ’ ὡς οὐρηθέντος αὐτοῦ τὰ τε τῆς οὐδες καὶ τὰ τῆς ἰσχυρίας ἐπαύσατο παραχρῆμα. πῶς οὖν εἰς τὴν κύστιν τῷ λόγῳ παράγει τὸ οὖρον, ἕξιον ἀκούσαι καὶ θαυμάσαι τὰν ὁδὸν τὴν σοφίαν, ὃς καταληπτῶν οὕτως εὐρείας οὖν ἑναργῶς φαινομένας ἀφανεῖς καὶ στενῶς καὶ παντάπασιν ἀναισθήτους ἡ ὑπέθετο. βούλεται γὰρ εἰς ἄτμους ἀναλυόμενον τὸ πινόμενον ύγρὸν εἰς τὴν κύστιν διαδίδοσθαι κάπετι εἰς ἐκείνους αὖθις ἀλληλοῦς συνιόντων οὕτως ἀπολαμβάνειν αὐτὸ τὴν ἀρχαῖν ἰδέαν καὶ γνῶσθαι πάλιν ύγρὸν εἰς ἄτμῶν ἀτεχνῶς ὡς περὶ σποργανᾶς τινος ἢ ἔριου τῆς κύστεως διανοούμενος, ἀλλ’ ὡς σώματος ἀκριβῶς πυκνοῦ καὶ στεγανοῦ δύο χιτώνας ἰσχυροτάτους κεκτημένου,
Erasistratus, Praxagoras,¹ and all other physicians of eminence, but practically every butcher is aware of this, from the fact that he daily observes both the position of the kidneys and the duct (termed the ureter) which runs from each kidney into the bladder, and from this arrangement he infers their characteristic use and faculty. But, even leaving the butchers aside, all people who suffer either from frequent dysuria or from retention of urine call themselves "nephritics,"² when they feel pain in the loins and pass sandy matter in their water.

I do not suppose that Asclepiades ever saw a stone which had been passed by one of these sufferers, or observed that this was preceded by a sharp pain in the region between kidneys and bladder as the stone traversed the ureter, or that, when the stone was passed, both the pain and the retention at once ceased. It is worth while, then, learning how his theory accounts for the presence of urine in the bladder, and one is forced to marvel at the ingenuity of a man who puts aside these broad, clearly visible routes,³ and postulates others which are narrow, invisible—indeed, entirely imperceptible. His view, in fact, is that the fluid which we drink passes into the bladder by being resolved into vapours, and that, when these have been again condensed, it thus regains its previous form, and turns from vapour into fluid. He simply looks upon the bladder as a sponge or a piece of wool, and not as the perfectly compact and impervious body that it is, with two very

¹ Diocles of Carystus was the chief representative of the Dogmatic or Hippocratic school in the first half of the fourth century B.C. Praxagoras was his disciple, and followed him in the leadership of the school. For Erasistratus, cf. p. 95 et seq.
² Sufferers from kidney-trouble.
³ The ureters.
δι' δὲν εἶπερ διέρχεσθαι φήσομεν τοὺς ἀτμούς, τι
dήποτ' οὐχὶ διὰ τοῦ περιτοναίου καὶ τῶν φρενῶν
dιελθόντες ἐνέπλησαν ὕδατος τὸ τ' ἐπιγαστρίου
ἀπαν καὶ τὸν θώρακα; ἀλλὰ παχύτερος, φησίν,
ἐστὶ δηλαδὴ καὶ στεγανώτερος ὁ περιτόναιος
χιτῶν τῆς κύστεως καὶ διὰ τοῦτ' ἐκείνος μὲν
ἀποστέγει τοὺς ἀτμούς, ἡ δὲ κύστις παραδέχεται.
ἀλλ' εἰπερ ἀνατεμήκηκε προτέ, τάχ' ἂν ἠπίστατο
tον μὲν ἐξωθὲν χιτῶνα τῆς κύστεως ἀπὸ τοῦ
περιτοναίου πεφυκότα τὴν αὐτὴν ἐκείνῳ φύσιν
ἐχειν, τὸν δ' ἐνδοθεν τὸν αὐτής τῆς κύστεως ἱδιόν
πλέον ἡ διπλάσιον ἐκείνου τὸ πάχος ὑπάρχειν.

'Αλλ' ἱσως οὔτε τὸ || πάχος οὐθ' ἡ λεπτότης
tῶν χιτῶνων, ἀλλ' ἡ θέσεις τῆς κύστεως αἰτία τοῦ
φέρεσθαι τοὺς ἀτμοὺς εἰς αὐτήν. καὶ μὴν εἰ καὶ
dιὰ ταλλα πάντα πιθανόν ἢν αὐτοὺς ἐνταυθοὶ
sυναθροίζεσθαι, τὸ γε τῆς θέσεως μόνης αὐταρκες
κωλύσαι. κατῶ μὲν γὰρ ἡ κύστις κεῖται, τοῖς δ' ἀτμοῖς σύμφυτος ἢ πρὸς τὸ μετέωρον φορά, ὡστε
πολὺ πρότερον ἄν ἐπηλθαν ἀπαντά τὰ κατὰ τὸν
θώρακά τε καὶ τὸν πνεύμονα, πρὶν ἐπὶ τὴν κύστιν
ἀφικέσθαι.

Καίτοι τι θέσεως κύστεως καὶ περιτοναίου καὶ
θώρακος μυημονεύων; διεκπεσόντες γὰρ δῆπον
tους τε τῆς κοιλίας καὶ τῶν ἐντερῶν χιτῶνας οἱ
ἀτμοὶ κατὰ τὴν μεταξὺ χώραν αὐτῶν τε τοῦτων
καὶ τοῦ περιτοναίου συναθροισθήσονται καὶ ἤγρον
ἐνταυθοὶ γενήσονται, ὡσπερ καὶ τῷ ὑδερικῷ ἐν
τούτῳ τῷ χώρῳ τὸ πλεῖστον ἀθροίζεται τοῦ

1 Unless otherwise stated, "peritoneum" stands for parietal peritoneum alone.

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strong coats. For if we say that the vapours pass through these coats, why should they not pass through the peritoneum\(^1\) and the diaphragm, thus filling the whole abdominal cavity and thorax with water? "But," says he, "of course the peritoneal coat is more impervious than the bladder, and this is why it keeps out the vapours, while the bladder admits them." Yet if he had ever practised anatomy, he might have known that the outer coat of the bladder springs from the peritoneum and is essentially the same as it, and that the inner coat, which is peculiar to the bladder, is more than twice as thick as the former.

Perhaps, however, it is not the thickness or thinness of the coats, but the situation of the bladder, which is the reason for the vapours being carried into it? On the contrary, even if it were probable for every other reason that the vapours accumulate there, yet the situation of the bladder would be enough in itself to prevent this. For the bladder is situated below, whereas vapours have a natural tendency to rise upwards; thus they would fill all the region of the thorax and lungs long before they came to the bladder.

But why do I mention the situation of the bladder, peritoneum, and thorax? For surely, when the vapours have passed through the coats of the stomach and intestines, it is in the space between these and the peritoneum\(^2\) that they will collect and become liquefied (just as in dropsical subjects it is in this region that most of the water gathers).\(^3\) Otherwise the vapours must necessarily pass straight forward

\(^1\) In the peritoneal cavity.
\(^2\) Contrast, however, anasarca, p. 41.
ΓΑΛΕΝ

υδατος, ἢ πάντως αὐτοὺς χρῆ φέρεσθαι πρόσω διὰ πάντων τῶν ὀπωσδέν ὁμιλοῦντων καὶ μηδέποτε ἱστασθαι. ἀλλ' εἰ καὶ τούτο τις ὑπόθωτο, διεκπεσόντες δὲν ὁὕτως οὐ τὸ περιτόναιον μόνον ἀλλὰ καὶ τὸ ἐνιγάστριον, εἰς τὸ περίεχον σκε- 
34 δασθείεν ἢ πάντως ἃν ὑπὸ τῷ δέρματι || συν- 
αθροισθείεν.

'Αλλὰ καὶ πρὸς ταύτ' ἀντιλέγειν οἱ νῦν Ἀσκληπιάδειοι πειρώνται, καίτοι πρὸς ἀπάντων ἀεὶ τῶν παρατυγχανόντων αὐτοῖς, ὅταν περὶ τούτων ἔριξοι, καταγελώμενοι. ὁὕτως ἄρα 
δυσαπότρυπτόν τι κακόν ἐστιν ἡ πέρι τᾶς αἱρέσεως 
φιλοτιμίᾳ καὶ δυσέκυπτρον ἐν τοῖς μάλιστα καὶ 
ψώρας ἀπάσης δυσιατότερον.

Τῶν γοῦν καθ' ἡμᾶς τις σοφιστῶν τὰ τ' ἀλλὰ 
καὶ περὶ τοὺς ἐρίστικοὺς λόγους ἰκανῶς συγκε- 
κροτήμενοι καὶ δεινὸς εἴπειν, εἴπερ τις ἄλλος, 
ἀφικόμενοι ἐμοὶ ποι' ὑπὲρ τούτων εἰς λόγους, 
τοσοῦτον ἀπέδει τοῦ δυσωπείσθαι πρὸς τινα 
τῶν εἰρημένων, ὡστε καὶ θαυμάζειν ἐφασκεν 
ἐμοῦ τὰ σαφῶς φαινόμενα λόγοι ληρώδεσιν 
ἀνατρέπειν ἐπιχειρούντος. ἐναργῶς γὰρ οὕτως 
θεωρεῖσθαι τᾶς κύστεις ἀπάσας, εἰ τις αὐτᾶς 
ἐμπλήσειεν ὦδατος ἢ ἀέρος, εἰτα δῆσας τῶν 
τράχηλον πιέζοι πανταχόθεν, οὐδαμόθεν μεθεί- 
σας οὐδέν, ἀλλ' ἀκριβῶς ἀπαν ἐντὸς ἑαυτῶν 
στεγοῦσας. καίτοι γ' εἴπερ ἦσαν τινες ἐκ τῶν 
νεφρῶν εἰς αὐτὰς ἥκοντες ἁίσθητοι καὶ μεγάλοι 
πόροι, πάντως ἅν, ἔφη, δι' ἐκείνων, ὡσπερ εἰς τῇ 
35 τὸ || ὑγρὸν εἰς αὐτὰς, οὕτω καὶ θλιβόντων 
ἐξεκρίνετο. ταύτα καὶ τὰ τοιαύτ' εἰπὼν ἐξαίφνης
through everything which in any way comes in con-
tact with them, and will never come to a standstill. 
But, if this be assumed, then they will traverse not 
merely the peritoneum but also the epigastrium, and 
will become dispersed into the surrounding air; 
otherwise they will certainly collect under the skin.

Even these considerations, however, our present-
day Asclepiadeans attempt to answer, despite the 
fact that they always get soundly laughed at by all 
who happen to be present at their disputations on 
these subjects—so difficult an evil to get rid of is 
this sectarian partizanship, so excessively resistant 
to all cleansing processes, harder to heal than any 
itch!

Thus, one of our Sophists who is a thoroughly 
hardened disputer and as skilful a master of language 
as there ever was, once got into a discussion with me 
on this subject; so far from being put out of 
countenance by any of the above-mentioned con-
siderations, he even expressed his surprise that I 
should try to overturn obvious facts by ridiculous 
arguments! "For," said he, "one may clearly 
observe any day in the case of any bladder, that, if 
one fills it with water or air and then ties up its neck 
and squeezes it all round, it does not let anything out 
at any point, but accurately retains all its contents. 
And surely," said he, "if there were any large and 
perceptible channels coming into it from the kidneys 
the liquid would run out through these when the 
bladder was squeezed, in the same way that it 
entered?" ¹ Having abruptly made these and

¹ Regurgitation, however, is prevented by the fact that 
the ureter runs for nearly one inch obliquely through the 
bladder wall before opening into its cavity, and thus an 
efficient valve is produced.
Galēn

ἀπταίστῳ καὶ σαφεὶ τῷ στόματι τελευτῶν ἀναπηδήσας ἀπῆγε καταλεπῶν ἡμᾶς ὡς οὐδὲ πιθανῆς τινος ἀντιλογίας εὑροῦσαι δυναμένους.

Οὔτος οὖν μόνον ὑγιές οὐδὲν ἤσαυρ οἱ ταῖς αἰρέσεσι δουλεύοντες, ἀλλ' οὐδὲ μαθεῖν ὑπομένουσι. δεδον γὰρ ἀκούσαι τὴν αὐτίαν, δι' ἦν εἰσιέναι μὲν δύναται διὰ τῶν ὑρητηρίων εἰς τὴν κύστιν τὸ υγρόν, ἐξείναι δ' αὐθίς ὁπίσω τὴν αὐτὴν ὀδὸν οὐκέθ' οἶνον τε, καὶ θαυμάσαι τὴν τέχνην τῆς φύσεως, οὔτε μαθεῖν ἔθελον καὶ λοιδοροῦνται προσέτι μάτην ὑπ' αὐτής ἀλλὰ τε πολλαὶ καὶ τοὺς νεφροὺς γεγονέναι φάσκουντες. εἰσὶ δ' οἳ καὶ δειχθῆναι παρόντων αὐτῶν τοὺς ἀπὸ τῶν νεφρῶν εἰς τὴν κύστιν ἐμφυομένους ὑρητήρας ὑπομείναντες ἐτόλμησαν εἰπεῖν οἱ μὲν, ὅτι μάτην καὶ οὔτοι γεγονόσιν, οἳ δ', ὅτι σπερματικοὶ τινὲς εἰσὶ πόροι καὶ διὰ τοῦτο κατὰ τὸν τράχηλον αὐτῆς, οὐκ εἰς τὸ κύτως ἐμφύονται. δεέσαντες οὖν ἡμεῖς αὐτοῖς τοὺς ὡς ἄληθῶς σπερματικοὺς πόρους κατωτέρω τῶν ὑρητηρίων ||

36 ἐμβάλλοντας εἰς τὸν τράχηλον, νῦν γοῦν, εἰ καὶ μὴ πρότερον, ὥσπερ οὖν ἀπαξεῖν τε τῶν ψευδῶν ὑπείληπμένων ἐπὶ τε τὰναντία μεταστήσειν αὐτίκα. οἱ δὲ καὶ πρὸς τοῦτ' ἀντιλέγειν ἐτολμῶν οὐδὲν εἶναι θαυμαστὸν εἰπόντες, ἐν ἑκείνοις μὲν ὡς ἄν στεγανωτέροις οὐσίων ἐπὶ πλέον ὑπομένειν τὸ σπέρμα, κατὰ δὲ τοὺς ἀπὸ τῶν νεφρῶν ὡς ἄν ἰκανῶς ἀνευρυσμένους ἔκρειν διὰ ταχέων. ἡμεῖς

1 On the τέχνη (artistic or creative skill) shown by the living organism (φύσις) v. pp. 25, 45, 47; Introduction, p. xxix.

2 Direct denial of Aristotle’s dictum that “Nature does nothing in vain.” We are reminded of the view of certain
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similar remarks in precise and clear tones, he con-
cluded by jumping up and departing—leaving me
as though I were quite incapable of finding any
plausible answer!

The fact is that those who are enslaved to their
sects are not merely devoid of all sound know-
ledge, but they will not even stop to learn! In-
stead of listening, as they ought, to the reason
why liquid can enter the bladder through the
ureters, but is unable to go back again the same way,
—instead of admiring Nature's artistic skill—
they refuse to learn; they even go so far as to scoff, and
maintain that the kidneys, as well as many other
things, have been made by Nature for no purpose! 2
And some of them who had allowed themselves to
be shown the ureters coming from the kidneys and
becoming implanted in the bladder, even had the
audacity to say that these also existed for no purpose;
and others said that they were spermatic ducts, and
that this was why they were inserted into the neck
of the bladder and not into its cavity. When, there-
fore, we had demonstrated to them the real sper-
matic ducts 3 entering the neck of the bladder lower
down than the ureters, we supposed that, if we had
not done so before, we would now at least draw
them away from their false assumptions, and convert
them forthwith to the opposite view. But even this
they presumed to dispute, and said that it was not to
be wondered at that the semen should remain longer
in these latter ducts, these being more constricted,
and that it should flow quickly down the ducts
which came from the kidneys, seeing that these were
modern laboratory physicians and surgeons that the colon is
a "useless" organ. cf. Erasistratus, p. 143.

3 The vasa deferentia.
οὐν ἡναγκάσθημεν αὐτοῖς τοῦ λοιποῦ δεικνύειν εἰσρέον τῇ κύστει διὰ τῶν ὑφητήρων τὸ ὀφρον ἐναργῶς ἐπὶ ξώντος ἐτὶ τοῦ ξύον, μόνοις ἀν οὖτω ποτὲ τὴν φλυαρίαν αὐτῶν ἐπισκήσεις ἐπιπέδωσατε.

Ὁ δὲ τρόπος τῆς δεξιώσος ἐστὶ τοιόσος. διδεῖν χρή τὸ πρὸ τῶν ὑφητήρων περιτόναιον, εἴτε βρόχοις αὐτοῖς ἐκλάβειν κάπετετ ἐπιτίθησαντας ἐάσαι τὸ ξύον οὐ γάρ ἂν ὑφήσειεν ἐτι. μετὰ δὲ ταῦτα λύειν μὲν τοὺς ἐξωθέν δεσμοὺς, δεικνύναι δὲ κενὴν μὲν τὴν κύστιν, μεσοῦς δὲ ἰκανῶς καὶ διατεταμένους τοὺς ὑφητήρας καὶ κενδυνεύοντας βαγίναι κάπετετα τοὺς βρόχοις αὐτῶν ἀφελόντας ἐναργῶς ὁρὰν ἦδη πληρομένην ὀφρον τὴν κύστιν.

37 Ἔπεὶ δὲ τούτῳ || φανέρω, πρὶν ὑφήσαι τὸ ξύον, βρόχοις αὐτοῖς περιβάλειν χρή τῷ αἰδοίῳ κάπετετα θλίβειν πανταχόθεν τὴν κύστιν. οὐδὲ γάρ ἂν οὐδὲν ἐτι διὰ τῶν ὑφητήρων ἐπανέλθοι πρὸς τοὺς νεφροὺς. κἂν τούτῳ δῆλον γίγνεται τὸ μὴ μόνον ἐπὶ τεθενῶτος ἀλλὰ καὶ περιόντος ἐτι τοῦ ξύον κωλύεσθαι μεταλαμβάνειν αὖθις ἐκ τῆς κύστεως τοὺς ὑφητήρας τὸ ὀφρον. ἐπὶ τούτοις ὀφθείσιν ἐπιτρέπειν ἢδη τὸ ξύον ὑφρεῖν λύνοντας αὐτοῦ τὸν ἐπὶ τῷ αἰδοίῳ βρόχον, εἴτ' αὖθις ἐπιβάλειν μὲν θατέρῳ τῶν ὑφητήρων, ἑαυτὸς δὲ τὸν ἐτέρου εἰς τὴν κύστιν ουρρεῖν καὶ τίνα διαληπτούντας χρόνου ἐπιδεικνύειν ἢδη, πῶς ὁ μὲν ἐτέρος αὐτῶν ὁ δεδεμένος μεστὸς καὶ διατεταμένος κατὰ τὰ πρὸς τῶν νεφρῶν μέρη φαίνεται, ὁ δ' ἐτέρος ὁ λελυμένος αὐτὸς μὲν χαλαρός ἐστι, πεπλήρωκε δ' ὀφρον τὴν κύστιν. εἴτ' αὖθις διατεμεῖν πρῶτον μὲν τὸν πλήρη καὶ δείξαι, πῶς ἐξακοντίζεται τὸ
well dilated. We were, therefore, further compelled to show them in a still living animal, the urine plainly running out through the ureters into the bladder; even thus we hardly hoped to check their nonsensical talk.

Now the method of demonstration is as follows. One has to divide the peritoneum in front of the ureters, then secure these with ligatures, and next, having bandaged up the animal, let him go (for he will not continue to urinate). After this one loosens the external bandages and shows the bladder empty and the ureters quite full and distended—in fact almost on the point of rupturing; on removing the ligature from them, one then plainly sees the bladder becoming filled with urine.

When this has been made quite clear, then, before the animal urinates, one has to tie a ligature round his penis and then to squeeze the bladder all over; still nothing goes back through the ureters to the kidneys. Here, then, it becomes obvious that not only in a dead animal, but in one which is still living, the ureters are prevented from receiving back the urine from the bladder. These observations having been made, one now loosens the ligature from the animal’s penis and allows him to urinate, then again ligatures one of the ureters and leaves the other to discharge into the bladder. Allowing, then, some time to elapse, one now demonstrates that the ureter which was ligatured is obviously full and distended on the side next to the kidneys, while the other one—that from which the ligature had been taken—is itself flaccid, but has filled the bladder with urine. Then, again, one must divide the full ureter, and demonstrate how
οὕρον ἐξ αὐτοῦ, καθάπερ ἐν ταῖς φλεβοτομώαις τὸ αἷμα, μετὰ ταῦτα δὲ καὶ τὸν ἔτερον αὐτὸς διατεμεῖν κάπετι ἐπιδημίαι τὸ ἄλοιφον ἐξωθεὶ, ἀμψωτέρων διηρημένων, || εἰθ’ ὅταν ἴκανός ἔχειν δοκῆ, λύσαι τὸν δεσμόν. εὐρεθήσεται γὰρ ἡ μὲν κύστις κενή, πλήρες δὲ οὖρον τὸ μεταξὺ τῶν ἐντέρων τε καὶ τοῦ περιτονάλου χωρίου ἀπαν, ὡς ἂν εἰ καὶ ύδερικὸν ἦν τὸ ἄλοιφον. ταῦτ’ οὖν εἰ τις αὐτὸς καθ’ ἐαυτὸν θεμελήσεις βασανίζειν ἐπὶ ἄλοιφο, μεγάλως μοι δοκεῖ καταγρώσεσθαι τῆς Ἀσκληπιάδου προσπετείας. εἰ δὲ δὴ καὶ τὴν αὐτίκαν μάθοι, δὴ ἢν οὐδὲν ἐκ τῆς κύστεως εἰς τοὺς ὕπορητάς ἀντεκρεῖ, πεισθήσεις ἂν μοι δοκεῖ καὶ διὰ τοὺς τὴν εἰς τὰ ἄλοιφα πρόνοιαν τε καὶ τέχνην τῆς φύσεως.

Ἰπποκράτης μὲν οὖν ὁ θησεων ἱατρῶν τε καὶ φιλοσόφων πρῶτος ἀπάντων, ὡς ἂν καὶ πρῶτος ἐπιγνοὺς τὰ τῆς φύσεως ἐργα, θαυμάζει τε καὶ διὰ παντὸς αὐτὴν ὑμεῖς δικαίων ὑμωμάζω καὶ μόνην ἐξαρκείν εἰς ἀπαντα τοῖς ἄλοιφοις φησίν, αὐτὴν ἐξ αὐτῆς ἀδιδάκτως πράττουσαν ἀπαντα τὰ δέοντα· τοιαύτην δ’ οὖσαν αὐτὴν εὐθέως καὶ δυνάμεις ὑπέλαβεν ἔχειν ἐλεκτικὴν μὲν τῶν οἰκείων, ἀποκριτικὴν δὲ τῶν ἀλλοτρίων καὶ τρέφειν τε καὶ αὐξεῖν αὐτήν τὰ ἄλοιφα καὶ κρίνειν τὰ νοσήματα· καὶ διὰ τοῦτ’ ἐν τοῖς σώμασιν ἠμῶν σύμπνοιαν τε μίαν εἶναι φησί καὶ σύρροιαν καὶ πάντα συμπαθεῖν. κατὰ δὲ τῶν Ἀσκληπιάδην

2 cf. p. 36, note 2.
the urine spurts out of it, like blood in the operation of venesection; and after this one cuts through the other also, and both being thus divided, one bandages up the animal externally. Then when enough time seems to have elapsed, one takes off the bandages; the bladder will now be found empty, and the whole region between the intestines and the peritoneum full of urine, as if the animal were suffering from dropsy. Now, if anyone will but test this for himself on an animal, I think he will strongly condemn the rashness of Asclepiades, and if he also learns the reason why nothing regurgitates from the bladder into the ureters, I think he will be persuaded by this also of the forethought and art shown by Nature in relation to animals.¹

Now Hippocrates, who was the first known to us of all those who have been both physicians and philosophers inasmuch as he was the first to recognize what Nature effects, expresses his admiration of her, and is constantly singing her praises and calling her "just." Alone, he says, she suffices for the animal in every respect, performing of her own accord and without any teaching all that is required. Being such, she has, as he supposes, certain faculties, one attractive of what is appropriate,² and another eliminative of what is foreign, and she nourishes the animal, makes it grow, and expels its diseases by crisis.³ Therefore he says that there is in our bodies a concordance in the movements of air and fluid, and that everything is in sympathy. According to Asclepiades, however, nothing is

³ The morbid material passed successively through the stages of "crudity," "coction" (pepsis), and "elimination" (crisis). For "critical days" cf. p. 74, note 1.
οὐδὲν οὐδενὶ συμπαθέσει ἐστὶ φύσει, διηρημένης τε καὶ κατατεθραυσμένης εἰς ἀναρμα στοιχεῖα καὶ ληρώδεις ὀγκοὺς ἀπάσης τῆς οὐσίας. ἦς ανάγκης οὐν ἀλλα τε μυρία τοῖς ἑναρχῶς φαινομένοις ἐναντίως ἀπεφήνατο καὶ τῆς φύσεως ἡγώον ἀντιπλάνων δύναμιν καὶ τῆς τῶν ἀλλοτρίων ἀποκριτικῆς. ἐπὶ μὲν οὖν τῆς ἑξαιματώσεως τε καὶ ἀναδόσεως ἐξεύρη τινα ψυχρῶν ἀδόλεσχιον· εἰς δὲ τὴν τῶν περιττωμάτων κάθαρσιν οὐδὲν ὀλως εὐρόν εἰπεῖν οὐκ ἀκνησεν ὡς ἔχομεν χωρῆσαι τοῖς φαινομένοις, ἐπὶ μὲν τῆς τῶν οὐρων διακρίσεως ἀποστρήγσιας μὲν τῶν τε νεφρῶν καὶ τῶν οὐρητήρων τὴν ἐνέργειαν, ἀδήλους δὲ τινὰς ποροὺς εἰς τὴν κύστιν ὑποθέμενος· τούτῳ γὰρ ἦν δηλαδή μέγα καὶ σεμνὸν ἀπιστησάντα τοῖς φαινομένοις πιστεύσαι τοῖς ἀδήλοις.

40 Ἐπὶ δὲ τῆς ξανθῆς χολῆς ἐτί μεῖζον αὐτῷ καὶ νεανικότερον ἐστὶ τὸ τόλμημα· γεννᾶσθαι γὰρ αὐτὴν ἐν τοῖς χοληδόχοις ἀγγείοις, οὐ διακρίνεσθαι λέγει.

Πῶς οὖν τοῖς ἰκτερικοῖς ἀμφοὶ συμπίπτει, τὰ μὲν διαχωρήματα μηδὲν ὀλως ἐν αὐτοῖς ἔχοντα χολῆς, ἀνάπλεων δ' αὐτοῖς γιγαντομενον ὀλον τὸ σώμα; ληρεῖν πάλιν ἐνταῦθ' ἀναγκάζεται τοῖς ἐπὶ τῶν οὐρων εἰρημένους παραπλησίως. ληρεῖ δ' οὖδέν ἦττον καὶ περὶ τῆς μελαίνης χολῆς καὶ τοῦ σπληνός οὔτε τί ποθ' ύφ' Ἰπποκράτους εἰρηται συνεις ἀντιλέγειν τ' ἐπικειρῶν οἷς οὐκ οἴδεν ἐμπληκτῷ τινὶ καὶ μανικὸ στόματι.

1 This was the process by which nutriment was taken up from the alimentary canal; "absorption," "dispersal;" cf. 62
naturally in sympathy with anything else, all substance being divided and broken up into inharmonious elements and absurd "molecules." Necessarily, then, besides making countless other statements in opposition to plain fact, he was ignorant of Nature's faculties, both that attracting what is appropriate, and that expelling what is foreign. Thus he invented some wretched nonsense to explain blood-production and anadosis,¹ and, being utterly unable to find anything to say regarding the clearing-out² of superfluities, he did not hesitate to join issue with obvious facts, and, in this matter of urinary secretion, to deprive both the kidneys and the ureters of their activity, by assuming that there were certain invisible channels opening into the bladder. It was, of course, a grand and impressive thing to do, to mistrust the obvious, and to pin one's faith in things which could not be seen.

Also, in the matter of the yellow bile, he makes an even grander and more spirited venture; for he says this is actually generated in the bile-ducts, not merely separated out.

How comes it, then, that in cases of jaundice two things happen at the same time—that the dejections contain absolutely no bile, and that the whole body becomes full of it? He is forced here again to talk nonsense, just as he did in regard to the urine. He also talks no less nonsense about the black bile and the spleen, not understanding what was said by Hippocrates; and he attempts in stupid—I might say insane—language, to contradict what he knows nothing about.

p. 13, note 5. The subject is dealt with more fully in chap. xvi.

¹ Lit. catharsis.
Τί δὴ τὸ κέρδος ἐκ τῶν τοιούτων δογμάτων εἰς τὰς θεραπείας ἐκτήσατο; μήτε νεφριτικόν τι νόσημα δύνασθαι θεραπεύσαι μήτε ἱκτερικόν μήτε μελαγχολικόν, ἀλλὰ καὶ περὶ τοῦ πάσιν ἀνδρῶτοις οὐχ Ἰπποκράτει μόνον ὀμολογουμένου τοῦ καθαίρειν τῶν φαρμάκων ἐναὶ μὲν τὴν ξανθὴν χολήν, ἐναὶ δὲ τὴν μέλαιναν, ἀλλὰ δὲ τινὰ φλέγμα καὶ τινα τὸ λεπτὸν καὶ ὑδατώδες περιττῶμα, μηδὲ περὶ τούτων συγχωρεῖν, ἀλλ’ ὑπ’ αὐτῶν τῶν φαρμάκων γίγνεσθαι λέγειν τοιούτων ἕκαστον τῶν κενουμένων, ὥσπερ ὑπὸ τῶν χολῆς ὀξῶν πόρων τὴν χολήν καὶ μηδὲν διαφέρειν κατὰ τὸν θαναμαστὸν. Ἀσκληπιάδην ἢ ὑδραγωγὸν διδόναι τοῖς ὑδροῦσιν ἢ χολαγωγὸν φάρμακον ἀπαντά γὰρ ὀμοίως κενοῦν καὶ συντήκειν τὸ σῶμα καὶ τὸ σύντηγμα τοιόνδε τι φαίνεσθαι ποιεῖν, μὴ πρότερον ὑπάρχον τοιούτων.

'Αρ’ οὖν οὐ μαίνεσθαι νομιστέον αὐτὸν ἢ παντάπασιν ἀπειρον εἶναι τῶν ἐργῶν τῆς τέχνης; τίς γὰρ οὐκ οἶδεν, ὡς, εἰ μὲν φλέγματος ἀγωγὸν δοθεῖν φάρμακον τοῖς ἱκτερισθέν, οὐκ ἂν οὐδὲ τέταρας κυάθους καθαρθεῖν οὔτω δ’ οὔδ’ εἰ τῶν ὑδραγωγῶν τι χολαγωγῷ δὲ φαρμάκῳ πλεῖστον μὲν ἐκκενοῦται χολῆς, αὐτίκα δὲ καθαρὸς τοῖς οὕτω καθαρθεῖσιν ὁ χρῶς γίγνεται. πολλοὺς γοῦν ἥμεισ μετὰ τὸ θεραπεύσαι τὴν ἐν τῷ ἦπατι διάθεσιν ἀπαξ καθηρατεῖς ἀπηλλάξαμεν τοῦ παθήματος. οὐ μὴν οὖ δ’ εἰ φλέγματος ἀγωγῷ καθαίροις φαρμάκῳ, πλέον ἃν τι διαπράξαι.

1 i.e. urine. 2 On use of κενῶν v. p. 67, note 9. 3 i.e. bile and phlegm had no existence as such before the
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And what profit did he derive from these opinions from the point of view of treatment? He neither was able to cure a kidney ailment, nor jaundice, nor a disease of black bile, nor would he agree with the view held not merely by Hippocrates but by all men regarding drugs—that some of them purge away yellow bile, and others black, some again phlegm, and others the thin and watery superfluity; he held that all the substances evacuated were produced by the drugs themselves, just as yellow bile is produced by the biliary passages! It matters nothing, according to this extraordinary man, whether we give a hydragogue or a cholagogue in a case of dropsy, for these all equally purge and dissolve the body, and produce a solution having such and such an appearance, which did not exist as such before!

Must we not, therefore, suppose he was either mad, or entirely unacquainted with practical medicine? For who does not know that if a drug for attracting phlegm be given in a case of jaundice it will not even evacuate four cyathi of phlegm? Similarly also if one of the hydragogues be given. A cholagogue, on the other hand, clears away a great quantity of bile, and the skin of patients so treated at once becomes clear. I myself have, in many cases, after treating the liver condition, then removed the disease by means of a single purgation; whereas, if one had employed a drug for removing phlegm one would have done no good.

drugs were given; they are the products of dissolved tissue. Asclepiades did not believe that diseases were due to a materia peccans, but to disturbances in the movements of the molecules (δυναμών) which constitute the body; thus, in opposition to the humoralists such as Galen, he had no use for drugs. cf. p. 49, note 5. 4 About 4 oz., or one-third of a pint.

65
Kai taiv oux Ἰπποκράτης μὲν οὖτως οἴδε γιγνόμενα, τοὺς δ' ἀπὸ τῆς ἐμπειρίας μόνης ὀρμὼ-42 μένοις ἔτέρῳς ἑγνωσταί, ἀλλὰ κάκελ�数οις ὡσαύτως καὶ πᾶσιν ἰατροῖς, οἰς μέλει τῶν ἔργων τῆς τέχνης, οὕτω δοκεῖ πλὴν Ἀσκληπιάδου. προδοσίαιν γὰρ εἶναι νενόμικε τῶν στοιχείων ὧν ὑπέθετο τὴν ἀληθῆ περὶ τῶν τοιούτων ὁμολογιαί. εἰ γὰρ ὅλως εὐρεθεῖη τι φάρμακον ἐλκτικὸν τούδε τινος τοῦ χυμοῦ μόνου, κίνδυνος κρατεῖν δηλαδή τῷ λόγῳ τὸ ἐν ἐκάστῳ τῶν σωμάτων εἶναι τινα δύναμιν ἐπισταστικὴν τῆς οἰκείας ποιότητος. διὰ τούτο κυίκον μὲν καὶ κόκκον τὸν κνίδιον καὶ ἰπποφαές οὐχ ἔλκειν ἐκ τοῦ σώματος ἀλλὰ ποιεῖν τὸ φλέγμα φησίν· ἀνθὸς δὲ χαλκοῦ καὶ λεπίδα καὶ αὐτὸν τὸν κεκαυμένον χαλκὸν καὶ χαμαίδρουν καὶ χαμαίλεστα εἰς ύδωρ ἀναλύειν τὸ σῶμα καὶ τοὺς ὕδειρικοὺς ὑπὸ τούτων ὦ καθαιρομένους ὑνίνοθαι ἀλλὰ κενομένους συναυξόντων δηλαδή τὸ πάθος. εἰ γὰρ οὐ κενοὶ τὸ περιεχόμενον ἐν τοῖς σώμασιν ύδατῶδες ύγρὸν ἀλλ' αὐτὸ γεννᾶ, τῷ νοσήματι προστιμορεῖται. καὶ μὲν γε καὶ ἡ σκαμμονία πρὸς τῷ μὴ κενοῖν ἐκ τοῦ σώματος τῶν ἱκτερικῶν τὴν χολὴν ἔτι καὶ τὸ χρηστὸν αἰμα χολήν ἑργαζομένῃ || καὶ συντήκουσα τὸ σῶμα καὶ τηλικά καὶ δρῶσα καὶ τὸ πάθος ἐπαύξουσα κατὰ γε τὸν Ἀσκληπιάδου λόγον.

"Ὅμως ἐναργῶς ὄραται πολλὸς ὄφελος. ναι, φησίν, ὀνύηναι μὲν, ἀλλ' αὐτῷ μόνῳ τῷ

1 The Empiricists. cf. Introduction, p. xiii.
2 His υγκοι or molecules.
3 He does not say "organized" or "living" body; inanimate things were also thought to possess "natures"; cf. p. 2, note 1.

66
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Nor is Hippocrates the only one who knows this to be so, whilst those who take experience alone as their starting-point know otherwise; they, as well as all physicians who are engaged in the practice of medicine, are of this opinion. Asclepiades, however, is an exception; he would hold it a betrayal of his assumed "elements" to confess the truth about such matters. For if a single drug were to be discovered which attracted such and such a humour only, there would obviously be danger of the opinion gaining ground that there is in every body a faculty which attracts its own particular quality. He therefore says that safflower, the Cnidian berry, and Hippophaes, do not draw phlegm from the body, but actually make it. Moreover, he holds that the flower and scales of bronze, and burnt bronze itself, and germander, and wild mastic dissolve the body into water, and that dropsical patients derive benefit from these substances, not because they are purified by them, but because they are rid of substances which actually help to increase the disease; for, if the medicine does not evacuate the dropsical fluid contained in the body, but generates it, it aggravates the condition further. Moreover, scarnony, according to the Asclepiadean argument, not only fails to evacuate the bile from the bodies of jaundiced subjects, but actually turns the useful blood into bile, and dissolves the body; in fact it does all manner of evil and increases the disease.

And yet this drug may be clearly seen to do good to numbers of people! "Yes," says he; "they derive

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4 Carthamus tinctorius. 5 Daphne Gnidium.
6 Euphorbia acanthothamnos. 7 Teucrium chamaedrys.
8 Atractylis gummifera. 9 On use of ἱερόν cf. p. 98, note 1.
λόγῳ τῆς κενώσεως. καὶ μὴν εἰ φλέγματος ἄγω-
γον αὐτοῖς δοῖς φάρμακον, οὐκ ὄνησονται. καὶ
tοῦθ᾽ οὕτως ἐναργεῖ ἔστιν, ὄστε καὶ οἱ ἀπὸ μόνης
tῆς ἐμπειρίας ὄρμωμενοι γυγνώσκουσιν αὐτό.
καίτοι τούτοις γε τοῖς ἀνθράσιν αὐτὸ δὴ τοῦτ'
ἔστι φιλοσόφημα, τὸ μηδενὶ λόγῳ πιστεύειν ἄλλα
μόνοις τοῖς ἐναργῶς φαίνομένοις. ἐκεῖνοι μὲν οὖν
σωφρονοῦσιν Ἀσκληπιάδης δὲ παραπαίει ταῖς
αισθήσεσιν ἡμᾶς ἀπιστεῖν κελεῦντι, ἐνθα τὸ φαι-
νόμενον ἀνατρέπει σαφῶς αὐτοῦ τὰς ὑποθέσεις.
καίτοι μακρῷ γὰρ ἡ ἁμεινὸν οὐχ ὀμόσε χωρεῖν
toῖς φαίνομένοις ἀλλ᾽ ἐκεῖνοι ἀναθέσθαι τὸ πᾶν.

Ἀρ' οὖν ταῦτα μόνον ἐναργῶς μάχεται τοῖς
Ἀσκληπιάδου δόγμασιν ἢ καὶ τὸ θέρους μὲν
πλείονα κενοῦσθαι τὴν ἐανθήν χολὴν ὑπὸ τῶν
αὐτῶν φαρμάκων, χειμῶνος δὲ τὸ φλέγμα, καὶ
νεανίσκος μὲν πλείονα τὴν χολὴν, πρεσβύτηρ δὲ τὸ
φλέγμα; φαίνεται μία ἐκαστὸν ἐλκείν τὴν
οὐσίαν, οὐκ αὐτὸ γεννᾶν τὴν ὑπὸ οὐσίαν. εἰ γοῦν
ἐθελήσαις νεανίσκο τινι τῶν ἵσχυν καὶ θερμῶν
ὡρα θέρους μῆτ' ἄργῳς βεβιωκότι μῆτ' ἐν πλησ-
μονῇ φλέγματος ἄγωγόν δοῦναι φάρμακον, ὀλί-
γιστον μὲν καὶ κατὰ βίας πολλῆς ἐκκενώσεις τοῦ
χυμοῦ, βλάψεις δὲ ἐσχάτως τοῦ ἀνθρώπου ἐμπα-
λιν δ' εἰ χολαγωγὸν δοῖς, καὶ πάμπουλ κενώσεις
καὶ βλάψεις οὐδέν.

Ἀρ' ἀπιστοῦμεν έτι τῷ μὴ οὐχ ἐκαστὸν τῶν
φαρμάκων ἐπάγεσθαι τῶν οἰκείον ἐαυτῷ χυμῶν;

1 Empiricist physicians.
benefit certainly, but merely in proportion to the evacuation." . . . But if you give these cases a drug which draws off phlegm they will not be benefited. This is so obvious that even those who make experience alone their starting-point\(^1\) are aware of it; and these people make it a cardinal point of their teaching to trust to no arguments, but only to what can be clearly seen. In this, then, they show good sense; whereas Asclepiades goes far astray in bidding us distrust our senses where obvious facts plainly overturn his hypotheses. Much better would it have been for him not to assail obvious facts, but rather to devote himself entirely to these.

Is it, then, these facts only which are plainly irreconcilable with the views of Asclepiades? Is not also the fact that in summer yellow bile is evacuated in greater quantity by the same drugs, and in winter phlegm, and that in a young man more bile is evacuated, and in an old man more phlegm? Obviously each drug attracts something which already exists, and does not generate something previously non-existent. Thus if you give in the summer season a drug which attracts phlegm to a young man of a lean and warm habit, who has lived neither idly nor too luxuriously, you will with great difficulty evacuate a very small quantity of this humour, and you will do the man the utmost harm. On the other hand, if you give him a cholagogue, you will produce an abundant evacuation and not injure him at all.

Do we still, then, disbelieve that each drug attracts that humour which is proper to it?\(^2\) Possibly the

\(^2\) Note that drugs also have "natures"; cf. p. 66, note 3, and pp. 83–84.
Galen

ἅσως φήσουσιν οἱ ἀπ’ Ἀσκληπιάδου, μᾶλλον δ’ οὐκ ἱσως, ἀλλὰ πάντως ἀπιστεῖν ἔρούσιν, ἵνα μὴ προδώσι τὰ φίλτατα.

XIV

Πάλιν οὖν καὶ ἡμεῖς ἐφ’ ἐτέραν μεταβδόμεν ἄδολεσχίαν οὐ γὰρ ἐπιτρέπουσιν οἱ σοφισταὶ τῶν ἄξιων τι ξηπημάτων προχειρίζεσθαι καίτων παμπόλλων ὑπαρχόντων, ἀλλὰ κατατρίβειν ἀναγκάζουσι τὸν χρόνον εἰς τὴν τῶν σοφισμάτων, δὲν προβάλλουσι, λύσιν.

Τῆς οὖν ἡ ἄδολεσχία; ἡ ἐνδοξος αὐτη καὶ πολυθρύλητος λίθος ἡ τὸν σίδηρον || ἐπιστωμενη. τάχα γὰρ ἂν αὐτη ποτε την ψυχην αυτων ἐπιστάσαιτο πιστεύειν εἰναι τινας ἐν ἐκάστῳ τῶν σωμάτων ἐλεκτικά τῶν οἰκείων ποιοτητῶν ὑπάρχει.

Εὐπόκουρος μὲν οὖν καίτω παραπλησίας Ἀσκληπιάδη στοιχείοις πρὸς τὴν φυσιολογίαν χρωμευον ὁμως ὁμολογεῖ, πρὸς μὲν τῆς ἦρακλείας λίθου τὸν σίδηρον ἔλκεσθαι, πρὸς δὲ τῶν ἥλεκτρων τὰ κυρήβια καὶ πειρᾶται γε καὶ τὴν αἰτίαν ἀποδίδοναι τοῦ φαινομενου. τὰς γὰρ ἀπορρεύσας ἀτόμους ἀπὸ τῆς λίθου ταῖς ἀπορρεύσεις ἀπὸ τοῦ σιδήρου τοῖς σχήμασιν οἰκείας εἰναι φησιν, ὡστε περιπλέκεσθαι ραδίως. προσκρονούσας οὖν αὐτὰς τοῖς συγκρίμασιν ἐκατέρως τῆς τε λίθου καὶ τοῦ σιδήρου κάπετι εἰς τὸ μέσον ἀποπαλλομένας οὕτως ἀλλήλαις τε περιπλέκεσθαι καὶ

1 Pun here. 2 Lit. physiology, i.e. nature-lore, almost our “Natural Philosophy”; cf. Introduction, p. xxvi.
adherents of Asclepiades will assent to this—or rather, they will—not possibly, but certainly—declare that they disbelieve it, lest they should betray their darling prejudices.

XIV

Let us pass on, then, again to another piece of nonsense; for the sophists do not allow one to engage in enquiries that are of any worth, albeit there are many such; they compel one to spend one’s time in dissipating the fallacious arguments which they bring forward.

What, then, is this piece of nonsense? It has to do with the famous and far-renowned stone which draws iron [the lodestone]. It might be thought that this would draw their minds to a belief that there are in all bodies certain faculties by which they attract their own proper qualities.

Now Epicurus, despite the fact that he employs in his Physics elements similar to those of Asclepiades, yet allows that iron is attracted by the lodestone, and chaff by amber. He even tries to give the cause of the phenomenon. His view is that the atoms which flow from the stone are related in shape to those flowing from the iron, and so they become easily interlocked with one another; thus it is that, after colliding with each of the two compact masses (the stone and the iron) they then rebound into the middle and so become entangled with each other,

3 The ultimate particle of Epicurus was the ἀτόμος or atom (lit. “non-divisible”), of Asclepiades, the ὑφρος or molecule. Asclepiades took his atomic theory from Epicurus, and he again from Democritus; cf. p. 49, note 5.

4 Lit. Herculean stone.
GALEN

συνεπιστάσθαι τὸν σίδηρον. τὸ μὲν οὖν τῶν
υποθέσεων εἰς τὴν αἰτιολογίαν ἀπίθανον ἀντικροσ
dῆλον, διός δ’ οὖν ὁμολογεῖ τὴν ὀλκήν. καὶ οὕτω
γε καὶ κατὰ τὰ σώματα τῶν ζῴων φησὶ γίγνεσθαι
τάς τ’ ἀναδόσεις καὶ τὰς διακρίσεις τῶν περιτ-
τωμάτων καὶ τὰς τῶν καθαιρόντων φαρμάκων
ἐνεργεῖας.

Ἀσκληπιάδης δὴ τὸ τῆς εἰρημένης αἰτίας
ἀπίθανον || υποδόμενος καὶ μηδεμίαν ἄλλην ἔφ’
ois ὑπὲθετο στοιχείοις ἐξευρήσκεσθαι ξέγειν ὑπὸ μηδενός μηδὲν
ἀναισχυντήσας ἔτραπετο, δέσον, εἰ μὴδ’ οἴσ Ἐπί-
κουρος εἰπεν ἥρεσκετο μὴ’ ἄλλα βελτίω λέγειν
εἰγέν, ἀποστῆναι τῶν ὑποθέσεων καὶ τὴν τε φύσιν
ἐπιτεύχῃ τεχνικῆν καὶ τὴν οὐσίαν τῶν ὑπὸ
μένην τοῦ ἑαυτῆς ἀεὶ καὶ ἀλλοιομενῆν ὑπὸ
tῶν ἑαυτῆς μορίον εἰς ἄλληλα δρώντων τε καὶ
πασχόντων. εἰ γὰρ ταῦθ’ ὑπὲθετο, χαλεπὸν οὐδὲν
ἡν τὴν τεχνικὴν ἐκείνην φύσιν ὁμολογῆσαι δύνα-
μεις ἔχειν ἐπισταστικῆς μὲν τῶν οἰκείων, ἀπο-
κριτικῆς δὲ τῶν ἄλλωτρων. οὐ γὰρ δι’ ἄλλο τί
γ’ ἦν αὐτὴ τὸ τεχνικὴ τ’ εἶναι καὶ τοῦ ζῴου
dιασωστικῆς καὶ τῶν νοσημάτων κριτικῆς παρά τὸ
προσίσεθαι μὲν καὶ φυλάττειν τὸ οἰκεῖον, ἀπο-
κρίνεις δὲ τὸ ἄλλοτριον.

Ἀλλ’ Ἀσκληπιάδης κάνταυθα τὸ μὲν ἀκόλου-
θον ταῖς ἄρχαις αἰσ ὑπέθετο συνείδειν, οὐ μὴν τὴν
γε πρὸς τὸ φαινόμενον ἐναργίας ἡδέσθη μάχην,
47 ἀλλ’ ὀμόσε || χωρεῖ καὶ περὶ τούτου πάσιν οὐκ
ιατροῖς μόνον ἄλλ’ ἡδη καὶ τοῖς ἄλλοις ἀνθρώποις

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1 Lit. aetiology. 2 Anadosis; cf. p. 62, note 1.
ON THE NATURAL FACULTIES, I. xiv

and draw the iron after them. So far, then, as his hypotheses regarding causation\(^1\) go, he is perfectly unconvincing; nevertheless, he does grant that there is an attraction. Further, he says that it is on similar principles that there occur in the bodies of animals the dispersal of nutriment\(^2\) and the discharge of waste matters, as also the actions of cathartic drugs.

Asclepiades, however, who viewed with suspicion the incredible character of the cause mentioned, and who saw no other credible cause on the basis of his supposed elements, shamelessly had recourse to the statement that nothing is in any way attracted by anything else. Now, if he was dissatisfied with what Epicurus said, and had nothing better to say himself, he ought to have refrained from making hypotheses, and should have said that Nature is a constructive artist and that the substance of things is always tending towards unity and also towards alteration because its own parts act upon and are acted upon by one another.\(^3\) For, if he had assumed this, it would not have been difficult to allow that this constructive nature has powers which attract appropriate and expel alien matter. For in no other way could she be constructive, preservative of the animal, and eliminative of its diseases,\(^4\) unless it be allowed that she conserves what is appropriate and discharges what is foreign.

But in this matter, too, Asclepiades realized the logical sequence of the principles he had assumed; he showed no scruples, however, in opposing plain fact; he joins issue in this matter also, not merely with all physicians, but with everyone else, and

\(^{1}\) cf. p. 45.  \(^{2}\) The *vis conservatrix et medicatrix Naturae.*
GALEN

οὔτε κρίσιν εἰναι τινα λέγων οὔθ' ἥμεραν κρίσιμον οὔθ' ὅλως οὐδέν ἐπὶ σωτηρία τοῦ ζῶου πραγμα-
tεύσασθαι τὴν φύσιν. ἀεὶ γὰρ τὸ μὲν ἀκολούθουν
φυλάττειν βούλεται, τὸ δ' ἐναργῶς φαινόμενον
ἀνατρέπειν ἐμπαλιν Ἑπικούρῳ. τιθεὶς γὰρ ἐκεῖνος
ἀεὶ τὸ φαινόμενον αἰτιάν αὐτοῦ ψυχρὰν ἀποδίδωσιν.
τὰ γὰρ ἀποπαλλόμενα σμικρὰ σώματα τῆς ἡρα-
κλείας λίθου τοιούτως ἐτέρως περιπλέκεσθαι μο-
ρίοις τοῦ σιδήρου κάπετα διὰ τῆς περιπλοκῆς
tαύτης μυδαμοῦ φαινομένης ἑπιστὰσθαι βαρείαν
οὔτως ύστεραν οὐκ οὐδὲ ὅπως ἄν τις πεισθῇ. καὶ
γὰρ εἰ τούτῳ συγχωρήσομεν, τὸ γε τῷ σιδήρῳ
πάλιν ἔτερον προστεθέν τι συνάπτεσθαι τὴν
αὐτὴν αἰτιάν οὐκέτι προστεθαί.

Τῇ γὰρ ἐροῦμε; ἢ δηλαδὴ τῶν ἀπορρεόντων
tῆς λίθου μορίων ἐνία μὲν προσκρούσαντα τῷ
σιδήρῳ πάλιν ἀποπάλλεσθαι καὶ ταύτα μὲν εἶναι,
δι' ὅν κρεμάνωνθαι συμβαίνει τὸν σιδηρόν, τὰ δ' εἰς αὐτὸν εἰσδινόμενα διὰ τῶν || κενών πόρων δι-
εξέρχεσθαι τάχιστα κἀπείτα τῷ παρακειμένῳ
σιδήρῳ προσκρούοντα μήτ' ἐκείνον διαδοῦνα δύ-
νασθαι, καὶ τοὺς τὸν πρώτον διαδύνατα, παλινδρο-
μοῦντα δ' αὖθις ἐπὶ τὸν πρότερον ἔτερας αὖθις
ἐργάζεσθαι ταῖς προτέραις ὁμοίαις περιπλοκάς;

Ἐναργῶς γὰρ ἐνταῦθα τὸ ληρόδες τῆς αἰτίας
ἐλέγχεται. γραφεῖα γούν οἶδα ποτε σιδηρὰ πέντε
cata τὸ συνεχὲς ἄλληλοις συναφθέντα, τοῦ πρῶ-
του μὲν μόνον τῆς λίθου ψαύσαντος, ἐξ ἑκείνου

1 cf. p. 61, note 3. The crisis or resolution in fevers was observed to take place with a certain regularity; hence arose the doctrine of “critical days.”

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maintains that there is no such thing as a crisis, or critical day,¹ and that Nature does absolutely nothing for the preservation of the animal. For his constant aim is to follow out logical consequences and to upset obvious fact, in this respect being opposed to Epicurus; for the latter always stated the observed fact, although he gives an ineffective explanation of it. For, that these small corpuscles belonging to the lodestone rebound, and become entangled with other similar particles of the iron, and that then, by means of this entanglement (which cannot be seen anywhere) such a heavy substance as iron is attracted—I fail to understand how anybody could believe this. Even if we admit this, the same principle will not explain the fact that, when the iron has another piece brought in contact with it, this becomes attached to it.

For what are we to say? That, forsooth, some of the particles that flow from the lodestone collide with the iron and then rebound back, and that it is by these that the iron becomes suspended? that others penetrate into it, and rapidly pass through it by way of its empty channels? ² that these then collide with the second piece of iron and are not able to penetrate it although they penetrated the first piece? and that they then course back to the first piece, and produce entanglements like the former ones?

The hypothesis here becomes clearly refuted by its absurdity. As a matter of fact, I have seen five writing-stylets of iron attached to one another in a line, only the first one being in contact with the

² These were hypothetical spaces or channels between the atoms; cf. Introduction, p. xiv.
Δ’ εἰς τάλλα τῆς δυνάμεως διαδοθείσης· καὶ οὐκ ἔστιν εἰπεῖν, ὡς, εἰ μὲν τῷ κάτω τοῦ γράφειον πέρατι προσάγως ἔτερον, ἔχεται τε καὶ συνάπτεται καὶ κρέμαται τὸ προσενεχθέν· εἰ δ’ ἀλλ’ τινὶ μέρει τῶν πλαγίων προσβείσας, οὐ συνάπτεται. πάντη γὰρ ὁμοίως ἡ τῆς λίθου διαδίδοται δύναμις, εἰ μόνον ἄψαυτο κατὰ τί τοῦ πρώτου γράφειον. καὶ μέντοι κακὸ τούτον πάλιν εἰς τὸ δεύτερον ὅλον ἢ δύναμις ἀμα νοηματί διαρρεί καὶ ἐκείνου πάλιν εἰς τὸ τρίτον ὅλον. εἰ δ’ ἰδίᾳς συμφιλάν τινα λίθου ἴρακλείαν ἐν ὁμοίῳ τινὶ κρεμαμένην, εἰτ’ ἐν κύκλῳ ψαύνοτα πάμπολλα σιδήρια κάκεινων πάλιν ἔτερα κάκεινων ἄλλα καὶ τούτ’ ἄρχοι πλεύ-σφος, ἀπαντά || δὴ ποὺ πίσπλασθαι δεῖ τὰ σιδήρια τῶν ἀπορρεόντων τῆς λίθου σωμάτων. καὶ κινδυνεύει διαφορεθήμαι τὸ σμικρὸν ἐκείνον λιθίθιον εἰς τὰς ἀπορροὰς διαλυθέν. καὶ τούτο, κἂν εἰ μηδὲν παρακάσων αὐτῷ σιδήριον, εἰς τὸν ἀέρα σκειδάνυ-νται, μᾶλιτ’ εἰ καὶ θερμὸς ὑπάρχω. 

Ναὶ, φησί, σμικρὰ γὰρ αὐτὰ χρῆ πάνω νοεῖν, ὡστε τῶν ἐμφερομένων τῷ ἀέρι ψηγμάτων τούτων δὴ τῶν σμικροτάτων ἐκείνων ἐνα μυριστόν εἰναι μέρος. εἰτ’ εἶ οὕτω σμικρῶν τολμᾶτε λέγειν κρεμάνυνθαι βάρη τηλικάτα σιδήρου; εἰ γὰρ ἔκαστον αὐτῶν μυριστόν ἐστι μέρος τῶν ἐν τῷ ἀέρι φερομένων ψηγμάτων, πηλίκου χρῆ νοῆσαι τὸ πέρας αὐτῶν τὸ ἀγκιστροεῖδες, ὁ περιπλέκεται πρὸς ἀλληλα; πάντως γὰρ δὴ ποὺ τούτο σμικρότατον ἐστιν ὅλον τοῦ ψῆγματος.

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1 He means the specific drawing power or faculty of the lodestone.  2 cf. our modern “radium-emanations.”
lodestone, and the power being transmitted through it to the others. Moreover, it cannot be said that if you bring a second stylet into contact with the lower end of the first, it becomes held, attached, and suspended, whereas, if you apply it to any other part of the side it does not become attached. For the power of the lodestone is distributed in all directions; it merely needs to be in contact with the first stylet at any point; from this stylet again the power flows, as quick as a thought, all through the second, and from that again to the third. Now, if you imagine a small lodestone hanging in a house, and in contact with it all round a large number of pieces of iron, from them again others, from these others, and so on,—all these pieces of iron must surely become filled with the corpuscles which emanate from the stone; therefore, this first little stone is likely to become dissipated by disintegrating into these emanations. Further, even if there be no iron in contact with it, it still disperses into the air, particularly if this be also warm.

"Yes," says Epicurus, "but these corpuscles must be looked on as exceedingly small, so that some of them are a ten-thousandth part of the size of the very smallest particles carried in the air." Then do you venture to say that so great a weight of iron can be suspended by such small bodies? If each of them is a ten-thousandth part as large as the dust particles which are borne in the atmosphere, how big must we suppose the hook-like extremities by which they interlock with each other to be? For of course this is quite the smallest portion of the whole particle.

3 cf. Ehrlich's hypothesis of "receptors" in explanation of the "affinities" of animal cells.
Εἰτα μικρὸν μικρῷ, κινούμενον κινούμενῷ περιπλακέν ὅκι εὐθὺς ἀποπάλλεται. καὶ γὰρ δὴ καὶ ἀλλ’, ἀττα πάντως αὐτοῖς, τὰ μὲν ἀνωθὲν, τὰ δὲ κάτωθεν, καὶ τὰ μὲν ἐμπροσθὲν, τὰ δ’ ὄπισθεν, τὰ δ’ ἐκ τῶν δεξιῶν, τὰ δ’ ἐκ τῶν ἀριστερῶν | 50 ἐκρηγνύμενα σείει τε καὶ βράττει καὶ μένειν ὅμικ ἡ. καὶ μέντοι καὶ πολλὰ χρή νοεῖν ἐξ ἀνάγκης ἐκαστὸν ἐκεῖνων τῶν σμικρῶν σωμάτων ἐχειν ἀγκιστρώδη πέρατα. δι’ ἐνὸς μὲν γὰρ ἀλλήλων συνάπτεται, δι’ ἐτέρου δ’ ἐνὸς τοῦ μὲν ὑπερκειμένου τῇ λίθῳ, τοῦ δ’ ὑποκειμένου τῷ σιδήρῳ. εἰ γὰρ ἄνω μὲν ἐξαφθείη τῆς λίθου, κάτω δὲ τῷ σιδήρῳ μὴ συμπλακείη, πλέον οὐδέν. ὡστε τοῦ μὲν ὑπερκειμένου τὸ ἄνω μέρος ἐκκρέμασθαι χρή τῆς λίθου, τοῦ δ’ ὑποκειμένου τῷ κάτω πέρατι συνήθθαι τῶν σίδηρον. ἐπεὶ δὲ κάκ τῶν πλαγίων ἀλλήλως περιπλέκεται, πάντως ποὺ κάνταυθα ἔχει τὰ ἀγκιστρα. καὶ μέμνησο μοι πρὸ πάντων, ὅπως ὑπα τὰ σμικρὰ τὰς τοιαύτας καὶ τοσαύτας ἀποφύγεις ἔχει. καὶ τούτου μᾶλλον ἔτι, πῶς ἴα τὸ δεύτερον σιδήρου συναφθῆ τῷ πρῶτῳ καὶ τῷ δευτέρῳ τὸ τρίτον κάκειν τὸ τέταρτον, ἀμα μὲν διεξέρχεσθαι χρὴ τοὺς πόρους ταυτὶ τὰ σμικρὰ καὶ ληφόδη ψήγματα, ἀμα δ’ ἀποπάλλεσθαι τοῦ μετ’ αὐτὸ | τεταγμένου, καίτοι κατὰ πᾶν ὅμοιον τῆν φύσιν ὑπάρχωντος.

Ὅδε γὰρ ἡ τοιαύτη πάλιν ὑπόθεσις ἀτολμος, ἀλλ’, εἰ χρῆ τάληθες εἰπεῖν, μακρῷ τῶν ἐμπροσθεν ἀναίσχυντοτέρα, πέντε σιδηρίων ὅμοιων ἀλλή-
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Then, again, when a small body becomes entangled with another small body, or when a body in motion becomes entangled with another also in motion, they do not rebound at once. For, further, there will of course be others which break in upon them from above, from below, from front and rear, from right and left, and which shake and agitate them and never let them rest. Moreover, we must perforce suppose that each of these small bodies has a large number of these hook-like extremities. For by one it attaches itself to its neighbours, by another—the topmost one—to the lodestone, and by the bottom one to the iron. For if it were attached to the stone above and not interlocked with the iron below, this would be of no use.¹ Thus, the upper part of the superior extremity must hang from the lodestone, and the iron must be attached to the lower end of the inferior extremity; and, since they interlock with each other by their sides as well, they must, of course, have hooks there too. Keep in mind also, above everything, what small bodies these are which possess all these different kinds of outgrowths. Still more, remember how, in order that the second piece of iron may become attached to the first, the third to the second, and to that the fourth, these absurd little particles must both penetrate the passages in the first piece of iron and at the same time rebound from the piece coming next in the series, although this second piece is naturally in every way similar to the first.

Such an hypothesis, once again, is certainly not lacking in audacity; in fact, to tell the truth, it is far more shameless than the previous ones; according

¹ i.e. from the point of view of the theory.
λοις ἐφεξῆς τεταγμένων διὰ τοῦ πρώτου διαδυ-μενα μᾶς ράδιως τῆς λίθου τὰ μόρια κατὰ τὸ δεύτερον ἀποπάλλεσθαι καὶ μὴ διὰ τοῦτον κατὰ τὸν αὐτὸν τρόπον ἐτοιμῶς διεξέρχεσθαι. καὶ μην ἐκατέρως ἀτοπον. εἰ μὲν γὰρ ἀποπάλλεται, πῶς εἰς τὸ τρίτον ὁκέως διεξέρχεται; εἰ δὲ οὐκ ἀποπάλλεται, πῶς κρεμάνυναι τὸ δεύτερον ἐκ τοῦ πρώτου; τὴν γὰρ ἀπόπαλσιν αὐτὸς ὑπέθετο δημιουργὸν τῆς ὀλκῆς.

'Αλλ', ὅπερ ἔφη, εἰς ἀδολεσχίαν ἀναγκαῖον ἐμπίπτειν, ἐπειδὰν τις τοιούτους ἀνδράς διαλέγη-ται. σύντομον οὖν τινα καὶ κεφαλαιώδη λόγον εἰπὼν ἀπαλλάττεσθαι βούλομαι. τοῖς Ἀσκλη-πιάδους γράμμασιν εἰ τις ἐπιμελῶς ὁμιλήσειε, τὴν τε πρὸς τὰς ἀρχὰς ἀκολουθίαν τῶν τοιοῦτων δογμάτων ἀκριβῶς ἄν ἐκμάθωι καὶ τὴν πρὸς τὰ φαινόμενα μάχην. ὁ μὲν οὖν Ἑπίκουρος τὰ 52 φαινόμενα φιλάττειν βουλόμενος ἀσχημονεῖ || φι-λοτιμούμενος ἐπιδεικνύειν αὐτὰ ταῖς ἀρχαῖς ὁμο-λογοῦντα. ὁ δ' Ἀσκληπιάδης τὸ μὲν ἀκόλουθον ταῖς ἀρχαῖς φιλάττει, τοῦ φαινομένου δ' οὐδὲν αὐτῷ μέλει. ὡστὶς οὖν βούλεται τὴν ἀτοπίαν ἔξελεγχει τῶν ὑπόθεσεων, εἰ μὲν πρὸς Ἀσκλη-πιάδην ὁ λόγος αὐτῷ γίγνοιτο, τῆς πρὸς τὸ φαινόμενον ὑπομμηνυσκέτω μάχης. εἰ δὲ πρὸς Ἑπίκουρον, τῆς πρὸς τὰς ἀρχὰς διαφωνίας. αἱ δ' ἄλλαι σχεδὸν αἱρέσεις αἱ τῶν ὁμοίων ἀρχῶν ἐχόμεναι τελῶς ἀπέσβησαν, αὐτὶ ἐς ἔτι μόνα διαρκοῦσιν οὐκ ἄγεννός. καίτοι τὰ μὲν Ἀσ-κληπιάδου Μηνόδοτος ὁ ἐμπειρικὸς ἀφύκτως ἔξελεγχει, τὴν τε πρὸς τὰ φαινόμενα μάχην ὑπο-μμηνυσκῶν αὐτὸν καὶ τὴν πρὸς ἄλληλα· τὰ δ' 80
to it, when five similar pieces of iron are arranged in a line, the particles of the lodestone which easily traverse the first piece of iron rebound from the second, and do not pass readily through it in the same way. Indeed, it is nonsense, whichever alternative is adopted. For, if they do rebound, how then do they pass through into the third piece? And if they do not rebound, how does the second piece become suspended to the first? For Epicurus himself looked on the rebound as the active agent in attraction.

But, as I have said, one is driven to talk nonsense whenever one gets into discussion with such men. Having, therefore, given a concise and summary statement of the matter, I wish to be done with it. For if one diligently familiarizes oneself with the writings of Asclepiades, one will see clearly their logical dependence on his first principles, but also their disagreement with observed facts. Thus, Epicurus, in his desire to adhere to the facts, cuts an awkward figure by aspiring to show that these agree with his principles, whereas Asclepiades safeguards the sequence of principles, but pays no attention to the obvious fact. Whoever, therefore, wishes to expose the absurdity of their hypotheses, must, if the argument be in answer to Asclepiades, keep in mind his disagreement with observed fact; or if in answer to Epicurus, his discordance with his principles. Almost all the other sects depending on similar principles are now entirely extinct, while these alone maintain a respectable existence still. Yet the tenets of Asclepiades have been unanswerably confuted by Menodotus the Empiricist, who draws his attention to their opposition to phenomena and to each other;
ΓΑΛΕΝ

'Επικούρου πάλιν ὁ Ἀσκληπιάδης ἐχόμενος ἀεὶ τῆς ἀκολουθίας, ὡς ἐκείνος οὐ πάνιν τι φαίνεται φροντίζων.

'Αλλ' οἱ νῦν ἀνθρωποί, πρὶν καὶ ταύτας ἐκμαθεῖν τὰς αἱρέσεις καὶ τὰς ἄλλας τὰς βελτίως κάπειτα χρόνῳ πολλῷ κρίναι τε καὶ βασανίσαι τὸ καθ' ἐκάστην αὐτῶν ἀληθές τε καὶ ψεύδος, οἱ μὲν ἰατροὶς ἔαντος, οἱ δὲ φιλοσόφοις ὀνομάζουσι μηδὲν εἰδότες. || οὐδὲν οὐν θαυμαστὸν ἐπίσης τοῖς ἀληθές τὰ ψευδή τετιμήθηκαί. ὅτω γὰρ ἐκαστὸς πρῶτῳ περιτύχῃ διδασκάλῳ, τοιοῦτος ἐγένετο, μὴ περιμένας μηδὲν ἔτι παρ' ἄλλου μαθεῖν. ἔνιοι δ' αὐτῶν, εἰ καὶ πλείοσιν ἐντύχομεν, ἀλλ' οὕτως ή εἰσὶν ἀσύνετοι τε καὶ βραδεῖς τὴν διάνοιαν, ὡστε καὶ γεγενήκατος οὔτω συνασιν ἀκολούθην λόγον. τὰλαί δὲ τοὺς τοιοῦτος ἐπὶ τὰς βαναύσους ἀπέλυνον τέχνας. ἀλλὰ ταῦτα μὲν ἐς ὁ τι τελευτήσει θεὸς οὐδὲν.

'Ημεῖς δ' ἐπειδὴ, καίτοι φεύγοντες ἀντιλέγειν τοῖς ἐν αὐταῖς ταῖς ἀρχαῖς εὐθὺς ἐσφαλμένοις, ὅμως ἡμαγκάσθημεν ὑπ' αὐτῆς τῶν πραγμάτων τῆς ἀκολουθίας εἰπεῖν τινα καὶ διαλεχθῆναι πρὸς αὐτοὺς, ἐτι καὶ τοῦτο προσθῆσομεν τοῖς εἰρημένοις, ὡς οὐ μόνον τὰ καθαίροντα φάρμακα πέφυκεν ἐπιστάσθαι τὰς οἰκείας ποιότητας ἀλλὰ καὶ τὰ τοὺς σκόλοπας ἀνάγοντα καὶ τὰς τῶν βελών ἀκίδας εἰς πολὺ βάθος σαρκὸς ἐμπεπαρμένας ἐνίοτε. καὶ μέντοι καὶ ὁσα τοὺς ἱοὺς τῶν θηρίων ἢ τοὺς ἐμπεφαρμαγμένους τοῖς βέλεσιν ἀνέλκει, καὶ ταῦτα τὴν αὐτὴν ταῖς ἱρακλείαις 54 λίθοις ἐπὶ δείκνυται δύναμιν. ἔγωγ' οὖν οἶδα ποτὲ καταπεπαρμένου ἐν ποδὶ νεανίσκον σκόλοπα τοῖς 82
and, again, those of Epicurus have been confuted by Asclepiades, who adhered always to logical sequence, about which Epicurus evidently cares little.

Now people of the present day do not begin by getting a clear comprehension of these sects, as well as of the better ones, thereafter devoting a long time to judging and testing the true and false in each of them; despite their ignorance, they style themselves, some "physicians" and others "philosophers." No wonder, then, that they honour the false equally with the true. For everyone becomes like the first teacher that he comes across, without waiting to learn anything from anybody else. And there are some of them, who, even if they meet with more than one teacher, are yet so unintelligent and slow-witted that even by the time they have reached old age they are still incapable of understanding the steps of an argument. . . . In the old days such people used to be set to menial tasks. . . . What will be the end of it God knows!

Now, we usually refrain from arguing with people whose principles are wrong from the outset. Still, having been compelled by the natural course of events to enter into some kind of a discussion with them, we must add this further to what was said—that it is not only cathartic drugs which naturally attract their special qualities, but also those which remove thorns and the points of arrows such as sometimes become deeply embedded in the flesh. Those drugs also which draw out animal poisons or poisons applied to arrows all show the same faculty as does the lodestone. Thus, I myself have seen a thorn which was embedded in a young man's foot fail to

\[1\] cf. p. 69, note 2.
μὲν δακτύλοις ἐλκουσίν ἡμῖν βιαίως οὐκ ἀκολούθησαντα, φαρμάκου δὲ ἐπιτεθέντος ἄλωτος τε καὶ διὰ ταχέων ἀνελθόντα. καίτοι καὶ πρὸς τοῦτο τινας ἀντιλέγουσι φάσκοντες, ὅταν ἡ φλεγμονὴ λυθῇ τοῦ μέρους, αὐτόματον ἐξείναι τὸν σκόλοπα πρὸς οὐδενὸς ἀνελκόμενον. ἀλλ' οὗτοι γε πρωτο- τον μὲν ἄγνοεῖν ἐοίκασιν, ὡς ἀλλα μὲν ἐστὶ φλεγμονῆς, ἀλλὰ δὲ τῶν οὕτω καταπεπαρμένων ἐλκτικὰ φάρμακα· καίτοι γ' εἴπερ ἀφλεγμάντων γενομένων ἐξεκρίνετο τὰ παρὰ φύσιν, ὡς φλεγμονῆς ἐστὶ λυτικά, ταύτ' εὐθὺς ἀν ἦν κακείων ἐλκτικά.

Δεύτερον δ', δ καὶ μᾶλλον ἃν τις θαυμάσσειν, ὡς οὐ μόνον ἀλλὰ μὲν τοὺς σκόλοπας, ἀλλὰ δὲ τοὺς ίοὺς ἐξάγει φάρμακα, ἀλλὰ καὶ αὐτῶν τῶν τοὺς ίοὺς ἐλκόντων τὰ μὲν τὸν τῆς ἐχίδνης, τὰ δὲ τὸν τῆς τρυγόνος, τὰ δ' ἄλλου τινὸς ἐπισταται καὶ σαφῶς ἐστὶν ἰδεῖν τοῖς φαρμάκοις ἐπικει- μένους αὐτοὺς. ἐνταῦθ' οὖν Ἐπίκουρου μὲν ἐπαινεῖν χρὴ τῆς πρὸς τὸ φαινόμενον αἴδοσ, μέμφεσθαι δὲ τὸν λόγον τῆς αἰτίας. ὅν γὰρ ἡμεῖς ἐλκοντες τοῖς δακτύλοις οὐκ ἀνηγάγομεν σκόλοπα, τούτον υπὸ τῶν σμικρῶν ἐκείων ἀνελ- κεσθαι ψηγμάτων, πῶς οὖν παντάπασιν ἀτοπον εἰναι χρὴ νομίζειν;

*Ἀρ' οὖν ἦδη πεπείσμεθα τῶν δυτῶν ἑκάστῳ δύσαμίν τιν' ὑπάρχειν, ἢ τὴν οἰκείαν ἐλκεὶ ποιήσῃ, τὸ μὲν μᾶλλον, τὸ δ' ἦττον;

*Ἡ καὶ τὸ τῶν πυρῶν ἐτὸ παράδειγμα προ-

1 That is to say, the two properties should go together in all cases—which they do not.

2 Trygon pastinaca.

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come out when we exerted forcible traction with our fingers, and yet come away painlessly and rapidly on the application of a medicament. Yet even to this some people will object, asserting that when the inflammation is dispersed from the part the thorn comes away of itself, without being pulled out by anything. But these people seem, in the first place, to be unaware that there are certain drugs for drawing out inflammation and different ones for drawing out embedded substances; and surely if it was on the cessation of an inflammation that the abnormal matters were expelled, then all drugs which disperse inflammations ought, _ipso facto_, to possess the power of extracting these substances as well.

And secondly, these people seem to be unaware of a still more surprising fact, namely, that not merely do certain medicaments draw out thorns and others poisons, but that of the latter there are some which attract the poison of the viper, others that of the sting-ray, and others that of some other animal; we can, in fact, plainly observe these poisons deposited on the medicaments. Here, then, we must praise Epicurus for the respect he shows towards obvious facts, but find fault with his views as to causation. For how can it be otherwise than extremely foolish to suppose that a thorn which we failed to remove by digital traction could be drawn out by these minute particles?

Have we now, therefore, convinced ourselves that everything which exists possesses a faculty by which it attracts its proper quality, and that some things do this more, and some less?

Or shall we also furnish our argument with the

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3 _cf_. p. 66, note 3.
χειρισόμεθα τῷ λόγῳ; φανήσουται γὰρ οἷμαι καὶ τῶν γεωργῶν αὐτῶν ἀμαθέστεροι περὶ τὴν φύσιν οἱ μηδὲν ὅλως ὑπὸ μηδενὸς ἐλκεσθαὶ συγχωροῦντες ὅσ ἔγωγε πρῶτον μὲν ἀκούσας τὸ γιγνόμενον ἐθαύμασα καὶ αὐτὸς ἡβουλήθην αὐτόπτης αὐτοῦ καταστήναι. μετὰ ταῦτα δὲ, ὡς καὶ τὰ τῆς πείρας ὀμολόγει τὴν αἰτίαν σκοπούμενος ἐν παμπόλλῳ χρόνῳ κατὰ πάσας τὰς αἱρέσεις οὐδεμίαν ἄλλην εὑρέθην οἷος τ' ἦν οὐδ' ἀχρὶ τοῦ πιθανοῦ προϊόσαν ἄλλα καταγελάστους τε καὶ σαφῶς ἐξελεγχομένας τὰς ἄλλας ἀπάσας πλην τῆς τὴν ὀλκήν πρεσβευούσης.

'Εστι δὲ τὸ γιγνόμενον τοιόνδε. κατακομβή-ζοντες οἱ παρ’ ἡμῖν γεωργοὶ τοὺς ἐκ τῶν ἁγρῶν πυροῦς εἰς τὴν πόλιν ἐν ἀμάξιας τισίν, ὅταν ύφελέσθαι βουληθῶσιν, ὥστε μὴ φωραθῆναι, κεράμι ἀττα πληρώσαντες ὅδατος μέσους αὐτοῖς ἐνιστάσιν. ἐλκοντες οὖν ἐκείνοι διὰ τοῦ κεραμίου τὸ ὠρόν εἰς αὐτοὺς ὄγκον μὲν καὶ βάρος προσκέτωνται, κατάδηλοι δ' οὐ πάνυ γίγνονται τοῖς ὀρῶσιν, εἰ μὴ τις προπεπυσμένος ἢδη περιεργότερον ἐπισκοποῦτο. καίτοι γ' εἰ βουληθείσης ἐν ἥλιῳ καταθεῖναι πάνυ θρμῆς ταῦτον ἀγγείον, ἐλάχιστον παντελῶς εὐρήσεις τὸ δαπανώμενον ἐφ' ἐκάστης ἓμερας. ὅτως ἄρα καὶ τῆς ἡλιακῆς θερμασίας τῆς σφοδρᾶς ἵσχυρότεραν οἱ πυροὶ δύσαμιν ἔχουσιν ἐλκείν εἰς εαυτοὺς τὴν πλησιάζουσαν ὑγρότητα. λέγος οὖν ἐνταῦθα μακρὸς ἢ πρὸς τὸ λεπτομέρες φορὰ τοῦ περιήχοντος ἕμας ἀέρος καὶ μάλιστ' ὅταν ἰκανῶς ἢ θερμός,

1 The way that corn can attract moisture.
ON THE NATURAL FACULTIES, I. xiv

illustration afforded by corn?¹ For those who refuse to admit that anything is attracted by anything else, will, I imagine, be here proved more ignorant regarding Nature than the very peasants. When, for my own part, I first learned of what happens, I was surprised, and felt anxious to see it with my own eyes. Afterwards, when experience also had confirmed its truth, I sought long among the various sects for an explanation, and, with the exception of that which gave the first place to attraction, I could find none which even approached plausibility, all the others being ridiculous and obviously quite untenable.

What happens, then, is the following. When our peasants are bringing corn from the country into the city in wagons, and wish to filch some away without being detected, they fill earthen jars with water and stand them among the corn; the corn then draws the moisture into itself through the jar and acquires additional bulk and weight, but the fact is never detected by the onlookers unless someone who knew about the trick before makes a more careful inspection. Yet, if you care to set down the same vessel in the very hot sun, you will find the daily loss to be very little indeed. Thus corn has a greater power than extreme solar heat of drawing to itself the moisture in its neighbourhood.² Thus the theory that the water is carried towards the rarefied part of the air surrounding us³ (particularly when that is distinctly warm) is utter nonsense; for although it is

² Specific attraction of the "proper" quality; cf. p. 85, note 3.
³ Theory of evaporation insufficient to account for it. cf. p. 104, note 1.
πολὺ μὲν ὑπάρχοντος ἢ κατὰ τοὺς πυροῦς λεπτο-
μερεστέρου, δεχομένου δ' οὐδὲ τὸ δέκατον μέρος
τῆς εἰς ἐκεῖνον μεταλαμβανόμενης ὑγρότητος.

XV

Ἐπεὶ δ' ἰκανῶς ἠδολεσχήσαμεν οὐχ ἐκόντες,
ἀλλ', ὡς ἡ παροιμία φησί, μαυνομένοις ἀναγ-
κασθέντες συμμανήναι, πάλιν ἐπὶ τὴν τῶν οὐρῶν
ἐπανέλθωμεν διάκρισιν, ἐν ἡ τῶν μὲν Ἀσκλη-
πιάδου λύρων ἐπιλαθόμεθα, μετὰ δὲ τῶν πε-
πεισμένων διηθείσαι τὰ οὕρα διὰ τῶν νεφρῶν,
tίς ὁ τρόπος τῆς ἐνεργείας ἐστίν, ἐπισκεψόμεθα:
πάντως γὰρ ἡ εξ αὐτῶν ἐπὶ τοὺς νεφροὺς φέρεται
tὰ οὕρα τούτο βέλτιον εἶναι νομίζοντα, καθάπερ
ἡμεῖς, ὅποταν εἰς τὴν ἄγοραν ἀπλώμεν· ἢ, εἰ τούτ'
ἀδύνατον, ἑτερὸν τὴ χρή τῆς φορᾶς αὐτῶν ἐξευρεῖν
αὐτίων. τι δὴ τούτ' ἐστιν· εἰ γὰρ μὴ τοὺς νεφροῖς
δώσομεν τινα δύναμιν ἐλκτικήν τῆς τοιαύτης
ποιότητος, ὡς Ἰπποκράτης ἐνόμιζεν, οὐδὲν ἑτερὸν
ἐξευρήσομεν. ὅτι μὲν γὰρ ἦτοι τούτους ἐλκεῖν
αὐτὸ προσήκειν ἢ τὰς φλέβας πέμπειν, εὔπερ γε μὴ
ἐξ ἑαυτοῦ φέρεται, παντὶ που δῆλον. ἀλλ' εἰ μὲν
αἱ φλέβες περιστελλόμεναι προσωθοῖς, οὐκ ἐκεῖνο
μόνον, ἀλλὰ σὺν αὐτῷ καὶ τὸ πᾶν αἴμα τὸ
περιεχόμενον ἐν ἑαυταῖς εἰς τοὺς νεφροὺς ἐκ-
θλίψουσιν εἰ δὲ τούτ' ἀδύνατον, ὡς δείξομεν,
λείπεται τοὺς νεφροὺς ἐλκεῖν.
ON THE NATURAL FACULTIES, I. xiv.–xv

much more raresied there than it is amongst the corn, yet it does not take up a tenth part of the moisture which the corn does.

XV

Since, then, we have talked sufficient nonsense—not willingly, but because we were forced, as the proverb says, “to behave madly among madmen”—let us return again to the subject of urinary secretion. Here let us forget the absurdities of Asclepiades, and, in company with those who are persuaded that the urine does pass through the kidneys, let us consider what is the character of this function. For, most assuredly, either the urine is conveyed by its own motion to the kidneys, considering this the better course (as do we when we go off to market!), or, if this be impossible, then some other reason for its conveyance must be found. What, then, is this? If we are not going to grant the kidneys a faculty for attracting this particular quality, as Hippocrates held, we shall discover no other reason. For, surely everyone sees that either the kidneys must attract the urine, or the veins must propel it—if, that is, it does not move of itself. But if the veins did exert a propulsive action when they contract, they would squeeze out into the kidneys not merely the urine, but along with it the whole of the blood which they contain. And if this is impossible, as we shall show, the remaining explanation is that the kidneys do exert traction.

1 Playful suggestion of free-will in the urine.
2 Specific attraction. cf. p. 87, note 2.
3 i.e. there would be no selective action.
GALEN

Πῶς οὖν ἀδύνατον τοῦτο; τῶν νεφρῶν ἡ θέσις ἀντιβαίνει. οὐ γὰρ δὴ οὕτω γ' ύπόκεινται τῇ
κούλῃ φλεβί || καθάπερ τοῖς ἐξ ἐγκεφάλου
περιττώμασιν ἐν τῇ ρινῇ καὶ κατὰ τὴν υπερφάνοις
οἱ τοῖς ἠθμοῖς ὁμοίοι πόροι, ἀλλ' ἐκατέρωθεν
αὐτῆς παράκεινται. καὶ μὴν, εἰτερ ὁμοίως τοῖς
ἡθμοῖς ὅσον ἂν ἦ λεπτότερον καὶ τελέως ὀρρῶδες,
tοῦτο μὲν ἐτοίμως διαπέμπουσι, τὸ δὲ παχύτερον
ἀποστέγουσι, ἀπαν ἐπ' αὐτούς ἵναι χρὴ τὸ
ἀίμα τὸ περιεχόμενον ἐν τῇ κούλῃ φλεβί, καθάπερ
εἰς τοὺς τρυγητοὺς ὁ πᾶς όνος ἐμβάλλεται. καὶ
μὲν γε καὶ τὸ τοῦ γαλακτος τοῦ τυρουμένου
παράδειγμα σαφῶς ἂν, ὁ βούλομαι λέγειν,
ἐνδείξαιτο. καὶ γὰρ καὶ τοῦτο πᾶν ἐμβληθὲν
εἰς τοὺς ταλάρους οὐ πᾶν διηθεῖται, ἀλλ' ὅσον
μὲν ἂν ἦ λεπτότερον τῆς εὐρύτητος τῶν πλοκά-
μων, εἰς τὸ κάταντες φέρεται καὶ τοῦτο μὲν
ὁρρὸς ἐπονομάζεται. τὸ λοιπὸν δὲ τὸ παχὺ τὸ
μέλλον ἐσεσθαι τυρός, ὅς ἂν οὐ παραδεχομένων
αὐτὸ τῶν ἐν τοῖς ταλάροις πόρων, οὐ διεκπέμπει
cάτω. καὶ τοῖνυν, εἰτερ οὕτω μέλλει διηθείσθαι
tῶν νεφρῶν ὁ τοῦ αἵματος ὁρρός, ἀπαν ἐπ'
αὐτούς Ἰκειν χρή τὸ αίμα καὶ μὴ τὸ μὲν ναὶ, τὸ
δ' οὐ. ||

Πῶς οὖν ἐχεῖ τὸ φαινόμενον ἐκ τῆς ἀνατομῆς;
Τὸ μὲν ἐτερον μέρος τῆς κούλης ἄνω πρὸς τὴν
καρδίαν ἀναφέρεται, τὸ λοιπὸν δ' ἐπιβαίνει τῇ
ῥάχει καθ' ὅλης αὐτῆς ἐκτεινόμενον ἄχρι τῶν
σκελῶν, ὥστε τὸ μὲν ἐτερον οὐδ' ἐγγὺς ἀφικνεῖται

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1 Nasal mucus was supposed to be the non-utilizable part of the nutriment conveyed to the brain. cf. p. 214, note 3.

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And how is propulsion by the veins impossible? The situation of the kidneys is against it. They do not occupy a position beneath the hollow vein [vena cava] as does the sieve-like [ethmoid] passage in the nose and palate in relation to the surplus matter from the brain;\(^1\) they are situated on both sides of it. Besides, if the kidneys are like sieves, and readily let the thinner serous [whey-like] portion through, and keep out the thicker portion, then the whole of the blood contained in the vena cava must go to them, just as the whole of the wine is thrown into the filters. Further, the example of milk being made into cheese will show clearly what I mean. For this, too, although it is all thrown into the wicker strainers, does not all percolate through; such part of it as is too fine in proportion to the width of the meshes passes downwards, and this is called whey [serum]; the remaining thick portion which is destined to become cheese cannot get down, since the pores of the strainers will not admit it. Thus it is that, if the blood-serum has similarly to percolate through the kidneys, the whole of the blood must come to them, and not merely one part of it.

What, then, is the appearance as found on dissection?

One division of the vena cava is carried upwards\(^2\) to the heart, and the other mounts upon the spine and extends along its whole length as far as the legs; thus one division does not even come near the

\(^2\) He means from its origin in the liver (i.e. in the three hepatic veins). His idea was that the upper division took nutriment to heart, lungs, head, etc., and the lower division to lower part of body. On the relation of right auricle to vena cava and right ventricle, cf. p. 321, notes 4 and 5.
τῶν νεφρῶν, τὸ λοιπὸν δὲ πλησιάζει μὲν, οὐ μὴν εἰς αὐτούς γε καταφύεται. ἔχρην δ', εἰπερ ἐμελλεν ὡς δ' ἡθμῶν αὐτῶν καθαρθήσεσθαι τὸ αἷμα, πάν ἐμπίπτειν εἰς αὐτοὺς κατεῖτα κάτω μὲν φέρεσθαι τὸ λεπτὸν, ἵσχεσθαι δ' ἂνω τὸ παχύν. νυνὶ δ' οὖχ οὕτως ἔχει: πλάγιοι γὰρ ἐκατέρωθεν τῆς κούλης φλεβὸς οἱ νεφροὶ κεῖνται. οὖκον ὡς ἡθμὸν διηθοῦσιν, πεπούσης μὲν ἑκείνης, αὐτὸι δ' οὐδεμιᾶν εἰσφερόμενοι δύναμιν, ἀλλ' ἐλκουσί δηλούστι τούτῳ γὰρ ἐτι λείπεται.

Πῶς οὖν ἐλκουσίν; εἰ μὲν, ὡς Ἑπίκουρος οῖεται τὰς ὀλκὰς ἀπάσας γίγνεσθαι κατὰ τὰς τῶν ἀτόμων ἀποτάλσεις τε καὶ περιπλοκάς, ἁμείνων ἢν οὕτως εἶπείν αὐτοὺς μηδ' ἐλκεῖν ὅλως: πολὺ γὰρ ἂν οὐτὸ γε τῶν ἐπὶ τῆς ἡρακλείας λίθου μικρὸν πρόσθεν εἰρημένων ὁ λόγος ἐξεταζόμενος εὑρεθεῖν γελοιότερος· ἀλλ' ὡς Ἰπποκράτης ἦθβουλετο. λεχθῆσται δὲ σαφέστερον ἐτὶ προῆκοντι τῷ λόγῳ. νυνὶ γὰρ οὐ τούτο πρόκειται διδάσκειν, ἀλλ' ὡς οὔτ' ἀλλ' τὶ δυνατὸν εἶπείν αὐτίον εἰναι τῆς τῶν οὐρῶν διακρίσεως πλὴν τῆς ὀλκῆς τῶν νεφρῶν οὐθ' οὕτω γίγνεσθαι τὴν ὀλκήν, ὡς οἱ μηδεμιᾶν οἰκεῖαν διδόντες τῇ φύσει δύναμιν οὕτωσι γίγνεσθαι.

Τούτου γὰρ ὀμολογηθέντος, ὡς ἐστιν ὅλως τις ἐν τοῖς ὑπὸ φύσεως διοικούμενοι δύναμις ἐλκτικὴ, ληρώδης νομίζουτ' ἄν δ' ἀναδόσεως τροφῆς ἀλλ' τι λέγειν ἐπιχειρῶν.

1 We arrive at our belief by excluding other possibilities.
2 i.e. the mechanistic physicists. cf. pp. 45–47.
3 cf. p. 85, note 3.
'kidneys, while the other approaches them but is certainly not inserted into them. Now, if the blood were destined to be purified by them as if they were sieves, the whole of it would have to fall into them, the thin part being thereafter conveyed downwards, and the thick part retained above. But, as a matter of fact, this is not so. For the kidneys lie on either side of the vena cava. They therefore do not act like sieves, filtering fluid sent to them by the vena cava, and themselves contributing no force. They obviously exert traction; for this is the only remaining alternative.

How, then, do they exert this traction? If, as Epicurus thinks, all attraction takes place by virtue of the \textit{rebounds} and \textit{entanglements} of atoms, it would be certainly better to maintain that the kidneys have no attractive action at all; for his theory, when examined, would be found as it stands to be much more ridiculous even than the theory of the lodestone, mentioned a little while ago. Attraction occurs in the way that Hippocrates laid down; this will be stated more clearly as the discussion proceeds; for the present our task is not to demonstrate this, but to point out that no other cause of the secretion of urine can be given except that of attraction by the kidneys,\footnote{The subject of \textit{anadosis} is taken up in the next chapter. \textit{cf.} also p. 62, note 1.} and that this attraction does not take place in the way imagined by people who do not allow Nature a faculty of her own.\footnote{\textit{Anadosis} is a Greek term for the absorption of fluid into the blood stream.}

For if it be granted that there is any attractive faculty at all in those things which are governed by Nature,\footnote{A person who attempted to say anything else about the absorption of nutriment would be considered a fool.} a person who attempted to say anything else about the absorption of nutriment would be considered a fool.
Ερασίστρατος δ' οὖν οἶδ' ὅπως ἑτέραις μὲν τισι δόξαις ευθέως ἀντεῖπε διὰ μακρῶν, ὑπερέβη δὲ τελέως τὴν Ἰπποκράτους, οὔθ' ἄχρι τοῦ μνημονεύσαι μόνον αὐτῆς, ὡς ἐν τοῖς περὶ καταπόσεως ἐποίησεν, ἀξιώσας. ἐν ἐκείνοις μὲν γὰρ ἄχρι τοσοῦτον φαίνεται μνημονεύσων, ὡς τούνομ' εἰπεῖν τῆς ὁλκής μόνον ὁδὲ πῶς γράφων;

"Ολκή μὲν ὅν τῆς κοιλίας οὐδεμία φαίνεται εἶναι" περὶ δὲ τῆς ἀναδόσεως τῶν λόγων ποιούμενοι οὖθ' ἄχρι συλλαβῆς μᾶς ἐμμονεύσει τῆς Ἰπποκρατείου δόξης. καίτοι γ' ἐπήρκεσεν ἀν ἡμῖν, εἰ καὶ τοῦτ' ἔγραψε μόνον, ὡς Ἰπποκράτης εἰπὼν "Σάρκες ὅλκοι καὶ ἐκ κοιλίας καὶ ἐξωθέν" ψεύδεται· οὔτε γὰρ ἐκ τῆς κοιλίας οὔτ' ἐξωθέν ἐλκεῖν δύνανται. εἰ δὲ καὶ ὁτι μήτρας αἰτιώμενος ἀρρωστόν αὐχένα κακῶς εἴπευν "Οὐ γὰρ δύναται αὐτές ὁ στόμαχος εἰρύσαι τὴν γονήν," ἢ εἰ καὶ τι τοιοῦτον ἄλλο γράφειν ο Ἐρασίστρατος ἄξιότερος, τότ' ἄν καὶ ἡμέως πρὸς αὐτῶν ἀπολογούμενοι εἴπομεν

Ω γενναίε, μὴ ῥητορικῶς ἡμῶν κατάτρεχε χώρις ἀποδείξεως, ἀλλ' εἰπέ τινα κατηγορίαν τοῦ δόγματος, ὅτι δὲ πεισθῶμεν σοι ὡς καλῶς ἐξέλεγχοντι τὸν παλαιὸν λόγον ἡ μεταπείσωμεν

1 On Erasistratus v. Introd. p. xii. His view that the stomach exerts no holké, or attraction, is dealt with more fully in Book III., chap. viii.
ON THE NATURAL FACULTIES, I. xvi

XVI

Now, while Erasistratus for some reason replied at great length to certain other foolish doctrines, he entirely passed over the view held by Hippocrates, not even thinking it worth while to mention it, as he did in his work "On Deglutition"; in that work, as may be seen, he did go so far as at least to make mention of the word attraction, writing somewhat as follows:

"Now, the stomach does not appear to exercise any attraction." But when he is dealing with anadosis he does not mention the Hippocratic view even to the extent of a single syllable. Yet we should have been satisfied if he had even merely written this: "Hippocrates lies in saying 'The flesh attracts both from the stomach and from without,' for it cannot attract either from the stomach or from without." Or if he had thought it worth while to state that Hippocrates was wrong in criticizing the weakness of the neck of the uterus, "seeing that the orifice of the uterus has no power of attracting semen," or if he [Erasistratus] had thought proper to write any other similar opinion, then we in our turn would have defended ourselves in the following terms:

"My good sir, do not run us down in this rhetorical fashion without some proof; state some definite objection to our view, in order that either you may convince us by a brilliant refutation of the ancient doctrine, or that, on the other hand, we may convert you from your ignorance." Yet why do I

\[2\] i.e. the tissues. \[3\] cf. p. 291.

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ός ἀγνοοῦντα. καίτοι τί λέγω ῥητορικὸς; μὴ γάρ, ἐπειδή τινες τῶν ῥητόρων, ἀ μάλιστ' ἀδυνατούσι διαλύεσθαι, ταῦτα διαγελάσαντες οὐδ' ἐπιχειροῦσιν ἀντιλέγειν, ἦδη ποὺ τοῦτο καὶ ἡμεῖς ἡγόμεθ' εἶναι τὸ ῥητορικὸς το γάρ διὰ λόγου πιθανοῦ ἔστι τὸ || ῥητορικὸς τὸ δ' ἀνευ λόγου βωμολοχικὸν, οὐ ῥητορικὸν. οὐκοῦν οὔτε ῥητορικὸς οὔτε διαλεκτικὸς ἀντεῖπεν ὁ Ἑρασίστρατος ἐν τῷ περὶ τῆς καταπόσεως λόγῳ. τί γάρ φησιν; "Ὅλη μὲν οὖν τῆς κοιλίας οὐδεμία φαίνεται εἶναι." πάλιν οὖν αὐτῷ παρ' ἡμῶν ἀντιμαρτυρῶν ὁ αὐτὸς λόγος ἀντιπαραβαλλέσθω περιστολῇ μὲν οὖν τοῦ στομάχου οὐδεμία φαίνεται εἶναι. καὶ πῶς οὐ φαίνεται; τὰχ' ἀν ἵσως εἶπο τὸν ἀπ' αὐτοῦ τὸ γάρ ἀεὶ τὸν ἀνωθεν αὐτοῦ μερὸν συστελλομένων διαστέλλεσθαι τὰ κάτω πῶς ούκ ἔστι τῆς περιστολῆς ἐνδεικτικόν; αὕτης οὖν ἡμεῖς, καὶ πῶς οὐ φαίνεται, φήσομεν ἡ τῆς κοιλίας ὀλκή; τὸ γάρ ἀεὶ τὸν κάτωθεν μερὸν τοῦ στομάχου διαστελλομένων συστελλεῖσθαι τὰ ἀνω πῶς οὐκ ἔστι τῆς ὀλκῆς ἐνδεικτικόν; εἰ δὲ σωμφονησεῖ συνεπει καὶ γνοὺς τὸ φαινόμενον τούτῳ μηδὲν μᾶλλον τῆς ἐτέρας τῶν δοξῶν ὑπάρχειν ἐνδεικτικὸν ἀλλ' ἀμφοτέρων εἶναι κοινῶν, οὕτως ἂν ἦδη δείξαμεν αὐτῷ τὴν ὀρθήν ὅδον τῆς τοῦ ἀληθοῦς εὑρέσεως.

'Ἀλλὰ περὶ μὲν τῆς κοιλίας αὐθίς. ἦ δὲ τῆς τροφῆς ἀνάδοσις οὐδὲν δεῖται || τῆς πρὸς τὸ κενούμενον ἀκολουθίας ἀπαξ γε τῆς ἐλκτικῆς δυνάμεως
say "rhetorical"? For we too are not to suppose that when certain rhetoricians pour ridicule upon that which they are quite incapable of refuting, without any attempt at argument, their words are really thereby constituted rhetoric. For rhetoric proceeds by persuasive reasoning; words without reasoning are buffoonery rather than rhetoric. Therefore, the reply of Erasistratus in his treatise "On Deglutition" was neither rhetoric nor logic. For what is it that he says? "Now, the stomach does not appear to exercise any traction." Let us testify against him in return, and set our argument beside his in the same form. Now, there appears to be no peristalsis of the gullet. "And how does this appear?" one of his adherents may perchance ask. "For is it not indicative of peristalsis that always when the upper parts of the gullet contract the lower parts dilate?" Again, then, we say, "And in what way does the attraction of the stomach not appear? For is it not indicative of attraction that always when the lower parts of the gullet dilate the upper parts contract?" Now, if he would but be sensible and recognize that this phenomenon is not more indicative of the one than of the other view, but that it applies equally to both, we should then show him without further delay the proper way to the discovery of truth.

We will, however, speak about the stomach again. And the dispersal of nutriment [anadosis] need not make us have recourse to the theory regarding the

1 Peristalsis may be used here to translate Gk. peristolé, meaning the contraction and dilation of muscle-fibres circularly round a lumen. cf. p. 263, note 2.

2 For a demonstration that this phenomenon is a conclusive proof neither of peristolé nor of real vital attraction, but is found even in dead bodies v. p. 267.
ΓΑΛΕΝ

ἐπὶ τῶν νεφρῶν ὠμολογημένης, ἣν καὶ τοι πάνυ σαφῶς ἄληθῆ γυνώσκων ὑπάρχειν ὁ 'Ερασί-στρατος οὗτ' ἐμνημόνευσεν οὗτ' ἀντείπειν οὐθ' ὀλος ἀπεφήνατο, τίν' ἔχει δόξαν ὑπὲρ τῆς τῶν οὖρων διακρίσεως.

*Η διὰ τὰ προειπὼν εὐθὺς κατ' ἄρχας τῶν καθ' ὄλου λόγου, ὡς ὑπὲρ τῶν φυσικῶν ἐνεργειῶν ἔρει, πρῶτον τίνες τ' εἰσὶ καὶ πῶς γίγνονται καὶ διὰ τίνων τόπων, ἐπὶ τῆς τῶν οὖρων διακρίσεως, ὅτι μὲν διὰ νεφρῶν, ἀπεφήνατο, τὸ δ' ὅπως γίγνεται παρέλπη; μάτην οὖν ἡμᾶς καὶ περὶ τῆς πέψεως ἐδίδαξεν, ὅπως γίγνεται, καὶ περὶ τῆς τοῦ χολῶ-

dous περιττώματος διακρίσεως κατατρίβει. ἦρκει

γὰρ εἰπεῖν κάνταυθα τὰ μόρια, δι' ὅν γίγνεται, τὸ δ' ὅπως παραλιπεῖν. ἄλλα περὶ μὲν ἐκείνων εἰχε

λέγειν, οὐ μόνον δι' ὅν ὀργάνων ἄλλα καὶ καθ' ὄντων γίγνεται τρόπον, ὡσπερ ὁμαι καὶ περὶ τῆς ἀναδόσεως· οὐ γὰρ ἦρκεσεν εἰπεῖν αὐτῷ μόνου, ὅτι διὰ φλεβῶν, ἄλλα καὶ πῶς ἔπεξήλθεν, ὅτι τῇ

πρὸς τὸ κενούμενον ἀκολουθία· περὶ δὲ τῶν 

οὖρων τῆς διακρίσεως, ὅτι μὲν διὰ νεφρῶν γίγνε- 

tαι, γράφει, τὸ δ' ὅπως οὐκέτι προστίθεσιν. οὐδὲ γὰρ οἶμαι τῇ πρὸς τὸ κενούμενον ἀκολουθία ἢν εἰπεῖν· οὗτο γὰρ ἀν ὀὐδεὶς ὑπ' ἱσχουρίας ἀπέθανεν οὐδέποτε μὴ δυναμένου πλείονος ἐπιρ-

1 This was Erasistratus's favourite principle, known in Latin as the "horror vacui" and in English as "Nature's abhorrence of a vacuum," although these terms are not an exact translation of the Greek. τὸ κενούμενον probably means
natural tendency of a vacuum to become refilled,\(^1\) when once we have granted the attractive faculty of the kidneys. Now, although Erasistratus knew that this faculty most certainly existed, he neither mentioned it nor denied it, nor did he make any statement as to his views on the secretion of urine.

Why did he give notice at the very beginning of his "General Principles" that he was going to speak about natural activities—firstly what they are, how they take place, and in what situations—and then, in the case of urinary secretion, declared that this took place through the kidneys, but left out its method of occurrence? It must, then, have been for no purpose that he told us how digestion occurs, or spends time upon the secretion of biliary superfluities;\(^2\) for in these cases also it would have been sufficient to have named the parts through which the function takes place, and to have omitted the method. On the contrary, in these cases he was able to tell us not merely through what organs, but also in what way it occurs—as he also did, I think, in the case of anadosis; for he was not satisfied with saying that this took place through the veins, but he also considered fully the method, which he held to be from the tendency of a vacuum to become refilled. Concerning the secretion of urine, however, he writes that this occurs through the kidneys, but does not add in what way it occurs. I do not think he could say that this was from the tendency of matter to fill a vacuum,\(^3\) for, if this were so, nobody would have ever died of retention of urine, since no more can the vacuum, not the matter evacuated, although Galen elsewhere uses κερβω in the latter (non-classical) sense, e.g. pp. 67, 215. Akolouthia is a following-up, a sequence, almost a consequence.\(^2\) v. p. 123. \(^3\) cf. Book II., chap. i.
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ρυμήναι ποτε παρὰ τὸ κενούμενον. ἄλλης γάρ αἰτίας μηδεμᾶς προστεθείσης, ἄλλα μόνης τῆς πρὸς τὸ κενούμενον ἀκόλουθιας ποδηγούσης τὸ συνεχές, οὐκ ἐγχωρεῖ πλέον ἐπιρρυμήναι ποτε τοῦ κενουμένου. ἀλλ' οὖδ' ἄλλην τινά προσθείναι πιθανὴν αἰτίαν ἐξέχει, ὥσ ἐπὶ τῆς ἀναδόσεως τῆς ἐκθλεψιν τῆς γαστρός. ἀλλ' αὐτὴ γ' ἐπὶ τοῦ κατὰ τὴν κοίλην αἵματος ἀπωλώλει τελέως, οὐ τῷ μήκει μόνον τῆς ἀποστάσεως ἐκλυθείσα, ἀλλὰ καὶ τῷ τὴν καρδίαν ὑπερκειμένην ἐξαρτάζειν αὐτῆς σφοδρός καθ' ἐκάστην διαστολῆν οὐκ ὀλέγον αἷμα.

Μόνη δ' τις ἔτι καὶ πάντων ἔρημος ἀπελείπετο τῶν σοφισμάτων ἐν τοῖς κάτω τῆς κοίλης ἢ πρὸς τὸ κενούμενον ἀκόλουθια, διὰ τε τοὺς ἐπὶ ταῖς ἱσχουρίαις ἀποθνήσκοντας ἀπολωλεκυία τὴν πιθανότητα καὶ διὰ τὴν τῶν νεφρῶν θέσιν οὐδὲν ἦττον. εἰ μὲν γὰρ ἂπαν ἐπ' αὐτοῦς ἐφέρετο τὸ αἷμα, δεόντως ἄν τις ἂπαν ἐφασκεν αὐτὸ καθαίρεσθαι. νυνὶ δὲ, οὐ γὰρ ὅλον ἄλλα τοσοῦτον αὐτοῦ μέρος, ὅσον αἱ μέχρι νεφρῶν δέχονται φλέβες, ἐπ' αὐτοὺς ἔρχεται, μόνον ἐκείνο καθαρθήσεται. καὶ τὸ μὲν ὀρρώδες αὐτοῦ καὶ λεπτὸν ὅλον δ' ἡθμῶν τινῶν τῶν νεφρῶν διαδύσεται τὸ δ' αἵματῶδες τε καὶ παχὺ κατὰ τὰς φλέβας ὑπομένου ἐμποδών στήσεται τῷ κατόπιν ἐπιρρέοντε. παλινδρομεῖν οὖν αὐτὸ πρὸτερον ἐπὶ τὴν κοίλην ἀναγκαῖον καὶ κενὰς οὕτως ἐργάζεσθαι τὰς ἐπὶ τοὺς νεφροὺς ιούσας φλέβας, αἱ δεύτερον οὐκέτι

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1 Vital factor necessary over and above the mechanical.
3 pp. 91, 93.
flow into a vacuum than has run out. For, if no other factor comes into operation ¹ save only this tendency by which a vacuum becomes refilled, no more could ever flow in than had been evacuated. Nor could he suggest any other plausible cause, such, for example, as the expression of nutriment by the stomach ² which occurs in the process of anadosis; this had been entirely disproved in the case of blood in the vena cava; ³ it is excluded, not merely owing to the long distance, but also from the fact that the overlying heart, at each diastole, robs the vena cava by violence of a considerable quantity of blood.

In relation to the lower part of the vena cava ⁴ there would still remain, solitary and abandoned, the specious theory concerning the filling of a vacuum. This, however, is deprived of plausibility by the fact that people die of retention of urine, and also, no less, by the situation of the kidneys. For, if the whole of the blood were carried to the kidneys, one might properly maintain that it all undergoes purification there. But, as a matter of fact, the whole of it does not go to them, but only so much as can be contained in the veins going to the kidneys; ⁵ this portion only, therefore, will be purified. Further, the thin serous part of this will pass through the kidneys as if through a sieve, while the thick sanguineous portion remaining in the veins will obstruct the blood flowing in from behind; this will first, therefore, have to run back to the vena cava, and so to empty the veins going to the kidneys; these veins will no longer be able to

¹ i.e. the part below the liver; cf. p. 91, note 2.
⁵ Renal veins.
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παρακομούσιν ἐπ' αὐτοῦς ἀκάθαρτον αἴμα· κατειληφότος γὰρ αὐτὸς τοῦ προτέρου πάροδος οὖν δείμα κλείσται. τις οὖν ἢ μὴ δύναμις ἀπάξει πάλιν ὁπίσω τῶν νεφρῶν τὸ καθαρὸν αἷμα; τις δὲ τούτῳ μὲν διαδεξαμένη κελεύσει πάλιν πρὸς τὸ κάτω μέρος ἱέναι τῆς κοίλης, ἔτερῳ δ' ἀνωθέν ἐπιφερομένῳ προστάξει, πρὶν ἐπὶ τούτοις νεφρῶν ἀπελθεῖν, μὴ φέρεσθαι κάτω;

Ταῦτ' οὖν ἀπαντά συνιδὼν ὁ Ἐρασίστρατος ἀπορῶν μεστά καὶ μιᾶς μοῦν δόξαν εὐποροῦν εὖρων ἐν ἀπασί τὴν τῆς ὀλκῆς, οὔτ' ἀπορεῖσθαι βουλόμενοι οὔτε τὴν Ἰπποκράτους ἐθέλων λέγειν ἀμείνον ὑπέλαβε σιωπητέον εἶναι περὶ τοῦ τρόπου τῆς διακρίσεως.

'Αλλ' εἰ κάκεινος ἐσίγησεν, ἢμείς οὖ σιωπήσομεν' ἵσμεν γὰρ, ὥς οὐκ ἐνδέχεται παρελθόντα τὴν Ἰπποκράτειον δόξαν, εἰθ' ἔτερον τι περὶ νεφρῶν ἐνεργείας εἰπόντα μὴ οὐ καταγάλαστον εἶναι παντάπασι. διὰ τοῦτο Ἐρασίστρατος μὲν ἐσιώτησεν, Ἀσκληπιάδης δ' ἐψεύσατο παραπλησίως οἰκέταις λάλοις μὲν τὰ πρόσθεν τοῦ βίου καὶ πολλὰ πολλάκις ἐγκλήματα διαλυσαμένους ὑπὸ περιττῆς πανουργίας, ἐπ' αὐτοφόρῳ δὲ ποτὲ κατειλημμένοις, εἰτ' οὐδὲν ἐξευρίσκοναι σώφρονα κάπειτ' ἐνταῦθα τοῦ μὲν αἰδημονεστέρου σιωπώντος, οἷον ἀποπληξία τινὶ κατειλημμένου, τοῦ δ' ἀνασύνηντον κρύπτοντος μὲν ἔθυ ὑπὸ μάλης τὸ ξητούμενον, ἐξομυμενὸν δὲ καὶ μὴ ἐωρακέναι πώποτε φάσκοντος. οὔτω γὰρ τοι καὶ ὁ Ἀσκλη- πιάδης ἐπιλειπόντων αὐτὸν τῶν τῆς πανουργίας σοφισμάτων καὶ μήτε τῆς πρὸς τὸ λεπτομερές
conduct a second quantity of unpurified blood to the kidneys—occupied as they are by the blood which had preceded, there is no passage left. What power have we, then, which will draw back the purified blood from the kidneys? And what power, in the next place, will bid this blood retire to the lower part of the vena cava, and will enjoin on another quantity coming from above not to proceed downwards before turning off into the kidneys?

Now Erasistratus realized that all these ideas were open to many objections, and he could only find one idea which held good in all respects—namely, that of attraction. Since, therefore, he did not wish either to get into difficulties or to mention the view of Hippocrates, he deemed it better to say nothing at all as to the manner in which secretion occurs.

But even if he kept silence, I am not going to do so. For I know that if one passes over the Hippocratic view and makes some other pronunciation about the function of the kidneys, one cannot fail to make oneself utterly ridiculous. It was for this reason that Erasistratus kept silence and Asclepiades lied; they are like slaves who have had plenty to say in the early part of their career, and have managed by excessive rascality to escape many and frequent accusations, but who, later, when caught in the act of thieving, cannot find any excuse; the more modest one then keeps silence, as though thunderstruck, whilst the more shameless continues to hide the missing article beneath his arm and denies on oath that he has ever seen it. For it was in this way also that Asclepiades, when all subtle excuses had failed him and there was no longer any room for nonsense about "conveyance towards the
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φορᾶς ἔχοισις ἢτι χώραν ἐνταυθοὶ ληρεῖσθαι μὴ ὁς ὑπὸ τῶν νεφρῶν γεννᾶται τοῦτο τὸ περὶτωμα, καθάπερ ὑπὸ τῶν ἐν ἡπατὶ πόρων ἡ χολή, δυνατὸν ὅν εἰσόντα μὴ ὁ μέγιστον ὠφλεῶν γέλωτα, ἐξομυντά τε καὶ πειδέοται φανερῶς, οὐ διήκειν λέγων ἐπὶ τοὺς νεφροὺς τὸ ὄουρον ἀλλ′ ἀτμοειδῶς εὐθὺς ἐκ τῶν κατὰ τὴν κοῖλῃ μερῶν εἰς τὴν κύστιν ἀδροῖσθαι.

Οὕτωι μὲν ὦν τοὺς ἐπὶ αὐτοφώρῳ κατειλημμένοις οἰκέταις ὀμοίως ἐκπλαγέντες ὁ μὲν ἐσιώπησεν, ὁ δὲ ἀνασχῦντως πειδέοται.

XVII

Τῶν δὲ νευτέρων ὁσοὶ τοῖς τούτων ὑνόμασιν ἐαυτοὺς ἐσέμνυναν Ἐρασιστράτειος τε καὶ Ἀσκληπιαδείους ἐπονομάζαντες, ὀμοίως τοῖς ὑπὸ τοῦ βελτίστου Μενάνδρου κατὰ τὰς κωμφίδιας εἰςαγομένους οἰκέταις, Δάοις τέ τισι καὶ Γέταις, οὐδὲν ἠγομένους σφίσι πεπράχθαι γενναῖον, εἰ μὴ τρῖς ἔξαπατήσειαν τὸν δεσπότην, οὕτω καὶ αὐτῷ κατὰ πολλὴν σχολὴν ἀναίνειντα σοφίσματα συνέθεσαν, οἱ μὲν, ἣνα μηδὲ ὠλος ἐξελεγχθεὶς ποτέ.

68 Ἀσκληπιαίδης πειδόμενος, οἱ δὲ, ἣνα κακῶς εἰπώσιν, αἱ καλῶς ἐσιώπησεν Ἐρασιστράτος.

Ἀλλὰ τῶν μὲν Ἀσκληπιαδείων ἄλλως. οἱ δὲ Ἐρασιστράτειοι λέγειν ἐπιχειροῦντες, ὅτες ὁι νεφροὶ διηθοῦσι τὸ ὄουρον, ἀπαντὰ δρῶσι τε καὶ

1 cf. p. 87, note 3.
2 κοίλην: the usual reading is κοιλίαν, which would make
rarefied part [of the air]," 1 and when it was impossible without incurring the greatest derision to say that this superfluous [i.e. the urine] is generated by the kidneys as is bile by the canals in the liver—he, then, I say, clearly lied when he swore that the urine does not reach the kidneys, and maintained that it passes, in the form of vapour, straight from the region of the vena cava, 2 to collect in the bladder.

Like slaves, then, caught in the act of stealing, these two are quite bewildered, and while the one says nothing, the other indulges in shameless lying.

XVII

Now such of the younger men as have dignified themselves with the names of these two authorities by taking the appellations "Erasistrateans" or "Asclepiadeans" are like the Davi and Getae—the slaves introduced by the excellent Menander into his comedies. As these slaves held that they had done nothing fine unless they had cheated their master three times, so also the men I am discussing have taken their time over the construction of impudent sophisms, the one party striving to prevent the lies of Asclepiades from ever being refuted, and the other saying stupidly what Erasistratus had the sense to keep silence about.

But enough about the Asclepiadeans. The Erasistrateans, in attempting to say how the kidneys let the urine through, will do anything or suffer anything it "from the region of the alimentary canal." cf. p. 118, note 1.
πάσχονσι καὶ παντοῖοι γίγνονται πιθανῶν ἐξευρεῖν τι ξητοῦντες αἰτίων ὅλκης μὴ δεύμενον.
Οἱ μὲν δὴ πλησίον Ἕρασιστράτῳ τοῖς χρόνοις γενόμενοι τὰ μὲν ἀνώ τῶν νεφρῶν μόρια καθαρῶν αἷμα λαμβάνειν φασὶ, τῷ δὲ βάρος ἔχειν τὸ ύδατῶδες περίττωμα βρίθειν τε καὶ ύπορρεῖν κάτω διηθούμενον δὲ ἐνταῦθα κατὰ τοὺς νεφροὺς αὐτοὺς χρηστῶν οὕτω γενόμενον ἀπασί τοῖς κάτω τῶν νεφρῶν ἐπιπέμπεσθαι τὸ αἷμα.
Καὶ μέχρι γε τινὸς εὐδοκίμησεν ἢδὲ ἡ δόξα καὶ ἦκμασε καὶ ἄληθῆς ἐνομίσθη· χρόνῳ δὲ ύστερον καὶ αὐτοῖς τοῖς Ἕρασιστρατείοις ὑποπτος ἐφάνη καὶ τελευτῶντες ἀπέστησαν αὐτῆς. αἰτεῖσθαι γὰρ ἑδόκουν δύο ταῦτα μήτε συγχωρούμενα πρὸς τινὸς ἀλλ’ οὐδ’ ἀποδειχθῆναι δυνάμενα, πρῶτον μὲν τὸ βάρος τῆς ὀρράδους ύγρότητος ἐν τῇ κοίλῃ || φλεβὶ γεννώμενον, ὡσπερ οὐκ ἔξι ἄρχης ύπάρχον, ὅποτ’ ἐκ τῆς κοιλίας εἰς ἢπαρ ἀνεφέρετο. τί δὴ οὖν οὐκ εὐθὺς ἐν ἐκείνους τοῖς χωρίοις ύπέρρει κάτω; πῶς δ’ ἂν τῷ δόξειν εὐλόγως εἰρήσθαι συντελεῖν εἰς τὴν ἀνάδοσιν ἡ ύδατῶδης ύγρότης, εἴπερ οὗτος ἐστὶ βαρεία;

Δεύτερον δ’ ἀτοπον, ὅτι κἂν κάτω συγχωρηθῇ φέρεσθαι πᾶσα καὶ μὴ κατ’ ἄλλο χωρίον ἢ τὴν κοίλην φλέβα, τίνα τρόπον εἰς τοὺς νεφροὺς ἐμπεσεῖται, χαλεπῶς, μᾶλλον δ’ ἀδύνατον εἴπειν, μὴ τ’ ἐν τοῖς κάτω μέρεσι κειμένων αὐτῶν τῆς φλεβὸς ἀλλ’ ἐκ τῶν πλαγίων μὴ τ’ ἐμφυομένης εἰς αὐτοὺς τῆς κοίλης ἀλλ’ ἀπόφυσιν τινα μόνον

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or try any shift in order to find some plausible explanation which does not demand the principle of attraction.

Now those near the times of Erasistratus maintain that the parts above the kidneys receive pure blood, whilst the watery residue, being heavy, tends to run downwards; that this, after percolating through the kidneys themselves, is thus rendered serviceable, and is sent, as blood, to all the parts below the kidneys.

For a certain period at least this view also found favour and flourished, and was held to be true; after a time, however, it became suspect to the Erasistrateans themselves, and at last they abandoned it. For apparently the following two points were assumed, neither of which is conceded by anyone, nor is even capable of being proved. The first is the heaviness of the serous fluid, which was said to be produced in the vena cava, and which did not exist, apparently, at the beginning, when this fluid was being carried up from the stomach to the liver. Why, then, did it not at once run downwards when it was in these situations? And if the watery fluid is so heavy, what plausibility can anyone find in the statement that it assists in the process of anadosis?

In the second place there is this absurdity, that even if it be agreed that all the watery fluid does fall downwards, and only when it is in the vena cava, still it is difficult, or, rather, impossible, to say through what means it is going to fall into the kidneys, seeing that these are not situated below, but on either side of the vena cava, and that the vena cava is not inserted into them, but merely sends a branch.

1 Not at an earlier stage, when it is still on its way from the alimentary canal to the liver. 2 i.e. a renal vein.
eis ekateron pempoushs, oswper kai eis talla pantai moria.

Tis oin he diadexamene tautin doxa kata-

gywosheiasan; emoi mev Eiaiwtiera makhphi faivetai

thi proteras. emas he oin kai auti poti.

faso gar, eiv katal tis gih ekxwthi meimgenov

elaiou ydati, diaphoron ekateron odon badieswthai

kal rynsasthai to mev tithi, to de tithi. thumaston

oin oivedh evna fasin, eiv to mev ydatodes ygron

eis tous neφrous rei, to o aima dia ths koilhs

ferei kai tw. katexwssai oin yh kai yde

h doxa. dia ti gar apo ths koilhs muprion

ekpephunikion fleboun aima mev eis tas allas

apasa, h o orrods ygroton eis tas epi tous

nefrous fermoenas ekterpetai; tou auto to

zetoumenon oin eirhkasin, allas to ygunomeun

eiptontes monon oioiatai thn aitian apodewedwkenai.

Palin oin, to tripton to sotithri, thn xeuristh

apasow doxan exeurhmewn vun upo Lukou tou

Makedonos, euodomousan de dia to kaiwv ydh

legeom. atpefhvato gar dh o Lukos oitlos,

oswper eis aditoun tinov xhriamov apoftheugomenos,

perittoma tis twn nefrwv threvesw eivai to

oiron. oti mev oin auto to ygunomeun apan

oiron ygrvetai, plhn eiv ti metaw twn diaxorh-

maton uphthven eis idrwtas apexorphsven eis

tin adhlon diapnvon, evargws evdeiknetai to

plhthos twn kath ekasth thmeran ourovmenon.

En xeiwmw de maist sta maethin estin epi twn

argouwnon mewn, kowvniξomewn de, kal maist

71 eiv leptous o oinos eiv kai porimos. ourovsh || gar
into each of them, as it also does into all the other parts.

What doctrine, then, took the place of this one when it was condemned? One which to me seems far more foolish than the first, although it also flourished at one time. For they say, that if oil be mixed with water and poured upon the ground, each will take a different route, the one flowing this way and the other that, and that, therefore, it is not surprising that the watery fluid runs into the kidneys, while the blood falls downwards along the vena cava. Now this doctrine also stands already condemned. For why, of the countless veins which spring from the vena cava, should blood flow into all the others, and the serous fluid be diverted to those going to the kidneys? They have not answered the question which was asked; they merely state what happens and imagine they have thereby assigned the reason.

Once again, then (the third cup to the Saviour!)

let us now speak of the worst doctrine of all, lately invented by Lycus of Macedonía, but which is popular owing to its novelty. This Lycus, then, maintains, as though uttering an oracle from the inner sanctuary, that urine is residual matter from the nutrition of the kidneys. Now, the amount of urine passed every day shows clearly that it is the whole of the fluid drunk which becomes urine, except for that which comes away with the dejections or passes off as sweat or insensible perspiration. This is most easily recognized in winter in those who are doing no work but are carousing, especially if the wine be thin and diffusible;

1 In a toast, the third cup was drunk to Zeus Sotēr (the Saviour).
2 An anatomist of the Alexandrian school.
3 cf. nasal mucus, p. 90, note 1.
οὗτοι διὰ ταχέων ὅλγου δεῖν, ὀσονπερ καὶ πίνουσιν. ὡτὶ δὲ καὶ ὁ Ἐρασίστρατος οὖτως ἐγλυγνωσκεν, οἱ τὸ πρῶτον ἀνεγνωκότες αὐτοῦ σύγγραμμα τῶν καθὸλου λόγων ἐπίστανται. ὡσθ' ὁ Δύκος οὖτ' ἀληθὴ φαίνεται λέγων οὔτ' Ἐρασίστρατεια, δῆλον δ' ὡς οὕδ' Ἀσκληπιάδεια, πολὺ δὲ μᾶλλον οὕδ' Ἰπποκράτεια. λευκῷ τοῖνυν κατὰ τὴν παροιμίαν ἐοικε κόρακι μὴτ' αὐτοῖς τοὺς κόραξιν ἀναμιχθῆναι δυναμένῳ διὰ τὴν χρόαν μῆτε ταῖς περιστεραῖς διὰ τὸ μέγεθος, ἀλλ' οὕτω ποὺ τούτων γ' ἔνεκα παροπτέος' ἵσωσ γὰρ τι λέγει θαυμαστῶν, δ' μηδεὶς τῶν ἐμπροσθεν ἔγων.

Τὸ μὲν οὖν ἄπαντα τὰ τρεφόμενα μόρια ποιεῖν τι περίττωμα συγχωρούμενον, τὸ δὲ τοὺς νεφροὺς μόνους, οὕτω σμικρὰ σώματα, χώας ὀλούς τέταρας ἢ καὶ πλείους ἱσχεὶ ἐνίοτε περιττόματος οὖθ' ὁμολογούμενον οὕτε λόγον ἔχουν' τὸ γὰρ ἐκάστου τῶν μειξώνων σπλάγχνων περίττωμα πλείου ἀναγκαῖον ὑπάρχειν. οἷον αὐτίκα τὸ τοῦ πνεύμονος, εἴπερ ἀνάλογον τῷ μεγέθει τοῦ σπλάγχνον γύνοιτο, πολλαπλάξιον ἔσται δὴ τοῦ κατὰ τοὺς νεφροὺς, ὡσθ' ὅλος μὲν οὐ θώραξ ἐμπλησθῆσεται, πυγῆσεται δ' αὐτίκα τὸ ξῦόν. ἀλλ' εἴ ισον φήσει τις γύνεσθαι τὸ καθ' ἐκαστον τῶν ἄλλων μορίων περίττωμα, διὰ ποίων κύστεων ἐκκρίνεται; εἰ γὰρ οἱ νεφροὶ τοῖς κωθωνιζομένοις τρεῖς ἢ τέταρας ἐνίοτε χώας ποιοῦσιν περιττόματος, ἐκαστον τῶν ἄλλων σπλάγχνων πολλῷ πλείους ἔσονται καὶ πίθου τινὸς οὔτω μεγίστου δεῖσει τοῦ δεξομένου τὰ πάντων περιτ-
these people rapidly pass almost the same quantity as they drink. And that even Erasistratus was aware of this is known to those who have read the first book of his "General Principles." 1 Thus Lycus is speaking neither good Erasistratism, nor good Asclepiadism, far less good Hippocratism. He is, therefore, as the saying is, like a white crow, which cannot mix with the genuine crows owing to its colour, nor with the pigeons owing to its size. For all this, however, he is not to be disregarded; he may, perhaps, be stating some wonderful truth, unknown to any of his predecessors.

Now it is agreed that all parts which are undergoing nutrition produce a certain amount of residue, but it is neither agreed nor is it likely, that the kidneys alone, small bodies as they are, could hold four whole congii, 2 and sometimes even more, of residual matter. For this surplus must necessarily be greater in quantity in each of the larger viscera; thus, for example, that of the lung, if it corresponds in amount to the size of the viscus, will obviously be many times more than that in the kidneys, and thus the whole of the thorax will become filled, and the animal will be at once suffocated. But if it be said that the residual matter is equal in amount in each of the other parts, where are the bladders, one may ask, through which it is excreted? For, if the kidneys produce in drinkers three and sometimes four congii of superfluous matter, that of each of the other viscera will be much more, and thus an enormous barrel will be needed to contain the waste products of them all.

2 About twelve quarts. This is about five times as much as the average daily excretion, and could only be passed if a very large amount of wine were drunk.
τῶματα. καίτοι πολλάκις, ὥσον ἐπιε τις, ὀλίγου
deīn οὐρησεν ἀπαν, ὡς ἂν ἔπι τοὺς νεφροὺς φερο-
μένου τοῦ πόματος ἀπαντος.

Ἐοικεν οὖν ὁ τὸ τρίτον ἐξαπατών οὗτος οὐδὲν
ἀνύειν ἀλλ' εὐθὺς γεγονέναι κατάφωρος καὶ μένειν
ἐτι τὸ ἐξ ἀρχής ἀπορον Ἑρασιστράτῳ τε καὶ τοῖς
ἀλλοις ἀπασὶ πλὴν Ἰπποκράτους. διατρήσω δ' ἐκὼν
ἐν τῷ τόπῳ σαφῶς εἰδώς, ὅτι μηδὲν εἰπεὶν
ἐχει μηδεῖς ἄλλος περὶ τῆς τῶν νεφρῶν ἐνεργείας,
ἀλλ' ἀναγκαῖον ἢ τῶν μαγείρων ἀμαθεστέρους
φαίνεσθαι μηδ' ὅτι διηθεῖται δι' αὐτῶν τὸ οὗρον
73 ὁμολογοῦντας ἢ || τούτο συγχωρήσαντας μηδὲν
ἐτ' ἐχειν εἰπείν ἐτερον αὐτιον τῆς διακρίσεως
πλὴν τῆς ὀλικής.

'Αλλ' εἰ μὴ τῶν οὗρων ἡ φορὰ τῇ πρὸς τὸ
κενοῦμενον ἀκολουθία γίγνεται, δῆλον, ὡς οὐδ' ἡ
τοῦ αἴματος οὐδ' ἡ τῆς χολῆς ἡ ἐπιερ ἐκείνων καὶ
τούτον πάντα γὰρ ὡσαύτως ἀναγκαῖον ἐπιτε-
λεῖσθαι καὶ κατ' αὐτὸν τὸν Ἑρασιστράτου.

Εἴρησται δ' ἐπὶ πλέον ύπερ αὐτῶν ἐν τῷ μετὰ
τάυτα γράμματι.
ON THE NATURAL FACULTIES, I. xvii

Yet one often urinates practically the same quantity as one has drunk, which would show that the whole of what one drinks goes to the kidneys.

Thus the author of this third piece of trickery would appear to have achieved nothing, but to have been at once detected, and there still remains the original difficulty which was insoluble by Erasistratus and by all others except Hippocrates. I dwell purposely on this topic, knowing well that nobody else has anything to say about the function of the kidneys, but that either we must prove more foolish than the very butchers 1 if we do not agree that the urine passes through the kidneys; or, if one acknowledges this, that then one cannot possibly give any other reason for the secretion than the principle of attraction.

Now, if the movement of urine does not depend on the tendency of a vacuum to become refilled, 2 it is clear that neither does that of the blood nor that of the bile; or if that of these latter does so, then so also does that of the former. For they must all be accomplished in one and the same way, even according to Erasistratus himself.

This matter, however, will be discussed more fully in the book following this.

BOOK II
BOOK II
"Οτι μεν ουν αναγκαιον εστιν ουκ 'Ερασιστράτων μόνον αλλα και τοις αλλοις απασιν, οσοι μελλουσι περι διακρισεως ουρων ερειν τι χρηστον, ομολογησαι δυναμιν τιν' υπαρχειν τοις νεφροις έλκουσαν εις εαυτους ποιοτητα τοιαυτην, οια εν τοις ουροις εστι, δια του προσθεν επιδεικται γραμματος, άναμμυνηκοντων αμι αυτω και τουθε ημων, ως ουκ αλλοις μεν εις την κυστιν φερεται τα ουρα δια των νεφρων, αλλως δε εις απαντα του ζωου τα μορια το αιμα, κατ' αλλου δε των τροπων η εανθη χολη διακρινεται. δειχθεις γαρ εναργως εφ' ενος | ουτινοσουν οργανου της έλκτικης τε και επισταστικης ονομαζομενης δυναμεως ουδεν ετι χαλεπον επι τα λοιπα μεταφερειν αυτην ου γαρ δη τοις μεν νεφροις η φυσις εδωκε τινα τοιαυτην δυναμιν, ουχι δε γε και τοις τω χολαδες ιγρων έλκουσιν άγγελους ουδε τουτως μεν, ουκετι δε και των αλλων μοριων εκαστω. και μην ει τοιτε άληθες εστι, θαυμαζειν χρη του 'Ερασιστρατου ψευδεις ουτω λόγους υπερ ανα-

1 cf. p. 89. 2 This term is nowadays limited to the drawing action of a blister. cf. p. 223.
In the previous book we demonstrated that not only Erasistratus, but also all others who would say anything to the purpose about urinary secretion, must acknowledge that the kidneys possess some faculty which attracts to them this particular quality existing in the urine.\(^1\) Besides this we drew attention to the fact that the urine is not carried through the kidneys into the bladder by one method, the blood into parts of the animal by another, and the yellow bile separated out on yet another principle. For when once there has been demonstrated in any one organ, the drawing, or so-called *epispastic*\(^2\) faculty, there is then no difficulty in transferring it to the rest. Certainly Nature did not give a power such as this to the kidneys without giving it also to the vessels which abstract the biliary fluid,\(^3\) nor did she give it to the latter without also giving it to each of the other parts. And, assuredly, if this is true, we must marvel that Erasistratus should make statements concerning the delivery of nutriment from the food-canal\(^4\) which are

\(^3\) The radicles of the hepatic ducts in the liver were supposed to be the active agents in extracting bile from the blood. *cf.* pp. 145–149.  
\(^4\) *Anadosis*; *cf.* p. 13, note 5.
δόσεως τροφῆς εἰπόντος, ὡς μηδ' Ἀσκληπιάδην
λαθεῖν. καίτοι γ' οἰεται παντὸς μᾶλλον ἀληθὲς
ὑπάρχειν, ὡς, εἴπερ ἐκ τῶν φλεβῶν ἀπορρέοι
ti, δυνώ θάτερον ἥ κενός ἔσται τόπος ἄθροῶς ἢ
to συνεχῆς ἐπιρρυθῆσεται τὴν βασιν ἀναπληρῶν
tou κενομένου. ἀλλ' ο' γ' Ἀσκληπιάδης οὐ
dυνώ θάτερον φησιν, ἀλλὰ τρίῳ ἐν τι χρήναι
λέγειν ἐπὶ τοῖς κενομένοις ἀγγείοις ἔπεσθαι ἢ
κενὸν ἄθροῶς τόπον ἢ to συνεχῆς ἀκολουθήσειν ἢ
συσταλήσθησθαι τὸ ἀγγείον. ἐπὶ μὲν γὰρ τῶν
καλάμων καὶ τῶν αὐλίσκων τῶν εἰς τὸ ύδρω
καθιεμένων ἀληθὲς εἰπείν, ὅτι κενομένου τοῦ
περιεχομένου κατὰ τὴν || εὐρυχωρίαν αὐτῶν ἄερος
ἡ κενὸς ἄθροῶς ἔσται τόπος ἢ ἀκολουθήσει τὸ
συνεχῆς. ἐπὶ δὲ τῶν φλεβῶν οὐκέτ' ἐγχωρεῖ, δυνα-
μένου δὴ τοῦ χυτῶν αὐτῶν εἰς ἐαυτὸν συνυζάνειν
καὶ διὰ τοῦτο καταπίπτειν εἰς τὴν ἑντὸς εὐρυ-
χωρίαν. οὗτω μὲν δὴ ψευδὴς ἢ περὶ τῆς πρὸς
to κενομένου ἀκολουθίας οὐκ ἀπόδειξις μὰ Δ' 
εἰπομ' ἂν ἀλλ' ὑπόθεσις 'Ερασιστράτευος.

Καθ' ἔτερον δ' αὐτὸ πρόποι, εἰ καὶ ἄληθης εἰς,
περιττῇ, τῆς μὲν κοιλίας ἐνθίβειν ταῖς φλεβὶ
dυναμένης, ὡς αὐτὸς ὑπέθετο, τῶν φλεβῶν δ' αὐ
περιστέλλεσθαι τῷ ἐνυπάρχοντι καὶ προωθεῖν
αὐτὸ. τὰ τε γὰρ ἀλλὰ καὶ πλήθος οὐκ ἂν ἐν τῷ
σώματι γένοιτο, τῇ πρὸς τὸ κενούμενον ἀκολουθᾶ
μόνη τῆς ἀναδόσεως ἐπιτελουμένης. εἰ μὲν οὖν
ἡ τῆς γαστρὸς ἐνθλήψῃς ἐκλύεσται προϊόσα καὶ

1 The term κοιλία is used both specifically for the stomach proper and also (as probably here) in a somewhat wider sense for the stomach region, including the adjacent part of the small intestine; this was the part of the alimentary canal
ON THE NATURAL FACULTIES, II.

so false as to be detected even by Asclepiades. Now, Erasistratus considers it absolutely certain that, if anything flows from the veins, one of two things must happen: either a completely empty space will result, or the contiguous quantum of fluid will run in and take the place of that which has been evacuated. Asclepiades, however, holds that not one of two, but one of three things must be said to result in the emptied vessels: either there will be an entirely empty space, or the contiguous portion will flow in, or the vessel will contract. For whereas, in the case of reeds and tubes it is true to say that, if these be submerged in water, and are emptied of the air which they contain in their lumens, then either a completely empty space will be left, or the contiguous portion will move onwards; in the case of veins this no longer holds, since their coats can collapse and so fall in upon the interior cavity. It may be seen, then, how false this hypothesis—by Zeus, I cannot call it a demonstration!—of Erasistratus is.

And, from another point of view, even if it were true, it is superfluous, if the stomach has the power of compressing the veins, as he himself supposed, and the veins again of contracting upon their contents and propelling them forwards. For, apart from other considerations, no plethora would ever take place in the body, if delivery of nutriment resulted merely from the tendency of a vacuum to become refilled. Now, if the compression of the stomach becomes weaker the further it goes, and cannot reach to an from which nutriment was believed to be absorbed by the mesenteric veins; cf. p. 309, note 2.

2 cf. p. 100, note 2; p. 167, note 2.

3 A characteristic "lesion" in Erasistratus's pathology.
GALEN

μέχρι παντός ἀδυνατός ἦστων ἐξικνεῖσθαι καὶ διὰ τούτῳ ἄλλης τινὸς δει τινα χανῆς εἰς τὴν πάντη φορὰν τοῦ αἵματος, ἀναγκαία μὲν ἡ πρὸς τὸ κενοῦμενον ἀκολουθία προσεξεύρηται: πλήθος δ’

77 ἐν οὐδενὶ τῶν μεθ’ ἦπαρ ἦσται μορίων, ἡ, εἰτερ ἀρα, περὶ τὴν καρδίαν τε καὶ τὸν πνεύμονα. μόνη γὰρ αὐτὴ τῶν μεθ’ ἦπαρ εἰς τὴν δεξιὰν αὐτῆς κοιλίαν ἐλκεῖ τὴν τροφὴν, εἴτε διὰ τῆς φλεβῶς τῆς ἀρτηριῶδους ἐκπέμπει τῷ πνεύμονι· τῶν γὰρ ἄλλων οὔδεν οὐδ’ αὐτὸς ὁ Ἐρασίστρατος ἐκ καρδίας βούλεται τρέφεσθαι διὰ τὴν τῶν ὑμένων ἐπιφυσίων. εἰ δὲ γ’, ἵνα πλήθος γενηται, φυλάξομεν ἀχρι παντὸς τὴν ρώμην τῆς κατὰ τὴν κοιλίαν ἐνθλίψεως, οὔδεν ἐτι δεόμεθα τῆς πρὸς τὸ κενοῦμενον ἀκολουθίας, μάλιστ’ εἰ καὶ τὴν τῶν φλεβῶν συνυποθομέθα περιστολῆν, ὡς αὐ καὶ τούτ’ αὐτῷ πάλιν ἀρέσκει τῷ Ἐρασίστρατῳ.

II

Ἀναμνηστέον οὗν αὕθεις αὐτῶν, καὶ μὴ βούληται, τῶν νεφρῶν καὶ λεκτέων, ὥς ἐλεγχος οὗτοι φανερώτατος ἀπάντων τῶν ἀποχωροῦντων τῆς ὀλκῆς· οὔδες γὰρ οὔδεν οὔτ’ εἰπε πιθανόν, ἀλλ’ οὔδ’ ἐξευρεῖν εἰχε κατ’ οὔδενα τρόπον, ὡς

1 A certain subordinate place allowed to the horror vacui.

2 i.e. the parts to which the veins convey blood after it leaves the liver—second stage of anadosis; cf. p. 91, note 2; p. 13, note 5.
ON THE NATURAL FACULTIES, II. I.–II

indefinite distance, and if, therefore, there is need of some other mechanism to explain why the blood is conveyed in all directions, then the principle of the refilling of a vacuum may be looked on as a necessary addition;¹ there will not, however, be a plethora in any of the parts coming after the liver,² or, if there be, it will be in the region of the heart and lungs; for the heart alone of the parts which come after the liver draws the nutriment into its right ventricle, thereafter sending it through the arterioid vein ³ to the lungs (for Erasistratus himself will have it that, owing to the membranous excrescences,⁴ no other parts save the lungs receive nourishment from the heart). If, however, in order to explain how plethora comes about, we suppose the force of compression by the stomach to persist indefinitely, we have no further need of the principle of the refilling of a vacuum, especially if we assume contraction of the veins in addition—as is, again, agreeable to Erasistratus himself.

II

Let me draw his attention, then, once again, even if he does not wish it, to the kidneys, and let me state that these confute in the very clearest manner such people as object to the principle of attraction. Nobody has ever said anything plausible, nor, as we previously showed, has anyone been able to discover,

³ What we now call the pulmonary artery. Galen believed that the right ventricle existed for the purpose of sending nutrient blood to the lungs.

⁴ Lit. owing to the ongrowth (epiphysis) of membranes; he means the tricuspid valve; cf. p. 314, note 2; p. 321, note 4.
epamproseben edeikunumen, eteron aitou oýrōn dia-
krisews, all' anagkaion h maýnešthai dokein, ei
78 phéseimen a'tmoéi||dōs eis tìn kústín iénai tò oýron
h așchmeonein tìs prós tò keuómenon ākolouthéias
mnηmoneúontas, lhrwóous mèn oúshs kàpì toù
a'imatos, aðunátou dé kai ħliðion pantaπasìn
épi toùn oýrōn.

"Evn mèn ðh toùtò sfálma toùn aπostántwv tìs
ólkhs: éteron dé tò perì tìs kàta tìn xanhēn
xholh díakrisews. oude gáρ ou'd ékei párrre-
ontos toû a'imatos tà stómata toùn xholhódχwv
agnéiwv ākrivōs díakrisēsetai tò xholwdes
peŕttwma. kai mh díakrinésth, fæsín, ðllà
suananaféreštho tò a'imati pântē toù sómatoù.
all', ð sòfwtatoi, pronoπhtikh toù ūψhωv kai
technikh aútoù ð 'Eρasístratov úpëtheto tìn
fȳw. ðllà kai tò xholwdes ūgrov ākhēstov
einai pantaπasì tois ūψh ev φaskev. ou suμ-
βaìnei ð ðlλìhovs āμfòw taúta. pwòs gáρ ðn
èti prono eşthai toû ūψhov ðξeìen èpitrepōusà
suananaférešthai tò a'imati μoxhērov oûtw xhmwv;

'Allà taúta mèn smikrā: tò dè mègiston kai
saféstaton pálw ëntaûh' amártima kai ðh
φrásow. eíper gáρ dì ou'dèn ðll' ð ðtì paçúterov
79 mèn ëstì to àīma, lepπotèra ðh ð ëntaûh xholh
kai tà mèn tòwv flesbhîwv evrûterà stómata, tà
by any means, any other cause for the secretion of urine; we necessarily appear mad if we maintain that the urine passes into the kidneys in the form of vapour, and we certainly cut a poor figure when we talk about the tendency of a vacuum to become refilled;¹ this idea is foolish in the case of blood, and impossible, nay, perfectly nonsensical, in the case of the urine.²

This, then, is one blunder made by those who dissociate themselves from the principle of attraction. Another is that which they make about the secretion of yellow bile. For in this case, too, it is not a fact that when the blood runs past the mouths [stomata] of the bile-ducts there will be a thorough separation out [secretion] of biliary waste-matter. “Well,” say they, “let us suppose that it is not secreted but carried with the blood all over the body.” But, you sapient folk, Erasistratus himself supposed that Nature took thought for the animals’ future, and was workmanlike in her method; and at the same time he maintained that the biliary fluid was useless in every way for the animals. Now these two things are incompatible. For how could Nature be still looked on as exercising forethought for the animal when she allowed a noxious humour such as this to be carried off and distributed with the blood? . . .

This, however, is a small matter. I shall again point out here the greatest and most obvious error. For if the yellow bile adjusts itself to the narrower vessels and stomata, and the blood to the wider ones, for no other reason than that blood is thicker and bile thinner, and that the stomata of the veins are

¹ Horror vacui.  ² But Erasistratus had never upheld this in the case of urinary secretion. cf. p. 99.
δὲ τῶν χοληδόχων ἀγγείων στενότερα, διὰ τούθ᾿ ἡ μὲν χολὴ τοῖς στενοτέροις ἀγγείοις τε καὶ στόμασιν ἐναρμόττει, τὸ δ᾿ ἀἷμα τοῖς εὐρυτέροις, δήλου, ὡς καὶ τὸ ύδατῶδες τούτο καὶ ὀρρώδες περίττωμα τοσοῦτο πρότερον εἰσρυθύνεται τοῖς χοληδόχωις ἀγγείοις, ὡσφ λεπτότερον ἐστὶ τῆς χολῆς. πῶς οὖν οὐκ εἴσρεῖ; ὃτι παχύτερον ἐστὶ ύδ. Διὰ τὸ οὖρον τῆς χολῆς· τούτο γὰρ ἐτόλμησέ τις εἰπεῖν τῶν καθ᾿ ἡμᾶς Ἐρασιστρατείων ἀποστάς δηλονότι τῶν αἰσθήσεων, ἀλὰ ἐπίστευσεν ἐπὶ τε τῆς χολῆς καὶ τοῦ αἵματος. εἴτε γὰρ ὅτι μᾶλλον ἡ χολὴ τοῦ αἵματος θεί, διὰ τούτῳ λεπτοτέραν αὐτὴν ἤμιν ἐστὶ νομιστέον, εἴθ᾿ ὅτι ὁδόνης ἡ ῥάκους ἡ τινος ἡμοῦ ῥᾶν διεξέρχεται καὶ ταῦτα τὰ γυναικίματα παχυτέρα τῆς ύδατῶδος ὑγρότητος καὶ αὐτὴ γενήσεται. πάλιν γὰρ οὐδ᾿ ἐνταῦθα λόγος οὐδεὶς ἐστιν, ὅσον ἀποδείξει λεπτοτέραν τὴν χολὴν τῶν ὀρρωδῶν περίττωμάτων.

Ἀλλ᾿ ὅταν τὶς ἀναίσχυντη περιπλέκων τε καὶ μῆποι καταπεπτωκέων συγχωρῶν, || ὰμοίως ἐσται τοῖς ἰδιῶταις τῶν παλαιστῶν, οὐ καταβληθέντες ὑπὸ τῶν παλαιστρικῶν καὶ κατὰ τῆς γῆς υπτοι κείμενοι τοσοῦτον δέουσι τὸ πτῶμα γυναικίων, ὡστε καὶ κρατοῦσι τῶν αὐχένων αὐτοὺς τοὺς καταβαλόντας οὐκ ἕωτες ἀπαλλάττεσθαι, καὶ τὸν ἄκατον ὑπολαμβάνουσι.

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1 This was the characteristically "anatomical" explanation of bile-secretion made by Erasistratus. cf. p. 170, note 2.
wider and those of the bile-ducts narrower,\(^1\) then it is clear that this watery and serous superfluity,\(^2\) too, will run out into the bile-ducts quicker than does the bile, exactly in proportion as it is thinner than the bile! How is it, then, that it does not run out? "Because," it may be said, "urine is thicker than bile!" This was what one of our Erasistrateans ventured to say, herein clearly disregarding the evidence of his senses, although he had trusted these in the case of the bile and blood. For, if it be that we are to look on bile as thinner than blood because it runs more, then, since the serous residue\(^2\) passes through fine linen or lint or a sieve more easily even than does bile, by these tokens bile must also be thicker than the watery fluid. For here, again, there is no argument which will demonstrate that bile is thinner than the serous superfluities.

But when a man shamelessly goes on using circumlocutions, and never acknowledges when he has had a fall, he is like the amateur wrestlers, who, when they have been overthrown by the experts and are lying on their backs on the ground, so far from recognizing their fall, actually seize their victorious adversaries by the necks and prevent them from getting away, thus supposing themselves to be the winners!

Why, then, says Galen, does not urine, rather than bile, enter the bile-ducts? \(^2\) Urine, or, more exactly, blood-serum.
III

Δήρος οὖν μακρὸς ἀπάσα πόρων ὑπόθεσις εἰς φυσικὴν ἐνέργειαν. εἰ μὴ γὰρ δύναμις τις σύμφυτος ἐκάστῳ τῶν ὄργανων ὑπὸ τῆς φύσεως εὐθὺς ἐξ ἀρχῆς δοθεῖσα, διαρκεῖν οὐ δυνήσεται τὰ ξίφα, μὴ ὧτι τοσοῦτον ἀριθμὸν ἐτῶν ἀλλ' οὐδ' ἁμερῶν διληγότων ἀνεπιτρόπευτα γὰρ ἐρᾶτοναι αὐτὰ καὶ τέχνης καὶ προνοίας ἔριμα μόναις ταῖς τῶν ύλῶν οἰκείονεν ῥοπαῖς, οὐδαμοῦ δύναμεως ὑδεμίας τῆς μὲν ἐλκούσης τὸ προσήκον ἑαυτῇ, τῆς δ' ἀπωθούσης τὸ ἀλλότριον, τῆς δ' ἀλλοιούσης τε καὶ προσφυόωσης τὸ θρέψον, οὐκ οἴδ' ὅπως οὐκ ἄν εἴημεν καταγελαστοὶ περὶ τε τῶν φυσικῶν ἐνεργείων διαλεγόμενοι καὶ πολὺ μᾶλλον ἔτι περὶ τῶν ψυχικῶν καὶ || συμπάσης γε τῆς ζωῆς.

Οὐδὲ γὰρ ζῆν οὐδὲ διαμένειν οὔδεν τῶν ζωῶν οὐδ' εἰς ἐλάχιστον χρόνον ἔσται δυνατόν, εἰ τοσαύτα κεκτημένον ἐν ἑαυτῷ μόρια καὶ οὕτω διαφέροντα μήθ' ἐλκτικῇ τῶν οἰκείων χρῆσεται δυνάμει μήτ' ἀποκριτικῇ τῶν ἀλλοτρίων μήτ' ἀλλοιοτικῇ τῶν θρέψοντων. καὶ μὴν εἰ ταύτας ἔχοιμεν, οὔδὲν ἔτι πόρων μικρῶν ή μεγάλων εἷς ὑποθέσεως ἀναποδείκτων λαμβανομένων εἰς οὐρον καὶ χολῆς διάκρισιν δεόμεθα καὶ τινὸς ἐπικαίρου θέσεως, ἐν δ' μόνῳ σωφρονεῖν ἔσκεν ὁ Ἐρασί-στρατος ἀπαντα καλῶς τεθήναι τε καὶ διαπλασ-

1 Or ducts, canals, conduits, i.e. morphological factors.
3 “Only”; cf. Introd., p. xxi.
4 Note how Galen, although he has not yet clearly differ-
III

Thus, every hypothesis of *channels*\(^1\) as an explanation of natural functioning is perfect nonsense. For, if there were not an *inborn faculty* given by Nature to each one of the organs at the very beginning, then animals could not continue to live even for a few days, far less for the number of years which they actually do. For let us suppose they were under no guardianship, lacking in creative ingenuity\(^2\) and forethought; let us suppose they were steered only by material forces,\(^8\) and not by any special *faculties* (the one attracting what is proper to it, another rejecting what is foreign, and yet another causing alteration and adhesion of the matter destined to nourish it); if we suppose this, I am sure it would be ridiculous for us to discuss natural, or, still more, psychical, activities—or, in fact, life as a whole.\(^4\)

For there is not a single animal which could live or endure for the shortest time if, possessing within itself so many different parts, it did not employ faculties which were attractive of what is appropriate, eliminative of what is foreign, and alterative of what is destined for nutrition. On the other hand, if we have these faculties, we no longer need *channels*, little or big, resting on an unproven hypothesis, for explaining the secretion of urine and bile, and the conception of some *favourable situation* (in which point alone Erasistratus shows some common sense, since he does regard all the parts of the body as entiatiated physiological from physical processes (both are "natural") yet separates them definitely from the psychical. \(cf.\ p.\ 2,\ footnote.\) A *psychical* function or activity is, in Latin, *actio animalis* (from *anima* = *psyche*).
θήναι τὰ μόρια τοῦ σώματος ὑπὸ τῆς φύσεως οἰόμενος.

Ἀλλ᾽ εἶ παρακολουθήσειν ἑαυτῷ φύσιν ὄνομάζοντι τεχνικὴν, εὐθὺς μὲν ἔξ ἄρχης ἀπαντά καλῶς διαπλάσασάν τε καὶ διαθείσαιν τὸν ξώον τὰ μόρια, μετὰ δὲ τὴν τοιαύτην ἐνέργειαν, ὡς οὐδὲν ἔλειπεν, ἐτὶ προαγαγοῦσαν εἰς φῶς αὐτὸ σὺν τισὶ δυνάμεις, ὅτι ἀνευ ξῆν οὐκ ἦδυνατο, καὶ μετὰ ταῦτα κατὰ βραχὺ προσαύξῆσαν ἄχρι τοῦ πρέπους μεγέθους, οὐκ οἶδα πῶς ὑπομένειν

82 πόρων σμικρότητι ἡ μεγέθεσιν ἡ τισὶν ἄλλαις οὕτω ληφώδεσιν ὑποθέσεις φυσικὰς ἐνεργείας ἐπιτρέπειν. ἡ γὰρ διαπλάττοσα τὰ μόρια φύσις ἐκεῖνη καὶ κατὰ βραχὺ προσαύξουσα πάντως δῆπον δὲ ὅλων αὐτῶν ἐκτέταται καὶ γὰρ ὅλα δὲ ὅλων οὐκ ἔξωθεν μόνον αὐτὰ διαπλάττει τε καὶ τρέφει καὶ προσαύξει. Πραξιτέλης μὲν γὰρ ἡ Φείδιας ἡ τὸς ἄλλος ἀγαλματοποιῶς ἔξωθεν μόνον ἐκόσμου τὰς ὕλας, καθὰ καὶ ψάλειν αὐτῶν ἦδυνατο, τὸ βάθος δὲ ἀκόσμητον καὶ ἄργον καὶ ἄτεχνον καὶ ἀπρονότητον ἀπέλυσεν, ὡς ἄν μὴ δυνάμενοι κατελθεῖν εἰς αὐτὸ καὶ καταδύναι καὶ θυγείν ἀπάντων τῆς ὑλῆς τῶν μερῶν. ἡ φύσις δὲ οὐχ οὕτως, ἀλλὰ τὸ μὲν ὁστὸν μέρος ἀπαν ὁστῶν ἀποτελεῖ, τὸ δὲ σαρκὸς σάρκα, τὸ δὲ πιμελής πιμελὴν καὶ τῶν ἄλλων ἐκαστὸν οὐδὲν γὰρ ἐκεῖν ἀψαυστὸν αὐτὴν μέρος οὐδ' ἀνεξέρχαστον οὐδ' ἀκόσμητον. ἀλλὰ τῶν μὲν χρυσῶν ὁ Φείδιας οὐκ ἦδυνατο ποιεῖν ἐλέφαντα καὶ χρυσὸν, ἀλλ' οὐδὲ τὸν χρυσὸν κηρῶν ἐκαστὸν γὰρ αὐτῶν μένον, οἷον ἐν ἐξ ἄρχῃς, ἔξωθεν μόνον ἡμφιεσμένον εἴδος τι
ON THE NATURAL FACULTIES, II. III

having been well and truly placed and shaped by Nature).

But let us suppose he remained true to his own statement that Nature is “artistic”—this Nature which, at the beginning, well and truly shaped and disposed all the parts of the animal,¹ and, after carrying out this function (for she left nothing undone), brought it forward to the light of day, endowed with certain faculties necessary for its very existence, and, thereafter, gradually increased it until it reached its due size. If he argued consistently on this principle, I fail to see how he can continue to refer natural functions to the smallness or largeness of canals, or to any other similarly absurd hypothesis. For this Nature which shapes and gradually adds to the parts is most certainly extended throughout their whole substance. Yes indeed, she shapes and nourishes and increases them through and through, not on the outside only. For Praxiteles and Phidias and all the other statuaries used merely to decorate their material on the outside, in so far as they were able to touch it; but its inner parts they left unembellished, unwrought, unaffected by art or forethought, since they were unable to penetrate therein and to reach and handle all portions of the material. It is not so, however, with Nature. Every part of a bone she makes bone, every part of the flesh she makes flesh, and so with fat and all the rest; there is no part which she has not touched, elaborated, and embellished. Phidias, on the other hand, could not turn wax into ivory and gold, nor yet gold into wax: for each of these remains as it was at the commencement, and becomes a perfect statue.

¹ The stage of organogenesis or diaplasis; cf. p. 25, note 4.
83 καὶ σχήμα τεχνικόν, ἀγαλμα τέλειον || γέγονεν. ἥ
φύσις δ’ οὐδεμιᾶς ἐτί φυλάττει τῶν ὕλων τὴν
ἀρχαίαν ἰδέαν· αἷμα γὰρ ἂν ἦν οὖτως ἀπαντά
τοῦ ξίφου τὰ μόρια, τὸ παρὰ τῆς κυνούσης ἐπιρ-
ρέον τῷ σπέρματι, δίκην κηροῦ τινος ὕλη μία καὶ
μονοειδής ὑποβεβλημένη τῷ τεχνώτη. γίγνεται
δὲ εὖ ξύνθης οὖδὲν τῶν τοῦ ξίφου μορίων οὐτ’ ἐρυθ-
ρών οὖτως οὐθ’ υγρόν. ὡστὸν γὰρ καὶ ἀρτηρία
καὶ φλέγ καὶ νεῦρον καὶ χόνδρος καὶ πιμελή καὶ
ἀδην καὶ ὕμην καὶ μυελὸς ἀναιμα μέν, εὖ αἷματος
dὲ γέγονε.

Τίνος ἀλλοιῶσαντος καὶ τίνος πτήσαντος καὶ
tίνος διαπλάσαντος ἐδεόμην ἂν μοι τὸν Ἑρασί-
στρατον αὐτὸν ἀποκρίνασθαι. πάντως γὰρ ἂν
εἴπεν ἦτοι τὴν φύσιν ἢ τὸ σπέρμα, ταύτων μὲν
λέγων καθ’ ἐκάτερον, διαφόροις δ’ ἐπινοίαις ἐρμη-
νεύων· δ’ γὰρ ἢν πρότερον σπέρμα, τοὐθ’, ὅταν
ἀρξηται φύειν τε καὶ διαπλάττειν τὸ ξίφον, φύσις
tis γίγνεται. καθάπερ γὰρ ὁ Φειδίας εἰχε μὲν τᾶς
dυνάμεις τής τέχνης καὶ πρὶν ψαύειν τῆς ὕλης,
ἐνήργει δ’ αὐταῖς περὶ τήν ὕλην—ἀπασα γὰρ
dύναμις ἀργεῖ ἀποροῦσα τῆς οἰκείας ὕλης—, οὖτω
84 καὶ τὸ σπέρμα τᾶς μὲν || δυνάμεις οἰκοθεν ἐκέκτητο,
tᾶς δ’ ἐνεργείας οὐκ ἐκ τῆς ὕλης ἐλαβεν, ἀλλὰ
περὶ τήν ὕλην ἐπεδείξατο.

Καὶ μὴν εἰ πολλῷ μὲν ἐπικλύσωτο τῷ αἵματι
tὸ σπέρμα, διαφθείροιτ’ ἂν εἰ δ’ ὅλως ἀποροίη

1 The spermatozoon now becomes an “organism” proper.
2 Galen attributed to the sperma or semen what we should
simply by being clothed externally in a form and artificial shape. But Nature does not preserve the original character of any kind of matter; if she did so, then all parts of the animal would be blood—that blood, namely, which flows to the semen from the impregnated female and which is, so to speak, like the statuary’s wax, a single uniform matter, subjected to the artist. From this blood there arises no part of the animal which is as red and moist [as blood is], for bone, artery, vein, nerve, cartilage, fat, gland, membrane, and marrow are not blood, though they arise from it.

I would then ask Erasistratus himself to inform me what the altering, coagulating, and shaping agent is. He would doubtless say, “Either Nature or the semen,” meaning the same thing in both cases, but explaining it by different devices. For that which was previously semen, when it begins to procreate and to shape the animal, becomes, so to say, a special nature.¹ For in the same way that Phidias possessed the faculties of his art even before touching his material, and then activated these in connection with this material (for every faculty remains inoperative in the absence of its proper material), so it is with the semen: its faculties it possessed from the beginning,² while its activities it does not receive from its material, but it manifests them in connection therewith.

And, of course, if it were to be overwhelmed with a great quantity of blood, it would perish, while if it were to be entirely deprived of blood to the fertilized ovum: to him the maternal contribution is purely passive—mere food for the sperm. The epoch-making Ovum Theory was not developed till the seventeenth century. cf. p. 19, note 3.
GALEN

παντάπασιν ἀργοῦν, οὐκ ἂν γένοιτο φύσις. ἵνα
οὖν μὴ ἑθείρηται καὶ γίγνηται φύσις ἀντὶ
σπέρματος; ὠλέγον ἐπιρρεῖν ἀναγκαῖον αὐτῷ τῷ
αἵματος, μᾶλλον δ' οὖν ὁλέγον λέγειν χρή, ἀλλὰ
σύμμετρον τῷ πλήθει τοῦ σπέρματος. τῆς οὖν
ὁ μετρῶν αὐτοῦ τὸ ποσὸν τῆς ἐπιρροῆς; τῆς ὕ
καλύων ἴέναι πλέον; τῆς ὁ προτρέπων, ἵν' ἐνδε-
έστερον μὴ ἴη; τίνα ξητήσομεν ἐνταῦθα τρίτων
ἐπιστάτην τοῦ ζωοῦ τῆς γενέσεως, δὲ χορηγήσει
tῷ σπέρματι τὸ σύμμετρον αἷμα; τι ἄν εἴπεν
Ἐρασίστρατος, εἰ ζῶν ταῦτ' ἡρωτήθη; τὸ σπέρμα
αὐτὸ δηλοῦντι τούτῳ γάρ ἐστιν ὁ τεχνίτης ὁ ἀνα-
λογῶν τῷ Φειδίᾳ, τό δ' αἷμα τῷ κηρῷ προσέοικεν.

Ὀύκουν πρέπει τὸν κηρὸν αὐτὸν ἑαυτῷ τὸ
μέτρον ἐξευρίσκειν, ἀλλὰ τὸν Φειδίαν. ἔλξει δὴ
τοσούτων αἵματος ὁ τεχνίτης εἰς ἑαυτὸν, ὅποσον
85 δεῖται. ἀλλ' ἐν' ταῦθα χρή προσέχειν ἢδη τὸν
νοῦν καὶ σκοπεῖν, μή πως λάθωμεν τῷ σπέρματι
λογισμὸν τινα καὶ νοοῦν χαρισάμενοι; οὕτω γὰρ
ἀν οὕτε σπέρμα ποιήσαμεν οὕτε φύσιν ἀλλ' ἢδη
ζῷον αὐτῷ. καὶ μὴν εἰ φυλάξομεν ἀμφότερα,
τὴν θ' ὅλην τοῦ συμμέτρον καὶ τὸ χωρίς
λογισμοῦ, δύναμιν τινα, καθάπερ ἡ λίθος ἐλκτι-
κήν εἰχε τοῦ σιδήρου, καὶ τῷ σπέρματι φῆσομεν
ὑπάρχειν αἵματος ἐπισπαστικῆν. ἡγαγάσθημεν
οὖν πάλιν κανταῦθα, καθάπερ ἢδη πολλάκις
ἐμπροσθεν, ἐλκτικὴν τινα δύναμιν ὁμολογήσαι
κατὰ τὸ σπέρμα.

1 i.e. we should be talking psychology, not biology; cf.
stomach, p. 307, note 3.
2 Attraction now described not merely as qualitative but
also as quantitative. cf. p. 85, note 3.
it would remain inoperative and would not turn into a *nature*. Therefore, in order that it may not perish, but may become a *nature* in place of semen, there must be an *afflux* to it of a little blood—or, rather, one should not say a little, but a quantity commensurate with that of the semen. What is it then that measures the quantity of this *afflux*? What prevents more from coming? What ensures against a deficiency? What is this third overseer of animal generation that we are to look for, which will furnish the semen with a due amount of blood? What would Erasistratus have said if he had been alive, and had been asked this question? Obviously, the semen itself. This, in fact, is the artificer analogous with Phidias, whilst the blood corresponds to the statuary's wax.

Now, it is not for the wax to discover for itself how much of it is required; that is the business of Phidias. Accordingly the artificer will draw to itself as much blood as it needs. Here, however, we must pay attention and take care not unwittingly to credit the semen with reason and intelligence; if we were to do this, we would be making neither semen nor a nature, but an actual living animal. And if we retain these two principles—that of proportionate attraction and that of the non-participation of intelligence—we shall ascribe to the semen a faculty for attracting blood similar to that possessed by the lodestone for iron. Here, then, again, in the case of the semen, as in so many previous instances, we have been compelled to acknowledge some kind of attractive faculty.

He still tends either to biologize physics, or to physicize biology—whichever way we prefer to look at it. *cf.* Book I., chap. xiv.
Τί δ’ ἦν τὸ σπέρμα; ἡ ἀρχή τοῦ ζῴου δηλονότι ἡ δραστική. ἡ γὰρ ὑλικὴ τὸ καταμήνων ἐστιν. εἰτ’ αὐτὴς τῆς ἀρχῆς πρώτη ταύτη τῇ δυνάμει χρωμένης, ἵνα γενήται τῶν ὑπ’ αὐτῆς τὶ δεδημουργημένων, ἀμοιρον εἴναι τῆς οἰκείας δυνάμεως ὅπερ ἱνδέχεται. πῶς οὖν Ἐρασίστρατος αὐτὴν ὅπερ ὅˀ δεν, εἰ δὴ πρώτη μὲν αὐτὴ τοῦ σπέρματος ἐνέργη ἵνα τὸ σύμμετρον ἀἵματος ἐπιστᾶσθαι πρὸς ἑαυτὸ; σύμμετρον δ’ ἄν εἴη τὸ λεπτὸν οὔτω καὶ ἀτμώδες, ὡστ’ εὐθὺς εἰς πάν μόριον ἐλκόμενον τοῦ σπέρματος δροσοείδὼς μηδαμοῦ τὴν ἔαυτος παρεμφαίνειν ἴδεαν. οὕτω γὰρ αὐτὸν καὶ κρατήσει ραδίως τὸ σπέρμα καὶ ταχέως ἐξομοιώσει καὶ τροφὴν ἑαυτοῦ ποιήσεται καταεί’ οὐμα δεύτερον ἐπιστᾶσεται καὶ τρίτον, ὡς ὅγκον ἑαυτῷ καὶ πλήθος ἀξιόλογον ἐργάσασθαι ἀραφέντε. καὶ μὴν ἡδή καὶ ἡ ἀλλοιωτικὴ δύναμις ἐξεύρηται μηδ’ αὐτὴ πρὸς Ἐρασίστρατον γεγραμμένη. τρίτη δ’ ἄν ἡ διαπλαστικὴ φανείᾳ, καθ’ ἡν πρῶτον μὲν οἶνον ἐπίπαγον τίνα λεπτὸν ὑμένα περιτίθησιν ἑαυτῷ τὸ σπέρμα, τὸν ὑφ’ Ἰπποκράτους ἐπὶ τῆς ἐκταίας γονῆς, ἡν ἐκπεσεὶ εἶπεν ἐλεγεν τῆς μουσουργοῦ, τῶν τῶν ὅνων εἰκασθέντα χιτῶνι· μετὰ δὲ τοῦτον ἡδὴ καὶ τάλλη, ὡς πρὸς ἐκεῖνον λέγεται διὰ τοῦ περὶ φύσιος παιδίον συγγράμματος.

Αλλ’ εἰ τῶν διαπλασθέντων ἐκαστον οὕτω μείνει σμικρόν, ὡς ἐξ ἀρχῆς ἐγένετο, τί ἂν εἴη πλέον; αὐξάνεσθαι τῶνυν αὐτὰ χρῆ. πῶς οὖν

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1 Aristotelian and Stoic duality of an active and a passive principle.
2 Note that early embryonic development is described as a process of nutrition. cf. p. 130, note 2.
ON THE NATURAL FACULTIES, II. III

And what is the semen? Clearly the active principle of the animal, the material principle being the menstrual blood. Next, seeing that the active principle employs this faculty primarily, therefore, in order that any one of the things fashioned by it may come into existence, it [the principle] must necessarily be possessed of its own faculty. How, then, was Erasistratus unaware of it, if the primary function of the semen be to draw to itself a due proportion of blood? Now, this fluid would be in due proportion if it were so thin and vaporous, that, as soon as it was drawn like dew into every part of the semen, it would everywhere cease to display its own particular character; for so the semen will easily dominate and quickly assimilate it—in fact, will use it as food. It will then, I imagine, draw to itself a second and a third quantum, and thus by feeding it acquires for itself considerable bulk and quantity. In fact, the alterative faculty has now been discovered as well, although about this also Erasistratus has not written a word. And, thirdly the shaping faculty will become evident, by virtue of which the semen firstly surrounds itself with a thin membrane like a kind of superficial condensation; this is what was described by Hippocrates in the sixth-day birth, which, according to his statement, fell from the singing-girl and resembled the pellicle of an egg. And following this all the other stages will occur, such as are described by him in his work “On the Child’s Nature.”

But if each of the parts formed were to remain as small as when it first came into existence, of what use would that be? They have, then, to grow.

On the alterative and shaping faculties cf. p. 18, note 1.
αὐξηθῆσεται; πάντη διατεινόμενα θ̄ ἀμα καὶ 
τρεφόμενα. καὶ μοι τῶν ἐμπροσθεν 
εἰρημένων ἐπὶ τῆς κύστεως, ἥν οἱ παίδες ἐμφυσώντες ἔτρι-
βον, ἀναμνησθέοις μαθήσῃ μᾶλλον || κὰκ τῶν νῦν 
ῥηθησομένων.

Ἐννόησον γὰρ δὴ τὴν καρδίαν οὐτω μὲν μικρὰν 
eῖναι κατ’ ἄρχας, ὡς κέγχρου μηδὲν διαφέρειν ἡ, 
eἰ δεύλει, κυνᾶμον, καὶ ξήτησον, δόπως ἀλλὰς 
αὐτὴ γένοιτο μεγάλη χωρὶς τοῦ πάντη διατεινο-
μένην τρέφεσθαι δι’ ὅλης ἑαυτῆς, ὡς ὁλίγον πρόσ-
θειν εἴδεικνυτο τὸ σπέρμα τρεφόμενον. ἀλλ’ οὕδὲ 
τούτ’ Ἐρασίστρατος οἴδειν ὁ τὴν τέχνην τῆς 
φύσεως ύμνῶν, ἀλλ’ οὕτως αὐξάνεσθαι τὰ ἄρχα 
νομίζει καθάπερ τινά κρησέραν ὡς σειρὰν ἡ σάκκον 
ἡ τάλαρον, δων ἐκάστῳ κατὰ τὸ πέρας ἐπιπλεκο-
μένων ὁμοίων ἐτέρων τοῖς ἐξ ἄρχῆς αὐτὰ συντι-
θείσιν ἡ πρόσθεσις γίγνεται.

Ἀλλὰ τούτῳ γ’ οὐκ αὐξησίς ἐστὶν ἀλλὰ γένε-
σις, ὡς σοφώτατος γίγνεται γὰρ ὁ θύλακος ἔτι καὶ 
ὁ σάκκος καὶ θοιμάτων καὶ ἡ οἰκία καὶ τὸ πλοῖον 
καὶ τῶν ἄλλων ἐκαστὸν, ὡς δὲ ἔστερον τὸ προσ-
ῃκὸν εἴδος, οὐ χάριν ὑπὸ τοῦ τεχνίτον δημιουρ-
γεῖται, συμπεπληρωμένον ἡ. πότ’ οὖν αὐξάνεται; 
ὅταν ἤδη τέλειος δὲν ὁ τάλαρος, ὡς ἔχειν πυθμένα 
τε τινα καὶ στόμα καὶ οἶον γαστέρα καὶ τὰ 
τοῦτων μεταξὺ, μείζων ἀπασί τούτων γένηται.

καὶ πῶς || ἔσται τούτο; φῆσει τις. πῶς δ’ ἄλλως 
ἡ εἰ ζῷον ἐξαίφνης ἡ φυτῶν ὁ τάλαρος ἡμῖν 
γένοιτο; μόνων γὰρ τῶν ζώντων ἡ αὐξησίς. σὺ 
δ’ ἵσως οὐει τὴν οἰκίαν οἰκοδομομεμένην αὐξάνε-
ON THE NATURAL FACULTIES, II. III

Now, how will they grow? By becoming extended in all directions and at the same time receiving nourishment. And if you will recall what I previously said about the bladder—which the children blew up and rubbed,¹ you will also understand my meaning better as expressed in what I am now about to say.

Imagine the heart to be, at the beginning, so small as to differ in no respect from a millet-seed, or, if you will, a bean; and consider how otherwise it is to become large than by being extended in all directions and acquiring nourishment throughout its whole substance, in the way that, as I showed a short while ago, the semen is nourished. But even this was unknown to Erasistratus—the man who sings the artistic skill of Nature! He imagines that animals grow like webs, ropes, sacks, or baskets, each of which has, woven on to its end or margin, other material similar to that of which it was originally composed.

But this, most sapient sir, is not growth, but genesis! For a bag, sack, garment, house, ship, or the like is said to be still coming into existence [undergoing genesis] so long as the appropriate form for the sake of which it is being constructed by the artificer is still incomplete. Then, when does it grow? Only when the basket, being complete, with a bottom, a mouth, and a belly, as it were, as well as the intermediate parts, now becomes larger in all these respects. “And how can this happen?” someone will ask. Only by our basket suddenly becoming an animal or a plant; for growth belongs to living things alone. Possibly you imagine that a house grows when it is being built, or a basket when being

¹ pp. 27–29.
σθαί καὶ τὸν τάλαρον πλεκόμενον καὶ θοίματιον ύφαινόμενον. ἀλλ’ οὖν ὃδε ἔχει· τοῦ μὲν γὰρ ἢδη συμπεπληρωμένον κατὰ τὸ εἶδος ἡ αὔξησις, τοῦ δὲ ἐτὶ γιγνομένου ἢ εἰς τὸ εἶδος ὁδὸς οὖν αὔξησις ἀλλὰ γένεσις ὁνομάζεται· αὔξάνεται μὲν γὰρ τὸ ὄν, γίγνεται δὲ τὸ οὖκ ὄν.

IV

Καὶ ταῦτ’ Ἐρασίστρατος οὖν οἶδεν, ὅτι οὐδὲν λανθάνει, εἰπὲρ ὅλως ἁληθεύοντι οἴ άπ’ αὐτοῦ φᾶσκοντες ὁμιληκέναι τοῖς ἐκ τοῦ περιπάτου φιλοσόφους αὐτῶν. ἀχρὶ μὲν οὖν τοῦ τὴν φύσιν ὑμεῖν ὡς τεχνικὴν κάγω γνωρίζω τὰ τοῦ περιπάτου δόγματα, τῶν δὲ ἄλλων οὐδὲν οὐδ’ ἔγγυς. εἰ γὰρ τις ὁμιλήσει τοῖς Ἀριστοτέλους καὶ Θεοφράστου γράμμασι, τῆς Ἰπποκράτους ἄν αὐτὰ δόξει φυσιολογιᾶς ὑπομνήματα συγκεῖσθαι, τὸ θερμὸν καὶ τὸ ψυχρὸν καὶ τὸ ξηρὸν καὶ τὸ ὑγρὸν εἰς ἄλληλα δρῶντα καὶ πᾶσχοντα καὶ τούτων αὐτῶν δραστικῶτατον μὲν τὸ θερμὸν, δεύτερον δὲ τῇ δυνάμει τὸ ψυχρὸν Ἰπποκράτους ταῦτα σύμπαντα πρῶτον, δεύτερον δὲ Ἀριστοτέλους εἰπόντος. τρέφεσθαι δὲ δι’ ὅλων αὐτῶν τὰ τρεφόμενα καὶ κερανυνύθαι δι’ ὅλων τὰ κεραννύμενα καὶ ἀλλοιούσθαι δι’ ὅλων τὰ ἀλλοιούμενα, καὶ ταῦθ’ Ἰπποκράτεια θ’ ἀμα καὶ Ἀριστοτέλεια. καὶ τῆν πέψιν ἀλλοιωσάν τιν’

plaited, or a garment when being woven? It is not so, however. Growth belongs to that which has already been completed in respect to its form, whereas the process by which that which is still becoming attains its form is termed not growth but genesis. That which is, grows, while that which is not, becomes.

IV

This also was unknown to Erasistratus, whom nothing escaped, if his followers speak in any way truly in maintaining that he was familiar with the Peripatetic philosophers. Now, in so far as he acclaims Nature as being an artist in construction, even I recognize the Peripatetic teachings, but in other respects he does not come near them. For if anyone will make himself acquainted with the writings of Aristotle and Theophrastus, these will appear to him to consist of commentaries on the Nature-lore [physiology]¹ of Hippocrates—according to which the principles of heat, cold, dryness and moisture act upon and are acted upon by one another, the hot principle being the most active, and the cold coming next to it in power; all this was stated in the first place by Hippocrates and secondly by Aristotle.² Further, it is at once the Hippocratic and the Aristotelian teaching that the parts which are being nourished receive that nourishment throughout their whole substance, and that, similarly, processes of mingling and alteration involve the entire substance.³ Moreover, that digestion is a species of

³ For definitions of alteration and mingling (crasis, "temperament") cf. Book I., chaps. ii. and iii.
GALEN

υπάρχειν καὶ μεταβολήν τοῦ τρέφοντος εἰς τὴν οἰκείαν τοῦ τρεφομένου ποιότητα, τὴν δ᾿ ἐξαιμάτωσιν ἀλλοιώσιν εἶναι καὶ τὴν θρέψιν ὅσαντως καὶ τὴν αὔξησιν ἐκ τῆς πάντης διατάσεως καὶ θρέψεως γίγνεσθαι, τὴν δ᾿ ἀλλοιώσιν ὑπὸ τοῦ θερμοῦ μάλιστα συντελεῖσθαι καὶ διὰ τοῦτο καὶ τὴν πέψιν καὶ τὴν θρέψιν καὶ τὴν τῶν χυμῶν ἀπάντων γένεσιν, ἣδη δὲ καὶ τοῖς περιπτώμασι τὰς ποιότητας ὑπὸ τῆς ἐμφύτου θερμασίας ἐγγίγνεσθαι, ταῦτα σύμπαντα καὶ πρὸς τούτους ἔτερα πολλά τὰ τῶν προειρημένων δυνάμεων καὶ τὰ ἃ τῶν νοσημάτων τῆς γενέσεως καὶ τὰ τῶν ἱαμάτων τῆς εὐρέσεως Ἰπποκράτης μὲν πρῶτος ἀπάντων δὲν ἴσμεν ὃρθῶς εἶπεν, Ἀριστοτέλης δὲ δεύτερος ὃρθώς ἐξηγήσατο. καὶ μὴν εἰ ταῦτα σύμπαντα τοῖς ἐκ τοῦ περιπτάτου δοκεῖ, καθάπερ οὖν δοκεῖ, μηδὲν δ᾿ αὐτῶν ἀρέσκει τῷ Ἐρασιστράτῳ, τί ποτε βούλεται τοῖς Ἐρασιστράτειοις ἡ πρὸς τοὺς φιλοσόφους ἐκεῖνους τοῦ τῆς αἰρέσεως αὐτῶν ἡγεμόνοις ὁμιλία; θαυμάζομεν μὲν γὰρ αὐτῶν ὡς θεὸν καὶ πάντ᾽ ἀληθεύειν νομίζουσιν. εἰ δ᾽ οὕτως ἔχει ταῦτα, πάμπολυ δὴν τῆς ἀληθείας ἐσφάλθαι χρῆ νομίζειν τοὺς ἐκ τοῦ περιπτάτου φιλοσόφους, οἷς μηδὲν ὡς Ἐρασιστράτος ὑπελάμβανεν ἀρέσκει. καὶ μὴν ὡσπέρ των εὐγένειαν αὐτῷ τῆς φυσιολογίας τὴν πρὸς τούς ἄνδρας ἐκεῖνους συνουσίαν ἑκκορίζουσι.

Πάλιν οὖν ἀναστρέψωμεν τὸν λόγον ἐτέρως ἡ ὡς ὀλίγῳ πρόσθεν ἐτύχομεν εἰπόντες. εἰπερ γὰρ οἱ ἐκ τοῦ περιπτάτου καλῶς ἐφυσιολογησαν, οὐδὲν δὲν εἰ ἡ ληρωδεστερον Ἐρασιστράτου καὶ δίδωμι τοῖς Ἐρασιστράτειοις αὐτοῖς τὴν αἴρεσιν.
ON THE NATURAL FACULTIES, II. iv

alteration—a transmutation of the nutriment into the proper quality of the thing receiving it; that blood-production also is an alteration, and nutrition as well; that growth results from extension in all directions, combined with nutrition; that alteration is effected mainly by the warm principle, and that therefore digestion, nutrition, and the generation of the various humours, as well as the qualities of the surplus substances, result from the innate heat;¹ all these and many other points besides in regard to the aforesaid faculties, the origin of diseases, and the discovery of remedies, were correctly stated first by Hippocrates of all writers whom we know, and were in the second place correctly expounded by Aristotle. Now, if all these views meet with the approval of the Peripatetics, as they undoubtedly do, and if none of them satisfy Erasistratus, what can the Erasistrateans possibly mean by claiming that their leader was associated with these philosophers? The fact is, they revere him as a god, and think that everything he says is true. If this be so, then we must suppose the Peripatetics to have strayed very far from truth, since they approve of none of the ideas of Erasistratus. And, indeed, the disciples of the latter produce his connection with the Peripatetics in order to furnish his Nature-lore with a respectable pedigree.

Now, let us reverse our argument and put it in a different way from that which we have just employed. For if the Peripatetics were correct in their teaching about Nature, there could be nothing more absurd than the contentions of Erasistratus. And, I will leave it to the Erasistrateans themselves to decide;

¹ i.e. are associated with oxidation? cf. p. 41, note 3.
91 ἣ γὰρ τὸν πρῶτον λόγον ἡ τούτου ἀποστάζεται. λέγει δ’ ὁ μὲν πρῶτος οὐδὲν ὧδες ἐγνωκέναι περὶ φύσεως τοὺς περιπατητικούς, ὁ δὲ δεύτερος Ἐρασίστρατος. ἐμὸν μὲν οὖν ὑπομνήσαι τῶν δογμάτων την μάχην, ἐκείνων δ’ ἡ αἴρεσις.

‘Αλλ’ ὅτι ἀν ἀποστάζειν τοῦ θαυμάζειν Ἐρασίστρατον οὐκ εἰσί σωματώσαν περὶ τῶν ἐκ τοῦ περιπάτου φιλοσόφων. παμπόλλων γὰρ οὕτων δογμάτων φυσικῶν περὶ τε γένεσιν καὶ φθοράν τῶν ζῴων καὶ θηλείαν καὶ νόσους καὶ τὰς θεραπείας αὐτῶν ἐν μόνον εὑρεθήσεται ταύτων Ἐρασίστρατῳ κακείνως τοῖς ἀνδράσι, τὸ τινὸς ἑνεκα πάντα ποιεῖν τὴν φύσιν καὶ μάτην μηδεν.

‘Αλλὰ καὶ αὐτὸ τούτο μέχρι λόγου κοινον, ἐργῷ δὲ μυριάκις Ἐρασίστρατος αὐτῷ διαφθείρει: μάτην μὲν γὰρ ὁ σπλήν ἐγένετο, μάτην δὲ τὸ ἐπίπλον, μάτην δ’ αἰ εἰς τοὺς νεφροὺς ἀρτηρίαι καταφυνομέναι, σχεδὸν ἀπασῶν τῶν ἀπὸ τῆς μεγάλης ἀρτηρίας ἀποβλαστανοῦσών οὐδὲν μέγισται, μάτην δ’ ἀλλὰ μυρία κατὰ γε τῶν Ἐρασίστρατεων λόγον ἀπερ εἰ μὲν οὖδ’ ὅλως γυμνώσκει, βραχεῖ μαγείρου σοφότερος ἐστίν ἐν ταῖς ἀνατομαῖς, εἰ δ’ εἴδως οὐ λέγει τὴν χρείαν ἀυτῶν, οἴεται || δηλοῦσιν παραπλησίως τῷ σπλήνι μάτην αὐτὰ γεγονέναι. καίτοι τί ταῦτ’ ἐπεξ- ἔρχομαι τῆς περὶ χρείας μορίων πραγματείας ὑπὲρ μελλοῦσις ἡμῖν ἴδια περαίνεσθαι;

1 “Useless” organs; cf. p. 56, note 2. For fallacy of Erasistratus’s view on the spleen v. p. 205.

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they must either advance the one proposition or the other. According to the former one the Peripatetics had no accurate acquaintance with Nature, and according to the second, Erasistratus. It is my task, then, to point out the opposition between the two doctrines, and theirs to make the choice.

But they certainly will not abandon their reverence for Erasistratus. Very well, then; let them stop talking about the Peripatetic philosophers. For among the numerous physiological teachings regarding the genesis and destruction of animals, their health, their diseases, and the methods of treating these, there will be found one only which is common to Erasistratus and the Peripatetics—namely, the view that Nature does everything for some purpose, and nothing in vain.

But even as regards this doctrine their agreement is only verbal; in practice Erasistratus makes havoc of it a thousand times over. For, according to him, the spleen was made for no purpose, as also the omentum; similarly, too, the arteries which are inserted into kidneys—although these are practically the largest of all those that spring from the great artery [aorta]! And to judge by the Erasistratean argument, there must be countless other useless structures; for, if he knows nothing at all about these structures, he has little more anatomical knowledge than a butcher, while, if he is acquainted with them and yet does not state their use, he clearly imagines that they were made for no purpose, like the spleen. Why, however, should I discuss these structures fully, belonging as they do to the treatise “On the Use of Parts,” which I am personally about to complete?
GALEN

Πάλιν οὖν ἀναλάβωμεν τῶν αὐτῶν λόγων εἰπόντες τε τι βραχὺ πρὸς τοὺς Ἐρασιστρατεῖους ἐτὶ τῶν ἐφεξῆς ἐχώμεθα. δοκοῦσι γὰρ μοι μηδὲν ἀνεγνωκέναι τῶν Ἀριστοτέλους οὔτοι συγγραμμάτων, ἀλλ’ ἄλλων ἀκούοντες, ὡς δευνὸς ἦν περὶ φύσιν ὁ ἀνθρώπος καὶ ὡς οἱ ἀπὸ τῆς στοὰς κατ’ ἱχνη τῆς ἐκείνου φυσιολογίας βαδίζοντι, εἰθ’ εὑρόντες ἐν τι τῶν περιφερομένων δογμάτων κοινὸν αὐτῷ πρὸς Ἐρασιστρατον ἀναπλάσαι τινα συνουσίαν αὐτοῦ πρὸς ἐκείνους τοὺς ἄνδρας. ἀλλ’ ὅτι μὲν τῆς Ἀριστοτέλους φυσιολογίας οὔδὲν Ἐρασιστράτωρ μέτεστιν, ὁ κατάλογος τῶν προειρημένων ἐνδείκνυται δογμάτων, ἀ πρώτων μὲν Ἰπποκράτους ἦν, δευτέρου δ’ Ἀριστοτέλους, τρίτων δὲ τῶν Στωικῶν, ἐνὸς μόνου μετατιθεμένου τοῦ τὰς ποιότητας εἶναι σώματα.

Τάχα δ’ ἄν τῆς λογικῆς ἐνεκα θεωρίας ὀμιληκέναι φαίεν τῶν Ἐρασιστρατον τοῖς ἐκ τοῦ περιπάτου φιλοσόφους, οὐκ εἰδότες, ὡς ἐκεῖνοι μὲν ψευδείς καὶ ἀπεράντους οὐκ ἐγγαγάν λόγους, τὰ δ’ Ἐρασιστράτεια βιβλία παμπόλλους ἐχεῖ τοὺς τοιούτους.

Τάχ’ ἄν οὖν ἦδη τις θαυμάζοι καὶ διαποροθε, τί παθῶν ὁ Ἐρασιστράτος εἰς τοσοῦτον τῶν Ἰπποκράτους δογμάτων ἀπετρότετο καὶ διὰ τί τῶν ἐν ὑπατί πόρων τῶν χοληδόχων, ἀλλ’ ὧρ ἦδη νεφρῶν, ἀφελόμενοι τῷ ἑλκτικῇ δύναμιν ἐπίκαιρον αἰτιάται θέσιν καὶ στομάτων

1 The Stoics.  2 The Peripatetics (Aristotelians).
3 Aristotle regarded the qualitative differences apprehended by our senses (the cold, the warm, the moist, and the dry) as fundamental, while the Stoics held the four corporeal elements
ON THE NATURAL FACULTIES, II. iv

Let us, then, sum up again this same argument, and, having said a few words more in answer to the Erasistreans, proceed to our next topic. The fact is, these people seem to me to have read none of Aristotle’s writings, but to have heard from others how great an authority he was on “Nature,” and that those of the Porch follow in the steps of his Nature-lore; apparently they then discovered a single one of the current ideas which is common to Aristotle and Erasistratus, and made up some story of a connection between Erasistratus and these people.² That Erasistratus, however, has no share in the Nature-lore of Aristotle is shown by an enumeration of the aforesaid doctrines, which emanated first from Hippocrates, secondly from Aristotle, thirdly from the Stoics (with a single modification, namely, that for them the qualities are bodies).³

Perhaps, however, they will maintain that it was in the matter of logic that Erasistratus associated himself with the Peripatetic philosophers? Here they show ignorance of the fact that these philosophers never brought forward false or inconclusive arguments, while the Erasistratean books are full of them.

So perhaps somebody may already be asking, in some surprise, what possessed Erasistratus that he turned so completely from the doctrines of Hippocrates, and why it is that he takes away the attractive faculty from the biliary passages in the liver—for we have sufficiently discussed the kidneys—alleging [as the cause of bile-secretion] a favourable situation, the narrowness of vessels, and a

(earth, air, fire, and water) to be still more fundamental. cf. p. 8, note 3. ¹ Lit. bile-receiving (choledochous).
GALEN

στενότητα καὶ χώραν τινὰ κοινήν, εἰς ἥν παράγουσι μὲν αἱ ἀπὸ τῶν πυλῶν τὸ ἀκάθαρτον αἷμα, μεταλαμβάνουσι δὲ πρῶτοι μὲν οἱ πόροι τὴν χολήν, δεύτεραι δὲ αἱ ἀπὸ τῆς κοίλης φλεβὸς τὸ καθαρὸν αἷμα. πρὸς γὰρ τῷ μηδὲν ἄν βλαβῆναι τὴν ὀλκήν εἰπὼν ἄλλων μυρίων ἐμελλεν ἀμφισβητομένων ἀπαλλάξεσθαι λόγων.

V

'Ως νῦν γε πόλεμος οὐ σμικρός ἐστι τοῖς Ἐρασιστρατείοις οὐ πρὸς τοὺς ἄλλους μόνον ἄλλα καὶ πρὸς ἄλληλους, οὐκ ἔχονσιν, ὅπες ἐξηγήσονται τὴν ἐκ τοῦ πρῶτον τῶν καθόλου λόγων λέξιν, ἐν ἦ φησιν. "Εἰς τὸ μιὸ ἄνεστομωμένων ἐτέρων δύο ἁγιεῖων τῶν τ' ἐπὶ τὴν χοληδόχον τεινόντων καὶ τῶν ἐπὶ τὴν κοίλην φλέβα συμβαίνει τῆς ἀναφερομένης ὡς τῆς κοιλίας τροφῆς τα ἐναρμόζοντα ἐκατέρω τῶν στομάτων εἰς ἐκάτερα τῶν ἁγιείων μεταλαμβάνονται καὶ τὰ μὲν ἐπὶ τὴν χοληδόχον φέρεσθαι, τὰ δ' ἐπὶ τὴν κοίλην φλέβα περαιοῦσθαι." τὸ γὰρ "εἰς τὸ αὐτὸ ἄνεστομωμένων," δ' ἄρχας τῆς λέξεως γέγραπται, τί ποτε χρη νοῆσαι, χαλεπὸν εἶπεῖν. ἦτοι γὰρ οὕτως εἰς ταύτην, ὥστε τῷ τῆς ἐν τοῖς σιμοῖς φλεβὸς πέρατι συνάπτειν δύο ἐπιν τέρατα, τὸ τ' ἐν τοῖς

1 Jecoris portae, the transverse fissure, by which the portal vein enters the liver.
ON THE NATURAL FACULTIES, II. iv.–v

common space into which the veins from the gateway [of the liver] conduct the unpurified blood, and from which, in the first place, the [biliary] passages take over the bile, and secondly, the [branches] of the vena cava take over the purified blood. For it would not only have done him no harm to have mentioned the idea of attraction, but he would thereby have been able to get rid of countless other disputed questions.

V

At the actual moment, however, the Erasistratians are engaged in a considerable battle, not only with others but also amongst themselves, and so they cannot explain the passage from the first book of the "General Principles," in which Erasistratus says, "Since there are two kinds of vessels opening at the same place, the one kind extending to the gall-bladder and the other to the vena cava, the result is that, of the nutriment carried up from the alimentary canal, that part which fits both kinds of stomata is received into both kinds of vessels, some being carried into the gall-bladder, and the rest passing over into the vena cava." For it is difficult to say what we are to understand by the words "opening at the same place" which are written at the beginning of this passage. Either they mean there is a junction between the termination of the vein which is on the concave surface of the liver and two other vascular terminations (that of the vessel on the convex surface of the liver.

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2 Lit. "anastomosing."
3 More literally, "synapse."
4 The portal vein.
5 The hepatic vein or veins.
κυρτοὶς καὶ τὸ τοῦ χοληδόχου πόρου, ἢ, εἰ μὴ οὔτω, χώραν τινὰ κοινὴν ἐπινοήσαι χρή τῶν τριῶν ἀγγείων οἷον δεξαμενήν τινα, πληρομένην μὲν ὑπὸ τῆς κάτω φλεβῶς, ἐκκενομένην δ' εἰς τοὺς χοληδόχους πόρους καὶ τὰς τῆς κοίλης ἀποσχίδας· καθ' ἐκατέραν δὲ τῶν ἐξηγήσεων ἀτόπα πολλά, περὶ δὲν εἰ πάντων λέγομι, λάθοιμ' ἀν ἐμαυτὸν ἐξηγήσεις Ἐρασιστράτου γράφων, οὐχ, ὅπερ ἐξ ἀρχῆς προΰθεμνη, περαιών. κοινὸν δ' ἀμφότεραις ταῖς ἐξηγήσεωι ἀτοπον τὸ μῆ || καθαιρεσθαι πάν τὸ αἷμα. χρὴ γὰρ ὡς εἰς ἥθμον τινα τὸ χοληδόχου ἀγγείον ἐμπίπτειν αὐτὸ, οὐ παρέρχεσθαι καὶ παραρρέω ὅκεως εἰς τὸ μεῖξον στόμα τῇ ῥύμῃ τῆς ἀναδόσεως φερόμενον.

'Αρ' οὖν ἐν τούτοις μόνον ἀπορίας ἀφύκτοις ὁ Ἐρασιστράτου λόγος ἐνέχεται μη βουληθέντος χρήσασθαι ταῖς ἐλεκτικάς δυνάμεσιν εἰς μηδὲν, ἡ σφοδρότατα μὲν ἐν τούτοις καὶ σαφῶς οὔτως, ὡς ἀν μηδὲ παίδα λαθεῖν;

VI

Εἰ δ' ἐπισκοποῖτο τὰς ἐπιμελῶς, οὐδ' ὁ περὶ θρέψεως αὐτοῦ λόγος, ὅν ἐν τῷ δευτέρῳ τῶν καθόλου λόγων διεξέρχεται, τὰς αὐτὰς ἀπορίας ἐκφεύγει. τῇ γὰρ πρὸς τὸ κενούμενον ἀκολουθία συγχωρηθέντος ἐνὸς λήμματος, ὡς πρόσθεν ἐδεικνύμεν, ἑπέραινε τι περὶ φλεβῶν μόνων καὶ τοῦ κατ' αὐτὰς αἵματος. ἐκρέοντος γὰρ τινός

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1 The portal vein. 2 cf. p. 120, note 1.
ON THE NATURAL FACULTIES, II. v.–vi

and that of the bile-duct), or, if not, then we must suppose that there is, as it were, a common space for all three vessels, which becomes filled from the lower vein,¹ and empties itself both into the bile-duct and into the branches of the vena cava. Now, there are many difficulties in both of these explanations, but if I were to state them all, I should find myself inadvertently writing an exposition of the teaching of Erasistratus, instead of carrying out my original undertaking. There is, however, one difficulty common to both these explanations, namely, that the whole of the blood does not become purified. For it ought to fall into the bile-duct as into a kind of sieve, instead of going (running, in fact, rapidly) past it, into the larger stoma, by virtue of the impulse of anadosis.

Are these, then, the only inevitable difficulties in which the argument of Erasistratus becomes involved through his disinclination to make any use of the attractive faculty, or is it that the difficulty is greatest here, and also so obvious that even a child could not avoid seeing it?

VI

And if one looks carefully into the matter one will find that even Erasistratus's reasoning on the subject of nutrition, which he takes up in the second book of his "General Principles," fails to escape this same difficulty. For, having conceded one premise to the principle that matter tends to fill a vacuum, as we previously showed, he was only able to draw a conclusion in the case of the veins and their contained blood.² That is to say, when
κατά τὰ στόματ’ αὐτῶν καὶ διαφορομένου καὶ μὴ άθρόως τόπου κενοῦ δυνάμενου γενέσθαι μήτε τῶν φλεβῶν συμπεσεῖν, τοῦτο γὰρ ἢν τὸ παραλειπόμενον, ἀναγκαίον ἢν ἔπεσθαι τὸ συνεχὲς ἀναπληρῶν τοῦ κενοῦ|μένου τὴν βάσιν. αἱ μὲν δὴ φλέβες ἡμῖν οὕτω θρέψονται τοῦ περιεχομένου καὶ αὐτὰς αἴματος ἀπολαύουσαι· τὰ δὲ νεῦρα πῶς; οὐ γὰρ δὴ κἂν τούτως ἔστιν αἴμα. πρό-χειρον μὲν γὰρ ἢν εἰπεῖν, ἐλκοντα παρὰ τῶν φλεβῶν· ἀλλ’ οὐ βούλεται. τί ποτ’ οὖν καν- ταύθα ἐπιτεχνᾶται; φλέβας ἔχειν ἐν ἑαυτῷ καὶ ἀρτηρίας τὸ νεῦρον ὡσπερ τินα σειράν ἐκ τριῶν ἱμάτων διαφερόντων τῇ φύσει πεπλεγ-μένην. φήθη γὰρ ἐκ ταύτης τῆς ὑποθέσεως ἐκφεύξεσθαι τῷ λόγῳ τῆς ὁλκήν οὖ γὰρ ἃν ἔτι δεήσεσθαι τὸ νεῦρον ἐν ἑαυτῷ περιέχον αἵματος ἀγγειον ἐπιρρήτου τινὸς ἡξώθεν ἐκ τῆς παρα- κειμένης φλεβὸς τῆς ἀληθινῆς αἵματος ἑτέρου, ἀλλ’ ἰκανὸν αὐτῷ πρὸς τὴν θρέψιν ἔσεσθαι τὸ κατεψυκμένον ἀγγεῖον ἐκεῖνο τὸ λόγῳ θεω-ρητόν.

Ἀλλὰ κανταύθα πάλιν αὐτῶν ὁμοία τις ἀπορία διεδέξατο. τοῦτ’ γὰρ τὸ σμικρὸν ἀγγεῖον ἑαυτὸ μὲν θρέψει, τὸ παρακείμενον μὲντοι νεῦρον ἑκεῖνο τὸ ἀπλοῦν ἢ τὴν ἀρτηρίαν οὐχ οἶδαν τ’ ἔσται τρέφειν ἄνευ τοῦ σύμφυτον τιν’ ὑπάρχειν αὐτοῖς ὁλκήν τῆς τροφῆς. τῇ μὲν γὰρ πρὸς τὸ κενοῦ-μενον ἀκολουθία πῶς ἂν ἔτι δύνατο τὴν τροφὴν ἐπιστῆσθαι τὸ ἀπλοῦν νεῦρον, ὡσπερ αἱ φλέβες

1 cf. p. 272, note 1.
2 i.e. one might assume an attraction.
blood is running away through the stomata of the veins, and is being dispersed, then, since an absolutely empty space cannot result, and the veins cannot collapse (for this was what he overlooked), it was therefore shown to be necessary that the adjoining quantum of fluid should flow in and fill the place of the fluid evacuated. It is in this way that we may suppose the veins to be nourished; they get the benefit of the blood which they contain. But how about the nerves? ¹ For they do not also contain blood. One might obviously say that they draw their supply from the veins.² But Erasistratus will not have it so. What further contrivance, then, does he suppose? He says that a nerve has within itself veins and arteries, like a rope woven by Nature out of three different strands. By means of this hypothesis he imagined that his theory would escape from the idea of attraction. For if the nerve contain within itself a blood-vessel it will no longer need the adventitious flow of other blood from the real vein lying adjacent; this fictitious vessel, perceptible only in theory,³ will suffice it for nourishment.

But this, again, is succeeded by another similar difficulty. For this small vessel will nourish itself, but it will not be able to nourish this adjacent simple nerve or artery, unless these possess some innate proclivity for attracting nutriment. For how could the nerve, being simple, attract its nourishment, as do the composite veins, by virtue of the tendency

³ i.e. visible to the mind’s eye as distinguished from the bodily eye. cf. p. 21, note 4. Theoreton without qualification means merely visible, not theoretic. cf. p. 205, note 1.
ai σύνθετοι; κοιλότης μὲν γάρ τίς ἦστιν ἐν αὐτῷ κατ' αὐτόν, ἀλλ' οὐχ αἱματος αὐτὴ ἢ ἅλλα πνεύματος ψυχικοῦ μεστή. δεόμεθα δ' ἦμεις οὐκ εἰς τῆν κοιλότητα ταύτην εἰσάγειν τῷ λόγῳ τῆς τροφῆς ἀλλ' εἰς τὸ περίέχον αὐτὴν ἀγγείον, εἰτ' οὖν τρέφεσθαι μόνον εἶτε καὶ αὔξεσθαι δέοιτο. τῶς οὖν εἰσάξομεν; οὕτω γὰρ ἐστὶ σμικρὸν ἐκεῖνο τὸ ἀπλοῦν ἀγγείον καὶ μεντοι καὶ τῶν ἀλλῶν ἐκάτερον, ὡστ', εἰ τῇ λεπτοτάτῃ βελόνῃ νύξειάς τι μέρος, ἀμα διαιρῆστες τὰ τρία. τόπος οὖν αἰσθητὸς ἀθρώως κενὸς οὐκ ἂν ποτ' ἐν αὐτῷ γένοιτο. λόγω δὲ θεωρητὸς τόπος κενούμενος οὐκ ἦν ἀναγκαστικὸς τῆς τοῦ συνεχούς ἀκολουθίας.

Ἡβουλόμην δ' αὐ πάλιν μοι κάνταύθα τὸν Ἐρασιστρατον αὐτὸν ἀποκρίνασθαι περὶ τοῦ στοιχείωδους ἐκείνου νεύρου τοῦ σμικροῦ, πότερον ἐν τι καὶ συνεχῆς ἀκριβῶς ἐστὶν ἢ ἐκ πολλῶν καὶ σμικρῶν σωμάτων, ὅν Ἐπίκουροι καὶ Δεύκιππος καὶ Δημόκριτος ὑπέθεντο, σύγκειται. καὶ γὰρ καὶ περὶ τούτου τούς Ἐρασιστρατείους ὅρω διαφερομένους. οἱ μὲν γὰρ ἐν τι καὶ συνεχὲς αὐτὸ νομίζουσιν ἢ οὐκ ἂν ἀπλοῦν εἰρήσθαι πρὸς αὐτοῦ φασί τινες δὲ καὶ τούτο διαλύουσιν εἰς ἐτέρα στοιχείῳ τολμῶσιν. ἀλλ' εἰ μὲν ἐν τι καὶ συνεχὲς ἐστι, τὸ κενούμενον ἐξ αὐτοῦ κατὰ τὴν ἀδηλον ὑπὸ τῶν ἰατρῶν ὀνομαζομένην διαπνοήν

1 According to the Pneumatist school, certain of whose ideas were accepted by Erasistratus, the air, breath, pneuma, or spirit was brought by inspiration into the left side of the heart, where it was converted into natural, vital, and psychic pneuma; the latter then went to the brain, whence it was distributed through the nervous system; practically
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of a vacuum to become refilled? For, although according to Erasistratus, it contains within itself a cavity of sorts, this is not occupied with blood, but with psychic pneumā,¹ and we are required to imagine the nutriment introduced, not into this cavity, but into the vessel containing it, whether it needs merely to be nourished, or to grow as well. How, then, are we to imagine it introduced? For this simple vessel [i.e. nerve] is so small—as are also the other two—that if you prick it at any part with the finest needle you will tear the whole three of them at once. Thus there could never be in it a perceptible space entirely empty. And an emptied space which merely existed in theory could not compel the adjacent fluid to come and fill it.

At this point, again, I should like Erasistratus himself to answer regarding this small elementary nerve, whether it is actually one and definitely continuous, or whether it consists of many small bodies, such as those assumed by Epicurus, Leucippus, and Democritus.² For I see that the Erasistrateans are at variance on this subject. Some of them consider it one and continuous, for otherwise, as they say, he would not have called it simple; and some venture to resolve it into yet other elementary bodies. But if it be one and continuous, then what is evacuated from it in the so-called insensible transpiration of the

this teaching involved the idea of a psyche, or conscious vital principle. "Psychic pneumā" is in Latin spiritus animalis (anima = psyche); cf. p. 126, note 4. Introduction, p. xxxiv.

² Observe that Erasistratus's "simple nerve" may be almost looked on as an anticipation of the cell. The question Galen now asks is whether this vessel is a "unit mass of living matter," or merely an agglomeration of atoms subject to mechanical law. cf. Galen's "fibres," p. 329.

Διὸ δὴ μοι καὶ δοκοῦσιν ἀμαθῶς πάνυ τὴν εἰς τὰ τοιαύτα στοιχεία τῶν ἀπλῶν ἁγγείων εἰσάγειν διάλυσιν ἐννοι τῶν Ἐρασιστρατείων. ἐμοὶ γοῦν οὐδὲν διαφέρει. καθ’ ἐκατέρους γὰρ ἄτοπος ὁ τῆς θρέψεως ἔσται λόγος, ἐκείνους τοῖς ἀπλοῖς ἁγγείοις τοῖς σμικροῖς τοῖς συντιθεῖσι τὰ μεγάλα τε καὶ αἰσθητὰ νεῦρα κατὰ μὲν τοὺς συνεχῶς φυλάττοντας αὐτὰ μή δυναμένης γενέσθαι τῆς πρὸς τὸ κενούμενον ἀκολουθίας, ὅτι μηδὲν ἐν τῷ συνεχεῖ γίγνεται κενόν, καὶ ἀπορρέῃ τί συνέρ-χεται γὰρ πρὸς ἄλληλα τὰ καταλειπόμενα μόρια, καθάπερ ἐπὶ τοῦ ὑδατος ὁρᾶται, καὶ πάλιν ἐν γίγνεται πάντα τὴν χώραν τοῦ διαφορηθέντος αὐτὰ καταλαμβάνοντα: κατὰ δὲ τοὺς ἑτέρους, ὁτι τῶν στοιχείων ἐκείνων οὐδὲν δεῖται τῆς πρὸς τὸ κενούμενον ἀκολουθίας. ἐπὶ γὰρ τῶν αἰσθητῶν μόνων, οὐκ ἐπὶ τῶν λόγω θεωρητῶν ἐχεί δύναμιν, ὡς αὐτὸς ὁ Ἐρασίστρατος ὀμολογεὶ διαρρήκτην, οὐ περὶ τοῦ τοιοῦτον κενοῦ φάσκων ἐκάστοτε ποιεῖσθαι τὸν λόγον, ὃ κατὰ βραχὺ παρέσπαρται τοῖς σώμασιν, ἄλλα περὶ τοῦ σαφοῦς καὶ αἰσθητοῦ καὶ ἄθροον καὶ μεγάλου καὶ ἑναρχοῦ καὶ ὅπως ἄν ἄλλως ὀνομάζειν ἔθελης. Ἐρασίστρατος μὲν γὰρ αὐτὸς αἰσθητὸν ἄθροώς οὗ φησὶ δύνασθαι
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physicians will leave no empty space in it; otherwise it would not be one body but many, separated by empty spaces. But if it consists of many bodies, then we have "escaped by the back door," as the saying is, to Asclepiades, seeing that we have postulated certain inharmonious elements. Once again, then, we must call Nature "inartistic"; for this necessarily follows the assumption of such elements.

For this reason some of the Erasistrateans seem to me to have done very foolishly in reducing the simple vessels to elements such as these. Yet it makes no difference to me, since the theory of both parties regarding nutrition will be shown to be absurd. For in these minute simple vessels constituting the large perceptible nerves, it is impossible, according to the theory of those who would keep the former continuous, that any "refilling of a vacuum" should take place, since no vacuum can occur in a continuum even if anything does run away; for the parts left come together (as is seen in the case of water) and again become one, taking up the whole space of that which previously separated them. Nor will any "refilling" occur if we accept the argument of the other Erasistrateans, since none of their elements need it. For this principle only holds of things which are perceptible, and not of those which exist merely in theory; this Erasistratus expressly acknowledges, for he states that it is not a vacuum such as this, interspersed in small portions among the corpuscles, that his various treatises deal with, but a vacuum which is clear, perceptible, complete in itself, large in size, evident, or however else one cares to term it (for, what Erasistratus himself says is, that "there cannot be a
γενέσθαι κενών ἐγώ δ' ἐκ περιουσίας εὐπορήσας ὁνομάτων ταῦτον δηλοῦν ἐν γε τῷ ὕπνῳ προκειμένῳ λόγῳ δυναμένων καὶ τάλλα προσέθηκα.

100 Κάλλιον οὖν μοι δοκεῖ καὶ || ἡμᾶς τι συνεισενεγκασθαι τοῖς Ἐρασιστρατείοις, ἐπειδὴ κατὰ τούτο γεγόναμεν, καὶ συμβουλεύσαι τοῖς τὸ πρῶτον ἐκεῖνο καὶ ἀπλοῦν ὑπ' Ἐρασιστράτου καλούμενον ἀγγείον εἰς ἐτέρ' ἀττα σώματα στοιχείωδη διαλύουσιν ἀποστήναι τῆς ὑπολήψεως, ως πρὸς τῷ μηδὲν ἔχειν πλέον ἐτί καὶ διαφερομένους Ἐρασιστράτῳ. ὦτι μὲν οὖν οὐδὲν ἔχει πλέον, ἐπιδεδεικται σαφῶς· οὐδὲ γὰρ ἡδυνήθη διαφυγεῖν τὴν περὶ τῆς θρέψεως ἀπορίαν ἡ ὑπόθεσις· ὦτι δ' οὐδ' Ἐρασιστράτῳ σύμφωνος ἐστίν, δ' ἐκεῖνος ἀπλοῦν καὶ πρῶτον ὄνομαζε, σύνθετον ἀποφαίνουσα, καὶ τὴν τῆς φύσεως τέχνην ἀναιροῦσα, πρόδηλου καὶ τοῦτ' εἰναι μοι δοκεῖ. εἰ μὴ γὰρ καὶ τοῖς ἀπλοῖσ τούτοις ἔνωσιν τινα τῆς οὐσίας ἀπολείψομεν, ἀλλ’ εἰς ἀναρμα καὶ ἀμέριστα καταβησάμεθα στοιχεία, παντάπασιν ἀναρισχομέν τῆς φύσεως τὴν τέχνην, ὅσπερ καὶ πάντες οἱ ἐκ ταύτης ὁρμώμενοι τῆς ὑποθέσεως ἰατροὶ καὶ φιλόσοφοι. δευτέρα γὰρ τῶν τού ζωὸν μορίων κατὰ τὴν τοιαύτην ὑπόθεσιν ἡ φύσις, οὐ πρῶτη 101 γύνεται. διαπλάττεων δὲ καὶ δημουργεῖν οὐ τοῦ δευτέρου γεγονότος, ἀλλὰ τοῦ προὔπαρχοντος ἐστὶν ὡστ’ ἀναγκαῖον ἐστὶν εὐθὺς ἐκ σπερμάτων ὑποθέσαι τὰς δυνάμεις τῆς φύσεως, αἷς δια-

1 cf. Book I., chap. xii.
2 i.e. in biology we must begin with living substance—with something which is specifically alive—here with the "unit mass of living matter." cf. p. 73, note 3.

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perceptible space which is entirely empty”; while I, for my part, being abundantly equipped with terms which are equally elucidatory, at least in relation to the present topic of discussion, have added them as well).

Thus it seems to me better that we also should help the Erasistrateans with some contribution, since we are on the subject, and should advise those who reduce the vessel called primary and simple by Erasistratus into other elementary bodies to give up their opinion; for not only do they gain nothing by it, but they are also at variance with Erasistratus in this matter. That they gain nothing by it has been clearly demonstrated; for this hypothesis could not escape the difficulty regarding nutrition. And it also seems perfectly evident to me that this hypothesis is not in consonance with the view of Erasistratus, when it declares that what he calls simple and primary is composite, and when it destroys the principle of Nature’s artistic skill. For, if we do not grant a certain unity of substance to these simple structures as well, and if we arrive eventually at inharmonious and indivisible elements, we shall most assuredly deprive Nature of her artistic skill, as do all the physicians and philosophers who start from this hypothesis. For, according to such a hypothesis, Nature does not precede, but is secondary to the parts of the animal. Now, it is not the province of what comes secondarily, but of what pre-exists, to shape and to construct. Thus we must necessarily suppose that the faculties of Nature, by which she

3 “Ad elementa quae nec coalescere possunt nec in partes dividi” (Linacre). On the two contrasted schools cf. p. 45.
4 cf. loc. cit.
πλάττει τε καὶ αὐξάνει καὶ τρέφει τὸ ζῷον. ἀλλ’ ἐκείνων τῶν σωμάτων τῶν ἀνάρμων καὶ ἀμερῶν οὐδὲν ἐν ἐαυτῷ διαπλαστικήν ἔχει δύναμιν ἢ αὐξητικὴν ἢ θρεπτικὴν ἢ ὅλως τεχνικὴν ἀπαθὲς γάρ καὶ ἀμεταβλητὸν ὑπόκειται. τῶν δ’ εἰρημένων οὐδὲν ἀνευ μεταβολῆς καὶ ἀλλοιώσεως καὶ τῆς δι’ ὅλων κράσεως γίγνεται, καθάπερ καὶ διὰ τῶν ἐμπροσθεν ἑνεδειξάμεθα. καὶ διὰ ταύτην τὴν ἀνάγκην οὐκ ἔχουσι, ὡς τὰ ἀκόλουθα τοῖς στοιχείοις, οἷς ὑπέδειντο, φυλάττοιεν, οἱ ἀπὸ τῶν τοιούτων αἱρέσεων ἀπαντες ἀτεχνὸν ἡγαγκάσθηςαν ἀποφήμασθαι τῇ φύσιν. καὶ τοῖς ταύτα γ’ οὐ παρ’ ἡμῶν ἔχρην μανθάνει τοὺς Ἐρασιστρατείους, ἀλλὰ παρ’ αὐτῶν τῶν φιλοσόφων, οἷς μάλιστα δοκεῖ πρῶτον ἐπισκοπεῖσθαι τὰ στοιχεῖα τῶν οὕτων ἁπάντων.

Οὕκουν οὖν Ἐρασίστρατον ἂν τις ὅρθως ἄχρι τοσάτῳς ἀμαθίας νομίζοι προῆκειν, ὡς μηδὲ 102 ταύτην γνωρίσαι δυνηθήναι τὴν ἀκολούθιαν, ἀλλ’ ἀμα μὲν ὑποδέονσαι τεχνικὴν τὴν φύσιν, ἀμα δ’ εἰς ἀπαθῆ καὶ ἀναρμα καὶ ἀμεταβλητα στοιχεία καταθράσσας τὴν οὐσίαν. καὶ μὴν εἰ δώσει τιν’ ἐν τοῖς στοιχείοις ἀλλοιώσων τε καὶ μεταβολὴν καὶ ἐνωσιν καὶ συνέχειαν, ἐν ἀσύνετον αὐτῷ τὸ ἀπλοῦν ἀγγείον ἐκεῖνο, καθάπερ καὶ αὐτὸς ὅνομάζει, γενήσεται. ἀλλ’ ἡ μὲν ἀπλή φλέξις ἐξ αὐτῆς τραφήσεται, τὸ νεῦρον δὲ καὶ ἡ ἀρτηρία παρὰ τῆς φλεβὸς.

2 "At corporum quae nec una committi nec dividi possunt nullum in se formatricem, auctricem, nutricem, aut
shapes the animal, and makes it grow and receive nourishment, are present from the seed onwards; whereas none of these inharmonious and non-partite corpuscles contains within itself any formative, incremental, nutritive, or, in a word, any artistic power; it is, by hypothesis, unimpressionable and untransformable, whereas, as we have previously shown, none of the processes mentioned takes place without transformation, alteration, and complete intermixture. And, owing to this necessity, those who belong to these sects are unable to follow out the consequences of their supposed elements, and they are all therefore forced to declare Nature devoid of art. It is not from us, however, that the Erasistrateans should have learnt this, but from those very philosophers who lay most stress on a preliminary investigation into the elements of all existing things.

Now, one can hardly be right in supposing that Erasistratus could reach such a pitch of foolishness as to be incapable of recognizing the logical consequences of this theory, and that, while assuming Nature to be artistically creative, he would at the same time break up substance into insensible, inharmonious, and untransformable elements. If, however, he will grant that there occurs in the elements a process of alteration and transformation, and that there exists in them unity and continuity, then that *simple vessel* of his (as he himself names it) will turn out to be single and uncompounded. And the simple vein will receive nourishment from itself, and the nerve and artery from the vein. How, and in what

*in summa artificem facultatem habet; quippe quod imputabile esse immutibileque praesumitur* (Linacre).

3 Book I., chaps. v.–xi.
πῶς καὶ τίνα τρόπον; ἐν τούτῳ γὰρ δὴ καὶ πρόσθεν γενόμενοι τῷ λόγῳ τῆς τῶν Ἐρασίστρατείων διαφωνίας ἐμνημονεύσαμεν, ἐπεδείξαμεν δὲ καὶ καθ' ἐκατέρως μὲν ἄπορον εἶναι τὴν τῶν ἀπλῶν ἐκείνων ἄγγειλαν θρέψιν, ἀλλὰ καὶ κρίναι τὴν μάχην αὐτῶν ὅπως ὀφθαλμός καὶ τιμήσας τὸν Ἐρασίστρατον εἰς τὴν βελτίωνα μεταστήσαντες αἵρεσιν.

Αὕτης οὖν ἐπὶ τῇ ἑν ἀπλοῦν ἡμωμένον εαυτῷ πάντη ὁ στοιχείωδες ἐκείνο νεύρον ὑποτιθεμένην αἵρεσιν ὁ λόγος μεταβὰς ἐπισκοπεῖσθων, πῶς τραφήσεται τῷ γὰρ εὑρέθην ἑνταῦθα κοινὸν ἀν ἢδη καὶ τῆς Ἰπποκράτους αἵρεσεως γένεσιν.

103 Κάλλιον δ' ἂν μοι δοκῶ τὸ ἕτηοὺ ἑμενον ἐπὶ τῶν νεοσηκότων καὶ σφόδρα καταλελεπτυσμένων βασανισθῆναι. πάντα γὰρ τούτως ἐναργώς φαίνεται τὰ μόρια τοῦ σώματος ἀτροφα καὶ λεπτὰ καὶ πολλῆς προσθήκης τε καὶ ἀναθρέψεως δεόμενα. καὶ τοίνυν καὶ τὸ νεύρον τοῦτο τὸ αἰσθητοῦ, ἐφ' οὔτερ ἐξ ἀρχῆς ἐπουθησάμην τὸν λόγον, ἰσχυόν μὲν ἰκανὸς γέγονεν, δεῖται δὲ θρέψεως. ἔχει δ' ἐν ἑαυτῷ μέρη πάμπολλα μὲν ἐκείνα τὰ πρῶτα καὶ ἄορατα νεύρα τὰ σμικρὰ καὶ τινὰς ἄρτηριας ἀπλᾶς οἶλγας καὶ φλέβας ὄμοιως. ἀπαντών οὖν αὐτοῦ τὰ νεύρα τὰ στοιχειώδη καταλελεπτυνται δηλοῦντι καὶ αὐτά, ἢ, εἰ μηδ᾽ ἐκείνα, οὐδὲ τὸ ὅλον. καὶ τοίνυν καὶ θρέψεως οὐ τὸ μὲν ὅλον δεῖται νεύρον, ἐκαστον δὴ ἐκείνων οὐ δεῖται. καὶ μὴν εἰ δεῖται μὲν ἀναθρέψεως, οὐδὲν δ' ἢ πρὸς τὸ κενούμενον ἀκολουθία

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way? For, when we were at this point before, we drew attention to the disagreement among the Erasistrateans, and we showed that the nutrition of these simple vessels was impracticable according to the teachings of both parties, although we did not hesitate to adjudicate in their quarrel and to do Erasistratus the honour of placing him in the better sect.  

Let our argument, then, be transferred again to the doctrine which assumes this elementary nerve to be a single, simple, and entirely unified structure, and let us consider how it is to be nourished; for what is discovered here will at once be found to be common also to the school of Hippocrates.

It seems to me that our enquiry can be most rigorously pursued in subjects who are suffering from illness and have become very emaciated, since in these people all parts of the body are obviously atrophied and thin, and in need of additional substance and feeding-up; for the same reason the ordinary perceptible nerve, regarding which we originally began this discussion, has become thin, and requires nourishment. Now, this contains within itself various parts, namely, a great many of these primary, invisible, minute nerves, a few simple arteries, and similarly also veins. Thus, all its elementary nerves have themselves also obviously become emaciated; for, if they had not, neither would the nerve as a whole; and of course, in such a case, the whole nerve cannot require nourishment without each of these requiring it too. Now, if on the one hand they stand in need of feeding-up, and if on the


2 On account of his idea of a simple tissue not susceptible of further analysis.  

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βοηθεῖν αὐτοῖς δύναται διὰ τὸ τὰς ἐμπροσθέν εἰρημένας ἀπορίας καὶ διὰ τὴν ὑπόγυιον ἵσχυ-τητα, καθάπερ δεῖξω, ξηθητέων ἥμων ἐστιν ἐτέραν αἰτίαν θρέψεως.

Πῶς οὖν ἢ πρὸς τὸ κενοῦμενον ἀκολουθία τρέφειν ἀδύνατός ἐστι τὸν οὕτω διακείμενον;

104 ὅτι τοσοῦτον ἀκολουθεῖ | ἀναγκάζει τῶν συν-εχόν, ὅσον ἀπορρεῖ. τούτῳ δ’ ἐπὶ μὲν τῶν εὐεκτοῦντων ἰκανῶν ἐστιν εἰς τὴν θρέψιν, ἵσα γὰρ ἐπὶ αὐτῶν εἶναι χρῆ τοῖς ἀπορρέουσι τὰ προστιθέμενα· ἐπὶ δὲ τῶν ἐσχάτως ἰσχυῶν καὶ πολλῆς ἀναθρέψεως δεομένων εἰ μὴ πολλαπλάσιον εἰ ἡ τὸ προστιθέμενον τοῦ κενομένου, τὴν ἔξ ἄρχῃς ἐξιν ἀναλαβέων· οὐκ οὖν ποτε δύναντο.

dhcp ν ὅσον, ὡς ἔλκειν αὐτὰ δεήσει τοσοῦτῳ πλεῖον, ὅσῳ καὶ δεῖται πλείονος. Ἕρασίστρατος δὲ κάνταῦθα πρότερον ποιῆσας τὸ δεύτερον οὐκ οἶδ’ ὅπως ὦκ αἰσθάνεται. διότι γὰρ, φησὶ, πολλὴ πρόσθεσις εἰς ἀνάθρεψιν γίγνεται τοῖς ἱεροσχῆσιν, διὰ τούτῳ καὶ ἡ πρὸς ταύτην ἀκολου-θία πολλῆ. πῶς δ’ ἄν πολλῇ πρόσθεσις γένοιτο μὴ προηγουμένης ἀνάδοσεως δαψυλοῦ; εἰ δὲ τὴν διὰ τῶν φλεβῶν ποράν τῆς τροφῆς ἀνάδοσιν καλεῖ, τὴν δ’ εἰς ἔκαστον τῶν ἀπλῶν καὶ ἀοράτων ἐκείνων νεύρων καὶ ἀρτηρίων μετάληψιν ὦκ ἀνάδοσιν ἄλλα διάδοσιν, ὡς τινες ὄνομαξεν ἡξίωσαν, εἶτα | τὴν διὰ τῶν φλεβῶν μόνη τῇ

1 The horror vacui.

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other the principle of the refilling of a vacuum\(^1\) can
give them no help—both by reason of the difficulties
previously mentioned and the actual thinness, as I
shall show—we must then seek another cause for
nutrition.

How is it, then, that the tendency of a vacuum
to become refilled is unable to afford nourishment
to one in such a condition? Because its rule is
that only so much of the contiguous matter should
succeed as has flowed away. Now this is sufficient
for nourishment in the case of those who are in
good condition, for, in them, what is \textit{presented}\(^2\)
must be equal to what has flowed away. But in
the case of those who are very emaciated and who
need a great restoration of nutrition, unless what
was presented were many times greater than what
has been emptied out, they would never be able to
regain their original habit. It is clear, therefore, that
these parts will have to exert a greater amount of
\textit{attraction}, in so far as their requirements are greater.
And I fail to understand how Erasistratus does not
perceive that here again he is putting the cart before
the horse. Because, in the case of the sick, there
must be a large amount of \textit{presentation}\(^2\) in order to
feed them up, he argues that the factor of “re-
filling”\(^1\) must play an equally large part. And how
could much \textit{presentation} take place if it were not
preceded by an abundant \textit{delivery}\(^3\) of nutriment?
And if he calls the conveyance of food through
the veins \textit{delivery}, and its assumption by each
of these simple and visible nerves and arteries not
\textit{delivery} but \textit{distribution},\(^4\) as some people have
thought fit to name it, and then ascribes conveyance

\(^1\) Anadosis, "absorption"; cf. p. 13, note 5.  \(^2\) Lit. \textit{diadoxis}. 

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πρὸς τὸ κενούμενον ἀκολουθία φησι γίγνεσθαι, τὴν εἰς τὰ λόγῳ θεωρητα μετάληψιν ἡμῖν ἐξηγη-σάσθω. ὅτι μὲν γὰρ οὐκέτι ἐπὶ τοὺτον ἥ πρὸς τὸ κενούμενον ἀκολουθία λέγεσθαι δύναται καὶ μᾶλλον ἐπὶ τῶν ἐσχάτως ἰσχυῶν, ἀποδέδεικται. τί δὲ φησιν ἐπὶ αὐτῶν ἐν τῷ δεύτερῳ τῶν καθόλου λόγων ο Ἕρασίστρατος, ἄξιον ἔπακοῦ-σαι τῆς λέξεως: "Τοῖς δὲ ἐσχάτοις τε καὶ ἀπλοῖς, λεπτοῖς τε καὶ στενοῖς οὕσιν, ἐκ τῶν παρακει-μένων ἀγγείων ἢ πρόσθεσις συμβαίνει εἰς τὰ κενώματα τῶν ἀπενεχθέντων κατὰ τὰ πλάγια τῶν ἀγγείων ἐλκομένης τῆς τροφῆς καὶ κατα-χοριζομένης." ἐκ ταύτης τῆς λέξεως πρῶτον μὲν τὸ κατὰ τὰ πλάγια προσίεμαι τε καὶ ἀποδέχομαι κατὰ μὲν γὰρ αὐτὸ τὸ στόμα τὸ ἀπλοῦν νεύρων οὐκ ἂν δύνατο δεχόμενον τὴν τροφὴν οὕτως εἰς ὅλον ἐαντὸ διανέμειν· ἀνάκειται γὰρ ἐκεῖνο τῷ ψυχικῷ πνεύματι· κατὰ δὲ τὸ πλάγιον ἐκ τῆς παρακειμένης φλεβῶς τῆς ἀπλῆς ἐγχωρεῖ λαβεῖν αὐτό. δεύτερον δὲ ἀποδέχομαι τῶν ἐκ τῆς Ἕρασίστρατος λέξεως ὑμμάτων τὸ 106 γεγραμμένον ἐφεξῆς τῷ κατὰ τὰ πλάγια. τί γὰρ φησι; "Κατὰ τὰ πλάγια τῶν ἀγγείων ἐλκο-μένης τῆς τροφῆς." οὕτως ὁμιλεῖς ὑμεῖς ὁμολογοῦμεν, ὁτι δ' οὐ τῇ πρὸς τὸ κενούμενον ἀκολουθία, δέδεικται πρόσθεν.

VII

'Εξεύρωμεν οὖν κοινῆ, πῶς ἐλκεται. πῶς δ' ἄλλως ἢ ὡς ὁ σίδηρος ὑπὸ τῆς ἤρακλείας λίθου

1 i.e. let him explain the diadosis.
through the veins to the principle of vacuum-refilling alone, let him explain to us the assumption of food by the hypothetical elements. For it has been shown that at least in relation to these there is no question of the refilling of a vacuum being in operation, and especially where the parts are very attenuated. It is worth while listening to what Erasistratus says about these cases in the second book of his "General Principles": "In the ultimate simple [vessels], which are thin and narrow, presentation takes place from the adjacent vessels, the nutriment being attracted through the sides of the vessels and deposited in the empty spaces left by the matter which has been carried away." Now, in this statement firstly I admit and accept the words "through the sides." For, if the simple nerve were actually to take in the food through its mouth, it could not distribute it through its whole substance; for the mouth is dedicated to the psychic pneuma. It can, however, take it in through its sides from the adjacent simple vein. Secondly, I also accept in Erasistratus's statement the expression which precedes "through the sides." What does this say? "The nutriment being attracted through the sides of the vessels." Now I, too, agree that it is attracted, but it has been previously shown that this is not through the tendency of evacuated matter to be replaced.

VII

Let us, then, consider together how it is attracted. How else than in the way that iron is attracted by

2 "Spiritus animalis"; cf. p. 152, note 1. The nutriment was for the walls of the vessels, not for their cavities. cf. p. 319, note 3.
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dύναμιν ἐχούσης ἐλεκτικῆς τοιαύτης ποιότητος; ἀλλ' εἰ τὴν μὲν ἀρχὴν τῆς ἀναδόσεως ή τῆς κοιλίας ἐνθλυσίς παρέχεται, τὴν δὲ μετὰ ταῦτα φοράν ἀπασαν αἱ τε φλέβες περιστελλόμεναι καὶ προωθοῦσαι καὶ τῶν τρεφομένων ἐκαστὸν ἐπισπώ-μενον εἰς ἑαυτὸ, τῆς πρὸς τὸ κενοῦμενον ἀκο-λούθης ἀποστάντες, ὡς οὐ πρεποῦσης ἀνδρὶ τεχνικῆς ὑποθεμένῳ τὴν φύσιν, οὕτως ἄν ἦδη καὶ τὴν ἀντιλογίαν εἴημεν πεφευγότες τὴν Ἀσκληπιάδου μὴ δυνάμενοι γε λύειν αὐτὴν. τὸ γάρ εἰς τὴν ἀπόδειξιν παραλαμβανόμενον λήμμα τὸ διεξευγμένου οὐκ ἐκ δυοῖν ἀλλ' ἐκ τριῶν ἐστὶ κατὰ γε τὴν ἀλήθειαν διεξευγμένον. εἰ μὲν οὖν 107 ὡς ἐκ δυοῖν αὐτῷ χρη||σιμεθα, ψεύδος ἐσται τι τῶν εἰς τὴν ἀπόδειξιν παρειλημμένων· εἰ δ' ὡς ἐκ τριῶν, ἀπέραντος ὁ λόγος γενήσεται.

VIII

Καὶ ταῦτ' οὐκ ἔχρην ἀγνοεῖν τὸν Ἑρασίστρα-τον, εἴπερ κἂν ὄναρ ποτὲ τοῖς ἐκ τοῦ περιπάτου συνέτυχεν, ὥσπερ οὖν οὐδὲ τὰ περὶ τῆς γενέσεως τῶν χυμῶν, ὑπὲρ δὲ οὐδὲν ἔχων εἰπεῖν οὐδὲ μέχρι τοῦ μετρίου πιθανὸν οὐκ ἐπακρούεσθαι σκηπτόμενος, ὡς οὐδὲ χρήσιμος ὁλῶς ἐστὶν ἡ τῶν τοιούτων ἐπίσκεψις. εἴτ', ὁ πρὸς θεῶν, ὡς μὲν τὰ σιτία κατὰ τὴν γαστέρα πέττεται χρήσιμον ἐπιστασθαι, πῶς δ' ἐν ταῖς φλεψὶν ἡ
the lodestone, the latter having a faculty attractive of this particular quality [existing in iron]? But if the beginning of anadosis depends on the squeezing action of the stomach, and the whole movement thereafter on the peristalsis and propulsive action of the veins, as well as on the traction exerted by each of the parts which are undergoing nourishment, then we can abandon the principle of replacement of evacuated matter, as not being suitable for a man who assumes Nature to be a skilled artist; thus we shall also have avoided the contradiction of Asclepiades though we cannot refute it: for the disjunctive argument used for the purposes of demonstration is, in reality, disjunctive not of two but of three alternatives; now, if we treat the disjunction as a disjunction of two alternatives, one of the two propositions assumed in constructing our proof must be false; and if as a disjunctive of three alternatives, no conclusion will be arrived at.

VIII

Now Erasistratus ought not to have been ignorant of this if he had ever had anything to do with the Peripatetics—even in a dream. Nor, similarly, should he have been unacquainted with the genesis of the humours, about which, not having even anything moderately plausible to say, he thinks to deceive us by the excuse that the consideration of such matters is not the least useful. Then, in Heaven’s name, is it useful to know how food is digested in the stomach, but unnecessary to know how bile comes into existence

1 Specific attraction; cf. Book I., chap. xiv.
2 cf. p. 100, note 2. 3 In Book II., chap. i.
χολή γίγνεται, περιττόν; καὶ τῆς κενώσεως ἀρα φροντιστέον αὐτῆς μόνης, ἀμελητέον δὲ τῆς γενέσεως; ὥστε νῦν ἀμενον ὑπάρχον μακρῷ τὸ κωλύειν εὐθὺς ἐξ ἀρχῆς γεννᾶσθαι πλεῖονα τοῦ πράγματ' ἐχειν ἐκκενοῦντας. θαυμαστῶν δὲ καὶ τὸ διαπορείν, εἰτ' ἐν τῷ σώματι τὴν γένεσιν αὐτῆς ὑποθετεόν εἰτ' εὐθὺς ἐξωθεὶν ἐν τοῖς σιτίοις περιέχεσθαι φατέον. εἰ γὰρ ὅτι τοῦτο καλὸς ἡπόρηται, τι οὐκί καὶ περὶ τοῦ αἵματος ἐπισκεφτεῖν ψόμεθα, πότερον ἐν τῷ σώματι ἡ λαμβάνει τὴν γένεσιν ἢ τοῖς σιτίοις παρέσταται, καθάπερ οἱ τὰς ὁμοιομερείας ὑποτίθεμεναι φασίν; καὶ μὴν πολλῷ γὰρ ἢ χρησιμώτερον ζητεῖσθαι, ποιὰ τῶν σιτίων ὁμολογεῖ τῇ τῆς αἵματώσεως ἐνέργεια καὶ ποία διαφέρεται, τοῦ ζητεῖν, τίνα μὲν τῇ τῆς γαστρός ἐνεργεία νικᾶται ῥᾴδιως, τίνα δ' ἀντι-βαίνει καὶ μάχεται. τοῦτων μὲν γὰρ ἡ ἐκλεξίς εἰς πέψιν μόνην, ἐκείνων δ' εἰς αἵματος χρηστοῦ διαφέρει γένεσιν. οὔδ'ε γὰρ ἵππον ἐστίν ἡ μὴ καλὸς ἐν τῇ γαστρὶ χυλωθῆναι τὴν τροφήν ἢ μὴ χρηστὸν αἷμα γεννηθῆναι. πῶς δ' οὐκ αἰδεῖται τᾶς μὲν τῆς πέψεως ἀποτυχίας διαρούμενος, ὡς πολλῷ τ' εἰσὶ καὶ κατὰ πολλὰς γίγνονται προφάσεις, ὑπὲρ δὲ τῶν τῆς αἵματώσεως σφαλμάτων οὖν ἀχρὶ ρήματος ἐνὸς οὐδ' ἄχρι συλλαβῆς μᾶς φθεγξάμενος; καὶ μὴν εὐρίσκεται γε καὶ παχὺ καὶ λεπτὸν ἐν ταῖς φλεψιν αἷμα καὶ τοῖς μὲν ἐρυθρότερον, τοῖς δὲ ξανθότερον, τοῖς δὲ μελάντερον, τοῖς δὲ φλεγματώδεστερον. εἰ δ' ὅτι

1 Prevention better than cure.
2 e.g. Anaxagoras; cf. p. 7, note 5; p. 20, note 3.
in the veins? Are we to pay attention merely to the evacuation of this humour, and not to its genesis? As though it were not far better to prevent its excessive development from the beginning than to give ourselves all the trouble of expelling it!¹ And it is a strange thing to be entirely unaware as to whether its genesis is to be looked on as taking place in the body, or whether it comes from without and is contained in the food. For, if it was right to raise this problem, why should we not make investigations concerning the blood as well—whether it takes its origin in the body, or is distributed through the food as is maintained by those who postulate homœomeries?² Assuredly it would be much more useful to investigate what kinds of food are suited, and what kinds unsuited, to the process of blood-production³ rather than to enquire into what articles of diet are easily mastered by the activity of the stomach, and what resist and contend with it. For the choice of the latter bears reference merely to digestion, while that of the former is of importance in regard to the generation of useful blood. For it is not equally important whether the aliment be imperfectly chylified⁴ in the stomach or whether it fail to be turned into useful blood. Why is Erasistratus not ashamed to distinguish all the various kinds of digestive failure and all the occasions which give rise to them, whilst in reference to the errors of blood-production he does not utter a single word—nay, not a syllable? Now, there is certainly to be found in the veins both thick and thin blood; in some people it is redder, in others yellower, in some blacker, in others more of the nature of phlegm. And one who realizes that it
καὶ δυσώδες οὐχ ἔνα τρόπον ἄλλ’ ἐν πολλαῖς
πάνυ διαφοραῖς ἀρρήτοις μὲν λόγῳ, σαφεστάταις
d’ αἰσθήσει φαίνεται γιγνόμενον, εἰδεὶς τις, οὐκ
ἀν οἶμαι μετρίως ἐτί καταγνώσεσθαι τῆς Ἑρα-
σιστράτου βαθμίας αὐτῶν οὐτῶ γ’ ἀναγκαλαν
eἰς τὰ ἔργα τῆς τέχνης θεωρίαν παραλιπόντος.

Ἐναργὴ γὰρ δὴ καὶ τὰ περὶ τῶν ὑδέρων ἀμα-
ρήματα τῆς βαθμίας ταύτη κατὰ λόγον ἱκολουθη-
κοτα. τὸ τε γὰρ τῇ στενοχωρίᾳ τῶν ὀδῶν
cωλύεσθαι νομίζειν πρόσω τοῦ ἕπατος ἰέναι τὸ
ἀίμα καὶ μηδέποτ’ ἀν ἄλλως ὑδέρων δύνασθαι
συστήναι πῶς οὖν ἐσχάτην ἐνδείκνυται βαθμίαν;
τὸ τε μὴ διὰ τὸν σπλήνα μηδὲ δι’ ἄλλο τι μόριον,
ἄλλ’ ἂεi διὰ τὸν ἐν τῷ ἕπατι σκίρρου ὑδέρων
οἰεσθαὶ γίγνεσθαί τελέως ἄργῳ τὴν διάνοιαν
ἀνθρώπου καὶ μηδενὶ τῶν ὀσημέρα γιγνομένων
παρακολουθοῦντος. ἐπὶ μὲν γε χρονίαις αἰμορ-
ροτίῳ ἐπισχεδείσας ἢ διὰ κένωσιν ἄμετρον εἰς
ψῦξιν ἐσχάτην ἀγαγούσαις τὸν ἀνθρώπου ὦν
ἀπαξ οὐδὲ διὰ ἄλλα πολλάκις ἤδη τεθεάμεθα
συστάντας ὑδέρων, ὡσπερ γε καὶ γυναιξίν ἡ τε
τῆς ἐφ’ ἐκάστῳ μηνι καθάρσεως ἀπόλεια παν-
tελῆς καὶ ἄμετρος κένωσις, ὃταν αἰμορραγήσωσί
pοθ’ αἱ μὴ τρεῖ σφοδρῶς, ἐπεκαλέσαντο πολλὰκις
ὑδέρων καὶ τις ἐν αὐτῶν καὶ ὁ γυναικεῖος ὄνομα-
ζόμενος ὤρους εἰς τούτ’ ἐτελεύτησε τὸ πάθος, ἱνα

1 Erasistratus held the spleen to be useless. cf. p. 143.
2 Induration: Gk. skirros, Lat. scirrhus. The condition is
now commonly known by Laënnec’s term cirrhosis, from
Gk. kirros, meaning yellow or tawny. Here again we have an
eexample of Erasistratus’s bias towards anatomical or structural
may smell offensively not in one way only, but in a
great many different respects (which cannot be put
into words, although perfectly appreciable to the
senses), would, I imagine, condemn in no measured
terms the carelessness of Erasistratus in omitting
a consideration so essential to the practice of our
art.

Thus, it is clear what errors in regard to the
subject of dropsies logically follow this carelessness.
For, does it not show the most extreme carelessness
to suppose that the blood is prevented from going
forward into the liver owing to the narrowness of the
passages, and that dropsy can never occur in any
other way? For, to imagine that dropsy is never
cased by the spleen\(^1\) or any other part, but always by
induration of the liver,\(^2\) is the standpoint of a man
whose intelligence is perfectly torpid and who is
quite out of touch with things that happen every
day. For, not merely once or twice, but frequently,
we have observed dropsy produced by chronic
haemorrhoids which have been suppressed,\(^3\) or
which, through immoderate bleeding, have given
the patient a severe chill; similarly, in women, the
complete disappearance of the monthly discharge,\(^4\)
or an undue evacuation such as is caused by
violent bleeding from the womb, often provoke
dropsy; and in some of them the so-called female
flux ends in this disorder. I leave out of account

\(^{3}\) On the risks which were supposed to attend the checking
of habitual bleeding from piles cf. Celsus (De Re Med. VI.
xviii. 9), "Atque in quibusdam parum tuto supprimitur, qui
sanguinis profuvio imbecilliores non fiunt; habent enim
purgationem hanc, non morbum." (i.e. the habit was to be
looked on as a periodical cleansing, not as a disease.)

\(^{4}\) Lit. catharsis.
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tou̱s ἀπὸ τῶν κενεῶνων ἀρχομένους ἢ ἄλλου τινὸς
tῶν ἐπικαίρων μορίων ύδέρους παραλίπων, σαφῶς
μὲν καὶ αὐτοὺς ἐξελέγχοντας τὴν Ἑρασίστρατος
ὑπόληψιν, ἀλλ' οὖχ οὕτως ἔναργῳ ὡς οἱ διὰ
cατάψυξιν σφοδράν τῆς δῆλης ἔξεως ἀποτελοῦ-
μενοι. πρῶτῃ γὰρ αὐτῇ γενέσεως ύδέρων αἰτία
diὰ τὴν ἀποτυχίαν τῆς αἰματώσεως γιγνομένη
τρόπον ὁμοίωτατον ταῖς ἐπὶ τῇ τῶν σιτίων ἀπε-
ψία διαρροιαίς. οὐ μὴν ἐσκίρρωται γε κατὰ τοὺς
tοιοῦτους ύδέρους οὐδ' ἄλλο τι σπλάγχνων οὐδὲ
τὸ ἵππαρ.

Ἀλλ' Ἑρασίστρατος ο σοφὸς ὑπεριδὼν καὶ
καταφρονῆσας, ὥν οὐθ' Ἰπποκράτης οὔτε Διο-
κλῆς οὔτε Πραξιγόρας οὔτε Φιλιστίων ἀλλ' οὔδὲ
tῶν ἀρίστων φιλοσόφων οὔδεις κατεφρονήσειν
οὔτε Πλάτων οὔτ'. Ἀριστοτέλης οὔτε Θεόφραστος,
ὅλας ἐνεργείας ὑπερβαίνει καθάπερ τι σμικρὸν
καὶ τὸ τυχόν τῆς τέχνης παραληψῶν μέρος οὐδ'
the dropsy which begins in the flanks or in any other susceptible part; this clearly confutes Erasistratus's assumption, although not so obviously as does that kind of dropsy which is brought about by an excessive chilling of the whole constitution; this, which is the primary reason for the occurrence of dropsy, results from a failure of blood-production, very much like the diarrhoea which follows imperfect digestion of food; certainly in this kind of dropsy neither the liver nor any other viscus becomes indurated.

The learned Erasistratus, however, overlooks—nay, despises—what neither Hippocrates, Diocles, Praxagoras, nor Philistion ² despised, nor indeed any of the best philosophers, whether Plato, Aristotle, or Theophrastus; he passes by whole functions as though it were but a trifling and casual department of medicine which he was neglecting, without deigning to argue whether or not these authorities are right in saying that the bodily parts of all animals are governed by the Warm, the Cold, the Dry and the Moist, the one pair being active and the other passive, and that among these the Warm has most power in connection with all functions, but especially with the genesis of the humours.² Now, one cannot be blamed for not agreeing with all these great men, nor for imagining that one knows more than they; but not to consider such distinguished teaching worthy either of contradiction or even mention shows an extraordinary arrogance.

² Philistion of Locri, a contemporary of Plato, was one of the chief representatives of the Sicilian school of medicine. For Diocles and Praxagoras see p. 51, note 1.
³ cf. Book I., chap. iii.
GALEN

Καὶ μὴν σμικρότατος ἐστὶ τὴν γνώμην καὶ ταπεινὸς ἐσχάτως ἐν ἀπάσαις ταῖς ἀντιλογίαις ἐν μὲν τοῖς περὶ τῆς πέψεως λόγοις τοῖς σηπεσθαί τὰ σιτία νυμίζουσι φιλοτίμως ἀντιλέγον, ἐν δὲ τοῖς περὶ τῆς ἀναδόσεως τοῖς διὰ τὴν παράθεσιν τῶν ἀρτηριῶν ἀναδίδοσθαι τὸ διὰ τῶν φλεβῶν αἷμα νυμίζουσιν, ἐν δὲ τοῖς περὶ τῆς ἀναπνοῆς τοῖς περιστείρβαι τὸν ἀέρα φάσκουσιν. οὐκ ἀκνησε δὴ ὁ δὲ τοῖς ἀτμοειδῶς εἰς τὴν κύστιν ἤναι τὰ οὕρα νυμίζουσιν ἀντεπεῖν οὕδε τοῖς εἰς
112 τὸν πνεύμονα φέρεσθαι τὸ ποτόν. οὕτως ἐν ἀπασὶ τὰς χειρίστας ἐπιλεγόμενος δόξας ἀγάλλεται δια-
τρίβων ἐπὶ πλέον ἐν ταῖς ἀντιλογίαις. ἐπὶ δὲ τῆς τοῦ αἴματος γενέσεως οὐδὲν ἀτιμοτέρας οὐσίας τῆς ἐν τῇ γαστρὶ χυλώσεως τῶν σιτίων οὔτ' ἀντεπεῖν τινὶ τῶν πρεσβυτέρων ἥξισθαι οὔτ' αὐτὸς εἰση-
γήσασθαι τιν' ἐτέραν γνώμην ἐτόλμησεν, ὁ περὶ πασῶν τῶν φυσικῶν ἐνεργειῶν ἐν ἀρχῃ τῶν καθό-
λου λόγων ὑποσχόμενος ἔρειν, ὅπως τε γίγνονται καὶ δι' ἀντινων τοῦ ξύου μορίων. ἡ τῆς μὲν
πέττειν τὰ σιτία πεφυκύιας δυνάμεως ἀρρωστού-
σης ἀπεπτήσει τὸ ξύον, τῆς δὲ αἴματούσης τὰ
πεθέντα οὐδὲν ἔσται πάθημα τὸ παράπαν, ἀλλ' ἀδαμαντίνη τις ἡμῖν αὐτή μόνῃ καὶ ἀπαθής ἐστίν;
ἡ ἀλλὰ τῇ τῆς ἀρρωστίας αὐτῆς ἐγγυον ὑπάρξει

1 Gk. pepsis; otherwise rendered coction.
2 cf. p. 18, note 5.
3 e.g. Asclepiades.
4 Lit. chylosis; cf. p. 238, note 2.
5 That is to say, the haematopoietic function deserves
ON THE NATURAL FACULTIES, II. VIII

Now, Erasistratus is thoroughly small-minded and petty to the last degree in all his disputations—when, for instance, in his treatise "On Digestion," he argues jealously with those who consider that this is a process of putrefaction of the food; and, in his work "On Anadosis," with those who think that the anadosis of blood through the veins results from the contiguity of the arteries; also, in his work "On Respiration," with those who maintain that the air is forced along by contraction. Nay, he did not even hesitate to contradict those who maintain that the urine passes into the bladder in a vaporous state, as also those who say that imbibed fluids are carried into the lung. Thus he delights to choose always the most valueless doctrines, and to spend his time more and more in contradicting these; whereas on the subject of the origin of blood (which is in no way less important than the chylification of food in the stomach) he did not deign to dispute with any of the ancients, nor did he himself venture to bring forward any other opinion, despite the fact that at the beginning of his treatise on "General Principles" he undertook to say how all the various natural functions take place, and through what parts of the animal! Now, is it possible that, when the faculty which naturally digests food is weak, the animal's digestion fails, whereas the faculty which turns the digested food into blood cannot suffer any kind of impairment? Are we to suppose this latter faculty alone to be as tough as steel and unaffected by circumstances? Or is it that weakness of this faculty will result in some-consideration as much as the digestive processes which precede it.
καὶ οὖχ ὤδερος; δῆλος οὖν ἐναργῶς ἐστιν ὁ Ερασίστρατος ἢ γὰρ ἐν μὲν τοῖς ἄλλοις οὐδὲ ταῖς
φαυλοτάταις δόξαις ἀντιλέγειν ὁκυσανεν, ἐνταυθοὶ
οὖτε ἀντεπείν τοῖς πρόσθεν οὐτ' αὐτὸς εἰπεῖν
τι καινὸν ἑτόλυμησε, τὸ σφάλμα τῆς ἐαυτοῦ γνωρί-
ξων αἰρέσεως.
Τί γὰρ ἐν καὶ λέγειν ἐσχεν ὑπὲρ αἴματος

113 ἀνθρωπος εἰς μηδὲν τῷ συμφύτῳ θερμῷ χρώ-
μενος; τι δὲ περὶ ξανθῆς χολῆς ἡ μελαίνης ἢ
φλέγματος; ὅτι νὴ Δία δυνατόν ἐστιν ἀναμεμω-
μένην τοῖς σιτίοις εἴθεσι ἐξωθεὶν παραγίγγεσθαι
tὴν χολήν. λέγει γοῦν ὁδὲ πως αὐτοῖς ὀνόμασι;
"Πότερον δ' ἐν τῇ περὶ τὴν κοιλίαν κατεργασία

tῆς τροφῆς γεννᾶται τοιαύτη ὑγρασία ἡ μεμυ-
μένη τοῖς ἐξωθεὶν προσφερομένοις παραγίγγεται,
οὔτεν χρῆσιμον πρὸς ιατρικὴν ἑπεσκέφθαι."
καὶ
μὴν, ὃ γενναίότατε, καὶ κενοῦσθαι χρῆναι φάσ-
κεις ἐκ τοῦ ξύφου τὸν χυμὸν τοῦτον καὶ μεγάλως
λυπεῖν, εἰ μὴ κενωθεῖν. πῶς οὖν οὔτεν ἐξ αὐτοῦ
χρηστοῦ ὑπολαμβάνων γίγνεσθαι τοιμᾶς ἀχρη-
στον λέγειν εἰς ἱατρικὴν εἶναι τὴν περὶ τῆς γενε-
σεως αὐτοῦ σκέψιν;

Τοποκείσθω γὰρ ἐν μὲν τοῖς σιτίοις περι-
έχεσθαι, μὴ διακρίνεσθαι δ' ἀκριβῶς ἐν ἑπάτι-
tαῦτα γὰρ ἀμφότερα νομίζεις εἶναι δυνατά. καὶ
μὴν οὐ σμικρὸν ἐνταῦθα τὸ διαφέρον ἡ ἐλαχιστὴν
ἡ παμπόλλην χολὴν ἐν ἑαυτοῖς περιέχουσα

1 i.e. Erasistratus could obviously say nothing about any
of the humours or their origins, since he had not postulated

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thing else than dropsey? The fact, therefore, that Erasistratus, in regard to other matters, did not hesitate to attack even the most trivial views, whilst in this case he neither dared to contradict his predecessors nor to advance any new view of his own, proves plainly that he recognized the fallacy of his own way of thinking.¹

For what could a man possibly say about blood who had no use for innate heat? What could he say about yellow or black bile, or phlegm? Well, of course, he might say that the bile could come directly from without, mingled with the food! Thus Erasistratus practically says so in the following words: "It is of no value in practical medicine to find out whether a fluid of this kind ² arises from the elaboration of food in the stomach-region, or whether it reaches the body because it is mixed with the food taken in from outside." But, my very good Sir, you most certainly maintain also that this humour has to be evacuated from the animal, and that it causes great pain if it be not evacuated. How, then, if you suppose that no good comes from the bile, do you venture to say that an investigation into its origin is of no value in medicine?

Well, let us suppose that it is contained in the food, and not specifically secreted in the liver (for you hold these two things possible). In this case, it will certainly make a considerable difference whether the ingested food contains a minimum or a maximum of bile; for the one kind is harmless, whereas that containing a large quantity of bile, owing to the fact that it cannot be properly purified ³ the four qualities (particularly the Warm—that is, innate heat). ² i.e. bile. ³ i.e. deprived of its bile.
114 αὐτὴν ἐν ἡπατὶ καθαρθῆναι καλῶς αἰτία κατα-στήσεται τῶν τ' ἄλλων παθῶν, ὅν αὐτὸς ὁ Ἐρασίστρατος ἐπὶ πλήθει χολῆς γίγνεσθαι φησὶ, καὶ τῶν ἱκτέρων οὐχ ἡκίστα. πῶς οὖν οὐκ ἀναγκαίωταν ἱστροφοῖ γιγαντόσκειν, πρῶτον μὲν, ὥς ἐν τοῖς σιτίοις αὐτοῖς ἐξωθεὶν ἡ χολὴ περι-έχεται, δεύτερον δ', ὡς τὸ μὲν τεῦτλον, εἰ τύχοι, παμπόλλην, ὁ δ' ἄρτος ἐλαχίστην καὶ τὸ μὲν ἐλαιον πλείστην, ὁ δ' οἶνος ὀλιγίστην ἐκαστὸν τε τῶν ἄλλων ἀνισοῦν τῷ πλήθει περιέχει τὴν χολήν; πῶς γὰρ οὐκ ἂν εἰχε γελοιότατος, ὃς ἂν ἐκὼν αἰρήται τὰ πλείονα χολῆν ἐν εὐαυτοῖς περι-έχοντα πρὸ τῶν ἐναντίων;

Τί δ' εἰ μὴ περιέχεται μὲν ἐν τοῖς σιτίοις ἡ χολή, γίγνεται δ' ἐν τοῖς τῶν ζῶν σώμασιν; ἢ οὔχι καὶ κατὰ τούτο χρήσιμον ἐπίστασθαι, τίνι μὲν καταστάσει σώματος ἐπεται πλείων αὑτῆς ἡ γένεσις, τίνι δ' ἐλαττών; ἀλλοιούν γὰρ δήποι καὶ μεταβάλλειν οἴοι τ' ἔσμεν καὶ τρέπειν ἐπὶ τὸ βέλτιον ἀεὶ τὰς μοχθηρὰς καταστάσεις τοῦ σω-ματος. ἀλλ' εἰ μὴ γυγνώσκοιμεν, καθότευ μοχθηρᾶς καὶ ὅτη τῆς δεουσάς ἐξίστανται, πῶς ἂν αὐτὰς

115 ἐπανάγειν οἴοι τ' εἴημεν ἐπὶ τὸ || κρέβτον;

Οὗκοιν ἄχρηστον ἐστίν εἰς τὰς ἱάσεις, ὡς Ὁρασίστρατος φησιν, ἐπίστασθαι τάληθες αὐτὸ περὶ γενέσεως χολῆς. οὐ μὴν οὖδ' ἀδύνατον οὖδ' ἀσαφῆς ἐξευρεῖν, ὅτι μὴ τῷ πλείστην ἐν ἐαυτῷ περιέχειν τὸ μέλι τὴν ξανθήν χολὴν ἀλλ' ἐν τῷ σώματι μεταβάλλομενον εἰς αὐτὴν ἀλλοιοῦταί τε καὶ τρέπεται. πικρόν τε γὰρ ἂν ἦν γευσίμονος, εἰ χολὴν ἐξωθεὶν εὐθὺς ἐν ἐαυτῷ περιέχειν ἀπασί τ' ἂν ὡσαυτὸς τοῖς ἀνθρώποις ἵσον αὐτῆς ἐγέννα

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in the liver, will result in the various affections—particularly jaundice—which Erasistratus himself states to occur where there is much bile. Surely, then, it is most essential for the physician to know in the first place, that the bile is contained in the food itself from outside, and, secondly, that for example, beet contains a great deal of bile, and bread very little, while olive oil contains most, and wine least of all, and all the other articles of diet different quantities. Would it not be absurd for any one to choose voluntarily those articles which contain more bile, rather than those containing less?

What, however, if the bile is not contained in the food, but comes into existence in the animal’s body? Will it not also be useful to know what state of the body is followed by a greater, and what by a smaller occurrence of bile?¹ For obviously it is in our power to alter and transmute morbid states of the body—in fact, to give them a turn for the better. But if we did not know in what respect they were morbid or in what way they diverged from the normal, how should we be able to ameliorate them?

Therefore it is not useless in treatment, as Erasistratus says, to know the actual truth about the genesis of bile. Certainly it is not impossible, or even difficult to discover that the reason why honey produces yellow bile is not that it contains a large quantity of this within itself, but because it [the honey] undergoes change, becoming altered and transmuted into bile. For it would be bitter to the taste if it contained bile from the outset, and it would produce an equal quantity of bile

¹ Here it is rather the living organism we consider than the particular food that is put into it.
τὸ πλῆθος. ἀλλ' οὖν ὃδ' ἔχει τάληθες. ἐν μὲν γὰρ τοῖς ἄκμαξοσι καὶ μάλιστ' εἰ φύσει θερμό-
τεροι καὶ βιόν εἶνεν βιοῦντες ταλαίπωροι, ἀπαν
εἰς ξανθὴν χολὴν μεταβάλλει τὸ μέλι: τοῖς
γέρουσι δ' ἰκανῶς ἔστιν ἐπιτήδειον, ὡς ἄν οὖν εἰς
χολὴν ἀλλ' εἰς αἷμα τὴν ἄλλοις ἐν ἐκεῖνοις
λαμβάνον. Ἄρα σύστατος δὲ πρὸς τῷ μηδὲν
τούτων γυνώσκειν οὐδὲ περὶ τὴν διαίρεσιν τοῦ
λόγου σωφρονεῖ, πότερον ἐν τοῖς σιτίοις ἡ χολὴ
περιέχεται εὐθὺς ἡ ἄρχης ἢ κατὰ τὴν ἐν τῇ
κοιλίᾳ κατεργασίαν ἐγένετο, μηδὲν εἶναι χρήσι-
116 μον εἰς ἰατρικὴν ἐπεσκέφθαι λέγων. ἔχρην || γὰρ
δὴ πρὸς τῷ προσθείναι τι καὶ περὶ τῆς ἐν ἡπατι καὶ
φλεψὶ γενέσεως αὐτῆς, ἐν τοῖς δὲ τοῖς ὀργάνοις
γεννᾶσθαι τὴν χολὴν ἁμα τῷ αἵματι τῶν παλαιῶν
ἰατρῶν τε καὶ φιλοσόφων ἀποφημανέων. ἀλλ'
τοῖς εὐθὺς ἡ ἄρχης σφαλεῖσαι καὶ διαμαρτάνωσι
τῆς ὀρθῆς ὀδοί τοιαύτα τῇ ληρεῖν ἀναγκαῖον ἐστὶ
καὶ προσετί τῶν χρησιμωτάτων εἰς τὴν τέχνην
παραλιπεῖν τὴν ξήτησιν.

'Ἡδέως δ' ἂν ἐνταῦθα τοῦ λόγου γεγονός
ἡρόμην τοὺς ὀμιλήσαι φάσκοντας αὐτὸν ἐπὶ
πλείστον τοῖς ἐκ τοῦ περιπάτου φιλοσόφως, εἰ
γυνώσκουσιν, ὡς περὶ τοῦ κεκρᾶσθαι τὰ σῶμαθ'
ημῶν ἐκ θερμοῦ καὶ ψυχροῦ καὶ ξηροῦ καὶ ὑγροῦ
πρὸς Ἀριστοτέλους εἰρηταὶ τε καὶ ἀποδέδεικται,
καὶ ὡς τὸ θερμὸν ἐν αὐτοῖς ἐστι τὸ δραστικότατον
καὶ ὡς τῶν ζῴων ὡς μὲν θερμότερα φύσει, ταύτα
πάντως ἐναίμα, τὰ δ' ἐπὶ πλέον ψυχρότερα
πάντως ἄναιμα καὶ διὰ τοῦτο τοῦ χειμῶνος ἀργὰ.
in every person who took it. The facts, however, are not so.\(^1\) For in those who are in the prime of life, especially if they are warm by nature and are leading a life of toil, the honey changes entirely into yellow bile. Old people, however, it suits well enough, inasmuch as the alteration which it undergoes is not into bile, but into blood. Erasistratus, however, in addition to knowing nothing about this, shows no intelligence even in the division of his argument; he says that it is of no practical importance to investigate whether the bile is contained in the food from the beginning or comes into existence as a result of gastric digestion. He ought surely to have added something about its genesis in liver and veins, seeing that the old physicians and philosophers declare that it along with the blood is generated in these organs. But it is inevitable that people who, from the very outset, go astray, and wander from the right road, should talk such nonsense, and should, over and above this, neglect to search for the factors of most practical importance in medicine.

Having come to this point in the argument, I should like to ask those who declare that Erasistratus was very familiar with the Peripatetics, whether they know what Aristotle stated and demonstrated with regard to our bodies being compounded out of the Warm, the Cold, the Dry and the Moist, and how he says that among these the Warm is the most active, and that those animals which are by nature warmest have abundance of blood, whilst those that are colder are entirely lacking in blood, and consequently in winter lie idle and motionless, lurking

\(^1\) Supreme importance of the “soil.” cf. Introduction, pp. xii. and xxxi.
καὶ ἀκίνητα κεῖται φωλεύοντα δίκην νεκρῶν. ἔρηται δὲ καὶ περὶ τῆς χρονᾶς τοῦ αἵματος οὐκ Ἀριστοτέλει μόνον, ἀλλὰ καὶ Πλάτωνι. καὶ ἥμεις νῦν, ὅπερ ἦδη καὶ πρόσθεν εἶπον, || οὐ τὰ καλῶς ἀποδεδειγμένα τοῖς παλαιοῖς λέγειν προβέβηκα, μήτε τῇ γνώμῃ μήτε τῇ λέξει τοὺς ἀνδρας ἐκείνους υπερβαλέσατο δυνάμενον. τὰ δ’ ἦτοι χωρὶς ἀποδείξεως ὡς ἐναργὴ πρὸς αὐτῶν εἰρημένα διὰ τὸ μηδὲ ὑπονοήσαι μοχθηροὺς οὕτως ἐσεθθαί τινὰς σοφιστάς, οἱ καταφρονήσουσι τῆς ἐν αὐτοῖς ἀληθείας, ἢ καὶ παραλειπεμένα τελέως ὑπ’ ἐκείνων ἄξιομεν εὐρίσκειν τε καὶ ἀποδεικνύναι.

Περὶ δὲ τῆς τῶν χυμῶν γενέσεως οὐκ οἶδ’, εἰ ἔχει τις ἔτερον προσθείναι σοφώτερον ὅν Ἰπποκράτης εἶπε καὶ Ἀριστοτέλης καὶ Πραξιγόρας καὶ Φιλότιμος καὶ ἄλλοι πολλοὶ τῶν παλαιῶν. ἀποδείκται γὰρ ἐκείνοις τοῖς ἀνδράσιν ἄλλοιον-μένης τῆς τροφῆς ἐν ταῖς φλεψίν ὑπὸ τῆς ἐμφύτου θερμασίας αἶμα μὲν ὑπὸ τῆς συμμετρίας τῆς κατ’ αὐτήν, οἱ δ’ ἄλλοι χυμοὶ διὰ τὰς ἀμετρίας γιγνόμενοι καὶ τοῦτῳ τῷ λόγῳ πάνθ’ ὀμολογεῖ τὰ φαινόμενα. καὶ γὰρ τῶν ἐδεσμάτων οὐκ μὲν ἐστὶ θερμότερα φύσει, χολωδέστερα, τὰ δὲ ψυχρότερα φλεγματικότερα· καὶ τῶν ἡλικίων ὀσσαύτως χο-118 λωδέστερραι μὲν αἱ θερμότεραι φύσει, φλεγματωδέστεραι δ’ αἱ ψυχρότεραι· καὶ τῶν ἐπιτηδευμάτων δὲ καὶ τῶν χωρῶν καὶ τῶν ώρῶν καὶ πολὺ δὴ πρότερον ἔτι τῶν φύσεων αὐτῶν αἱ μὲν ψυ- χρότεραι φλεγματωδέστεραι, χολωδέστεραι δ’ αἱ

1 Aristotle, Hist. Animal., iii. xix.; Plato, Timaeus, 80 B. 182
in holes like corpses. Further, the question of the colour of the blood has been dealt with not only by Aristotle but also by Plato.¹ Now I, for my part, as I have already said, did not set before myself the task of stating what has been so well demonstrated by the Ancients, since I cannot surpass these men either in my views or in my method of giving them expression. Doctrines, however, which they either stated without demonstration, as being self-evident (since they never suspected that there could be sophists so degraded as to contemn the truth in these matters), or else which they actually omitted to mention at all—these I propose to discover and prove.

Now in reference to the genesis of the humours, I do not know that any one could add anything wiser than what has been said by Hippocrates, Aristotle, Praxagoras, Philotimus² and many other among the Ancients. These men demonstrated that when the nutriment becomes altered in the veins by the innate heat, blood is produced when it is in moderation, and the other humours when it is not in proper proportion. And all the observed facts³ agree with this argument. Thus, those articles of food, which are by nature warmer are more productive of bile, while those which are colder produce more phlegm. Similarly of the periods of life, those which are naturally warmer tend more to bile, and the colder more to phlegm. Of occupations also, localities and seasons, and, above all, of natures⁴ themselves, the colder are more phlegmatic, and the warmer more

¹ Philotimus succeeded Diocles and Praxagoras, who were successive leaders of the Hippocratic school. cf. p. 51, note 1.
² Lit. phenomena.
³ i.e. living organisms; cf. p. 47, note 1.
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θερμότεραι· καὶ νοσημάτων τὰ μὲν ψυχρὰ τοῦ φλέγματος ἔκγονα, τὰ δὲ θερμὰ τῆς ξανθῆς χολῆς· καὶ ὅλως οὐδὲν ἔστιν εὐρείν τῶν πάντων, ὃ μὴ τούτῳ τῷ λόγῳ μαρτυρεῖ. πῶς δ᾽ οὐ μέλλει; διὰ γὰρ τὴν ἐκ τῶν τεττάρων ποιῶν κρᾶσιν ἐκάστου τῶν μορίων ὁδὲ πως ἐνεργοῦντος ἀνάγκη πᾶσα καὶ διὰ τὴν βλάβην αὐτῶν ἢ διαφθείρεσθαι τελέως ἢ ἐμποδίζεσθαι γε τὴν ἐνέργειαν καὶ οὕτω νοσεῖν τὸ ζῷον ἢ ὅλον ἡ κατὰ τὰ μόρια.

Καὶ τὰ πρῶτά γε καὶ γενικῶτατα νοσήματα τέτταρα τῶν ἁριθμῶν ὑπάρχει θερμότητι καὶ ψυχρότητι καὶ ἕρποτητι καὶ ψυχρότητι διαφέροντα. τούτο δὲ καὶ αὐτὸς ὁ Ἐρασίστρατος ὀμολογεῖ καίτοι μὴ βουλόμενος. ὅταν γὰρ ἐν τοῖς πυρετοῖς χείροις τῶν σιτίων τὰς πέψεις γίγνεσθαι λέγει,

119 μὴ διότι τῆς ἐμφύτου || θερμασίας ἢ συμμετρίας διέφθαρται, καθάπερ οἱ πρόσθεν ὑπελάμβανον, ἀλλ᾽ ὅτι περιστελλεσθαι καὶ τρίβειν ἡ γαστήρ αὐξ ὧμοιως δύναται βεβλαμμένη τὴν ἐνέργειαν, ἔρεσθαι δίκαιον αὐτῶν, ὅπο τίνος ἡ τῆς γαστρὸς ἐνέργεια βέβλαπται.

Γενομένου γὰρ, εἰ τύχω, βουβῶνος ἐπὶ προσπαίσματι, πρὶν μὲν πυρέζαι τὸν ἀνθρώπουν, οὐκ ἂν χείρον ἡ γαστήρ πέψειν ὀυ γὰρ ἰκανὸν ἢν οὐδέτερον αὐτῶν όυθ᾽ ὁ βουβῶν οὕτε τὸ ἔλκος ἐμποδίσαι τι καὶ βλάψαι τὴν ἐνέργειαν τῆς κοιλίας· εἰ δὲ πυρέζειν, εὐθὺς μὲν αἱ πέψεις γίγνονται χείρους, εὐθὺς δὲ καὶ τὴν ἐνέργειαν τῆς γαστρὸς βεβλάφθαι φαμὲν ὅρθως λέγοντες. ἀλλ᾽ ὅπο τίνος ἐβλάβη, προσβείναι

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1 Erasistratus rejected the idea of innate heat; he held that the heat of the body was introduced from outside.

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bilious. Also cold diseases result from phlegm, and warmer ones from yellow bile. There is not a single thing to be found which does not bear witness to the truth of this account. How could it be otherwise? For, seeing that every part functions in its own special way because of the manner in which the four qualities are compounded, it is absolutely necessary that the function [activity] should be either completely destroyed, or, at least hampered, by any damage to the qualities, and that thus the animal should fall ill, either as a whole, or in certain of its parts.

Also the diseases which are primary and most generic are four in number, and differ from each other in warmth, cold, dryness and moisture. Now, Erasistratus himself confesses this, albeit unintentionally;¹ for when he says that the digestion of food becomes worse in fever, not because the innate heat has ceased to be in due proportion, as people previously supposed, but because the stomach, with its activity impaired, cannot contract and triturate as before—then, I say, one may justly ask him what it is that has impaired the activity of the stomach.

Thus, for example, when a bubo develops following an accidental wound ² gastric digestion does not become impaired until after the patient has become fevered; neither the bubo nor the sore of itself impedes in any way or damages the activity of the stomach. But if fever occurs, the digestion at once deteriorates, and we are also right in saying that the activity of the stomach at once becomes impaired. We must add, however, by what

¹ As a bubo is a swelling in the groin, we must suppose that the wound referred to would be in the leg or lower abdomen.

²
χρή τῷ λόγῳ. τὸ μὲν γὰρ ἐλκος οὐχ οἶον τ' ἢν αὐτὴν βλάπτειν, ὡστερ οὐδ' ὁ βουβῶν. ἡ γὰρ ἀν ἔβλαψε καὶ πρὸ τοῦ πυρετοῦ. εἰ δὲ μὴ ταῦτα, δήλου, ὡς ἡ τῆς θερμασίας πλεονεξία. δύο γὰρ ταῦτα προσεγένετο τῷ βουβῶν, ἡ τῆς κατὰ τὰς ἄρτηριάς τε καὶ τὴν καρδίαν κινήσεως ἀλλοίωσις καὶ ἡ τῆς κατὰ φύσιν θερμασίας πλεονεξία. ἀλλ' ἡ μὲν τῆς κινήσεως ἀλλοίωσις οὐ μόνον οὔδεν 120 βλάψει τὴν ἐνέργειαν τῆς γαστρός, ἀλλὰ καὶ προσωφελήσει κατ' ἐκείνα τῶν ζωῶν, ἐν οἷς εἰς τὴν πέψιν ὑπέθετο πλείστον δύνασθαι τὸ διὰ τῶν ἄρτηριῶν εἰς τὴν κούλιαν ἐμπιπτον πνεύμα. διὰ λοιπὴν οὖν ἔτι καὶ μόνην τὴν ἀμετρον θερμασίαν ἡ βλάβη τῆς ἐνέργειας τῆς γαστρί. τὸ μὲν γὰρ πνεῦμα σφοδρότερον τε καὶ συνεχέστερον καὶ πλέον ἐμπίπτει νῦν ή πρότερον. ὡστε ταῦτῃ μὲν μᾶλλον πέψει τά διὰ τὸ πνεῦμα καλῶς πέττοντα ζῶα, διὰ λοιπὴν δ' ἔτι τὴν παρὰ φύσιν θερμασίαν ἀπεπτήσει. τὸ γὰρ καὶ τῷ πνεύματι φάναι τιν' ὑπάρχειν ἰδιότητα, καθ' ἢν πέττει, κάπετα ταῦτην πυρεττοῦντων διαφθείρεσθαι καθ' ἐτερον τρόπον ἐστὶν ὑμολογησαι τὸ ἄτοπον. ἐρωτηθέντες γὰρ αὕτης, ὑπὸ τίνος ἡλλοιωθὴ τὸ πνεῦμα, μόνην ἐξουσιν ἀποκρίνεσθαι τὴν παρὰ φύσιν θερμασίαν καὶ μάλιστ' ἐπὶ τοῦ κατὰ τὴν

1 i.e. fever as a cause of disease.
2 As we should say, “circulatory” changes.
3 This is the “vital spirit” or pneuma which, according to Erasistratus and the Pneumatist school, was elaborated in the left ventricle, and thereafter carried by the arteries all over the body, there to subserve circulatory processes. It
it has been impaired. For the wound was not capable of impairing it, nor yet the bubo, for, if they had been, then they would have caused this damage before the fever as well. If it was not these that caused it, then it was the excess of heat \(^1\) (for these two symptoms occurred besides the bubo—an alteration in the arterial and cardiac movements \(^2\) and an excessive development of natural heat). Now the alteration of these movements will not merely not impair the function of the stomach in any way: it will actually prove an additional help among those animals in which, according to Erasistratus, the pneum\(a\), which is propelled through the arteries and into the alimentary canal, is of great service in digestion; \(^3\) there is only left, then, the disproportionate heat to account for the damage to the gastric activity. For the pneum\(a\) is driven in more vigorously and continuously, and in greater quantity now than before; thus in this case, the animal whose digestion is promoted by pneum\(a\) will digest more, whereas the remaining factor—abnormal heat—will give them indigestion. For to say, on the one hand, that the pneum\(a\) has a certain property by virtue of which it promotes digestion, and then to say that this property disappears in cases of fever, is simply to admit the absurdity. For when they are again asked what it is that has altered the pneum\(a\), they will only be able to reply, "the abnormal heat," and particularly if it be the pneum\(a\) in the food canal which is in

has some analogy with oxygen, but this is also the case with the "natural spirit" or pneum\(a\), whose seat was the liver and which was distributed by the veins through the body; it presided over the more vegetative processes. \(cf.\ p.152,\ note\ 1\); Introduction, p. xxxiv.
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κοιλίαν ὁυδὲ γὰρ πλησιάζει κατ’ οὐδὲν τούτῳ τῷ βουβῶνι.

Καίτοι τί τῶν ζύφων ἐκείνων, ἐν οἷς ἡ τοῦ πνεύματος ἰδιότης μέγα δύναται, μνημονεύω, παρὸν ἐπ’ ἀνθρώποις, ἐν οἷς ἡ οὐδὲν ἡ παντάπασιν ἀμο||δρόν τι καὶ μικρὸν ὄφελεί, ποιεῖσθαι τὸν λόγον; ἀλλ’ ὅτι μὲν ἐν τοῖς πυρετοῖς οὗτοι κακῶς πέττουσιν, ὀμολογεὶ καὶ αὐτὸς καὶ τὴν γ’ αἰτίαν προστιθεὶς βεβλάφθαι φησί τῆς γαστρὸς τήν ἐνέργειαν, οὐ μὴν ἄλλην γε τινα πρόφασιν τῆς βλάβης εἰπεῖν ἔχει πλὴν τῆς παρὰ φύσιν θερμασίας. ἀλλ’ εἰ βλάπτει τήν ἐνέργειαν ἢ παρὰ φύσιν θερμασία μὴ κατά τι συμβεβηκός, ἀλλὰ διὰ τὴν αὐτῆς οὐσίαν τε καὶ δύναμιν, ἐκ τῶν πρῶτων ἀν εἰ οὐσιάκως· καὶ μὴν οὐκ ἐνδεχεται τῶν πρῶτων μὲν εἶναι νοσημάτων τὴν ἀμετρίαν τῆς θερμασίας, τὴν δ’ ἐνέργειαν ὑπὸ τῆς εὐκρασίας μὴ γίγνεσθαι. οὐδὲ γὰρ δι’ ἄλλο τι δυνατὸν γίγνεσθαι τὴν δυσκρασίαν αὐτίκα τῶν πρῶτων νοσημάτων ἀλλ’ ἡ διὰ τὴν εὐκρασίαν διαφθειρομένην. τῷ γὰρ ὑπὸ ταύτης γίγνεσθαι τὰς ἐνέργειας ἀνάγκη καὶ τὰς πρῶτας αὐτῶν βλάβας διαφθειρομένης γίγνεσθαι.

"Οτι μὲν οὖν καὶ κατ’ ἑνὸς τῶν Έρασίστρατον ἢ εὐκρασία τοῦ θερμοῦ τῶν ἐνέργειῶν αἰτία, τοῖς θεωρεῖν τὸ ἀκόλουθον δυναμένοις ἰκανῶς ἀποδεδείχθαι νομίζω. τούτου δ’ ὑπάρχοντος ἠμῖν οὐδὲν ἐτι χαλεπόν || ἐφ’ ἐκάστης ἐνεργείας

1 Even leaving the pneuma out of account, Galen claims that he can still prove his thesis.

2 In other words: if dyscrasia is a first principle in pathology, then eucrasia must be a first principle in physiology.
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question (since this does not come in any way near the bubo).

Yet why do I mention those animals in which the property of the pneuma plays an important part, when it is possible to base one's argument upon human beings, in whom it is either of no importance at all, or acts quite faintly and feebly? But Erasistratus himself agrees that human beings digest badly in fevers, adding as the cause that the activity of the stomach has been impaired. He cannot, however, advance any other cause of this impairment than abnormal heat. But if it is not by accident that the abnormal heat impairs this activity, but by virtue of its own essence and power, then this abnormal heat must belong to the primary diseases. But, indeed, if disproportion of heat belongs to the primary diseases, it cannot but be that a proportionate blending [eucrasia] of the qualities produces the normal activity. For a disproportionate blend [dyscrasia] can only become a cause of the primary diseases through derangement of the eucrasia. That is to say, it is because the [normal] activities arise from the eucrasia that the primary impairments of these activities necessarily arise from its derangement.

I think, then, it has been proved to the satisfaction of those people who are capable of seeing logical consequences, that, even according to Erasistratus's own argument, the cause of the normal functions is eucrasia of the Warm. Now, this being so, there is nothing further to prevent us from saying

3 The above is a good instance of Galen's "logical" method as applied to medical questions; an appeal to those who are capable of following "logical sequence." cf. p. 209, note l.
GALEN

τῇ μὲν εὐκρασίᾳ τὸ βέλτιον ἔπεσθαι λέγειν, τῇ δὲ δυσκρασίᾳ τὰ χεῖρω. καὶ τοῖνυν εἴπερ ταῦθ' ούτως ἔχει, τὸ μὲν αἶμα τῆς συμμέτρου θερμασίας, τὴν δὲ ξανθὴν χολὴν τῆς ἀμέτρου νομιστέον ὑπάρχειν ἐγγονον. οὕτω γὰρ καὶ ἡμῖν ἐν τε ταῖς θερμαῖς ἡλικίαις καὶ τοῖς θερμοῖς χωρίοις καὶ ταῖς ὀραίοις του ἑτῶν ταῖς θερμαῖς καὶ ταῖς θερμαῖς καταστάσεωι, ὁσαύτως δὲ καὶ ταῖς θερμαῖς κράσεωι τῶν ἀνθρώπων καὶ τοῖς ἐπιτηδεύμασι τε καὶ τοῖς διαίτημασι καὶ τοῖς νοσήμασι τοῖς θερμοῖς εὐλόγως ἡ ξανθὴ χολὴ πλείστη φαίνεται γιγνομένη.

Τὸ δ' ἀπορεῖν, εἰτ' ἐν τοῖς σώμασι τῶν ἀνθρώπων ὁ χυμὸς οὗτος ἔχει τὴν γένεσιν εἰτ' ἐν τοῖς στίοις περέχεται, μηδ' ὅτι τοῖς ὑγιαίνουσιν ἀμέμπτως, ὅταν ἀσιτήσωσι παρὰ τὸ έθος ὑπὸ τῶν περιστάσεων πραγμάτων ἀναγκασθέντες, πικρὸν μὲν τὸ στόμα γίγνεται, χολώδη δὲ τὰ οὐρα, δάκνεται δ' ἡ γαστήρ, ἑωρακότος ἐστὶν ἀλλ' ὀσπερ ἔξαιφνης νῦν εἰς τὸν κόσμον ἐληλυθότος καὶ μὴν τὰ κατ' αὐτὸν φαινόμενα γιγνώσκοντος. ἐπεὶ τίς οὐκ οἶδεν, ὡς ἕκαστον τῶν ἐφωμένων ἐπὶ πλέον ἀλυκώτερον μὲν τὸ 123 πρῶτον, ύστερον || δὲ πικρότερον γίγνεται; καὶ εἰ τὸ μέλι βουληθεὶς αὐτὸ τὸ πάντων γλυκύτατον ἐπὶ πλείστον ἐψειν, ἀποδείξεις καὶ τοῦτο πικρότατον. ὃ γὰρ τοῖς ἄλλοις, ὃσα μὴ φύσει θερμὰ, παρὰ τῆς ἐψήφωσις ἐγγίγνεται, τούτ' ἐκ φύσεως ὑπάρχει τῷ μέλειτι. διὰ τούτ' οὖν ἐψόμενον οὐ γίγνεται γλυκύτερον ὅσον γὰρ ἐχρὴν εἶναι θερμότητος εἰς γένεσιν γλυκύτητος, ἀκριβῶς αὐτῷ τοῦτο πᾶν οἰκοθεν ὑπάρχει. ὃ τοίνυν 190
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that, in the case of each function, ecurasia is followed by the more, and dyscrasia by the less favourable alternative. And, therefore, if this be the case, we must suppose blood to be the outcome of proportionate, and yellow bile of disproportionate heat. So we naturally find yellow bile appearing in greatest quantity in ourselves at the warm periods of life, in warm countries, at warm seasons of the year, and when we are in a warm condition; similarly in people of warm temperaments, and in connection with warm occupations, modes of life, or diseases.

And to be in doubt as to whether this humour has its genesis in the human body or is contained in the food is what you would expect from one who has—I will not say failed to see that, when those who are perfectly healthy have, under the compulsion of circumstances, to fast contrary to custom, their mouths become bitter and their urine bile-coloured, while they suffer from gnawing pains in the stomach— but has, as it were, just made a sudden entrance into the world, and is not yet familiar with the phenomena which occur there. Who, in fact, does not know that anything which is overcooked grows at first salt and afterwards bitter? And if you will boil honey itself, far the sweetest of all things, you can demonstrate that even this becomes quite bitter. For what may occur as a result of boiling in the case of other articles which are not warm by nature, exists naturally in honey; for this reason it does not become sweeter on being boiled, since exactly the same quantity of heat as is needed for the production of sweetness exists from beforehand in the honey. Therefore the external heat,
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ἐξωθέν τοῖς ἐλλιπῶς θερμοῖς ἢν ὠφέλιμον, τούτῳ ἐκεῖνῳ βλάβη τε καὶ ἀμετρία γίνεται καὶ διὰ τούτων ἰαίτων τῶν ἀλλών ἐφόμενον ἀποδείκνυται πικρών. δὴ αὐτὸ δὲ τούτῳ καὶ τοῖς θερμοῖς φύσει καὶ τοῖς ἀκμάζουσιν εἰς χολήν ἐτοίμως μεταβάλλεται. θερμῷ γὰρ θερμὸν πλησίαζον εἰς ἀμετρίαν κράσεως ἐτοίμως ἐξίσταται καὶ φθάνει χολή γιγνόμενον, οὐχ αἶμα. δεῖται τοῖς γυναικάς μὲν κράσεως ἀνθρώπου, γυναικῶς δὲ ἡλικίας, ὡς εἰς αἷματος ἀγγέλων φύσιν. οὕκον ἀπὸ τρόπον συνεβοῦλευσεν Ἰπποκράτης τοῖς φύσει πικροχόλοις μὴ προσφέρειν τὸ μέλη, ὡς ἐν θερμότερας δὲ δηλοντόντες ὑπάρχουσιν. οὕτω δὲ καὶ τοῖς νοσήμασι τοῖς πικροχόλοις πολέμουν εἶναι τὸ μέλη καὶ τῇ τῶν γερόντων ἡλικία φίλιον οὐχ Ἰπποκράτης μόνον ἀλλὰ καὶ πάντες ἰατροὶ λέγουσιν, οἱ μὲν ἐκ τῆς φύσεως αὐτοῦ τὴν δύναμιν ἐνδειξαμένης εὑρόντες, οἱ δὲ ἐκ τῆς πεῖρας μόνης. οὐδὲ γὰρ οὔδὲ τοὺς ἀπὸ τῆς ἐμπειρίας ἰατροῖς ἔτερον τι παρὰ ταῦτα τετήρηται γιγνόμενον, ἀλλὰ χρηστὸν μὲν γέροντι, νέῳ δὲ οὐ χρηστόν, καὶ τῷ μὲν φύσει πικροχόλῳ βλαβέρον, ὠφέλιμον δὲ τῷ φλεγματώδει καὶ τῶν νοσημάτων ὡςαύτως τοῖς μὲν πικροχόλοις ἐχθρόν, τοῖς δὲ φλεγματώδεσι φίλιον. εὖ δὲ λόγῳ τοῖς μὲν θερμοῖς σώμασιν ἢ διὰ φύσιν ἢ διὰ νόσου ἢ δι’ ἡλικίαν ἢ δι’ ὁραν ἢ διὰ χώραν ἢ δι’ ἐπιτήθευμα χολῆς γεννητικοῦ, αἷματος δὲ τοῖς ἐναντίοις.

Καὶ μὴν οὐκ ἐνδέχεται ταύτων ἐδέσμα τοῖς μὲν χολήν γεννᾶν, τοῖς δὲ αἷμα μὴ οὐκ ἐν τῷ σώματι
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which would be useful for insufficiently warm substances, becomes in the honey a source of damage, in fact an excess; and it is for this reason that honey, when boiled, can be demonstrated to become bitter sooner than the others. For the same reason it is easily transmuted into bile in those people who are naturally warm, or in their prime, since warm when associated with warm becomes readily changed into a disproportionate combination and turns into bile sooner than into blood. Thus we need a cold temperament and a cold period of life if we would have honey brought to the nature of blood.\(^1\) Therefore Hippocrates not improperly advised those who were naturally bilious not to take honey, since they were obviously of too warm a temperament. So also, not only Hippocrates, but all physicians say that honey is bad in bilious diseases but good in old age; some of them having discovered this through the indications afforded by its nature, and others simply through experiment,\(^2\) for the Empiricist physicians too have made precisely the same observation, namely, that honey is good for an old man and not for a young one, that it is harmful for those who are naturally bilious, and serviceable for those who are phlegmatic. In a word, in bodies which are warm either through nature, disease, time of life, season of the year, locality, or occupation, honey is productive of bile, whereas in opposite circumstances it produces blood.

But surely it is impossible that the same article of diet can produce in certain persons bile and in others blood, if it be not that the genesis of these humours is

\(^1\) The aim of dietetics always being the production of moderate heat—i.e. blood.

\(^2\) Note contrasted methods of Rationalists and Empiricists.
GALEN

tῆς γενέσεως αὐτῶν ἐπιτελουμένης. εἰ γὰρ δὴ
οἷκοθέν γε καὶ παρ’ ἑαυτοῦ τῶν ἐδεσμάτων
ἐκαστὸν ἔχουν καὶ ύπ’ ὑπὸ τῶν ἔκομων σῶμασι
125 μεταβαλλόμενον ἐγέννα τὴν χολήν, ἐν ἀπασιν
ἀν ὁμοίως αὐτὴν τοῖς σώμασιν ἐγέννα καὶ τὸ
μὲν πικρὸν ἔξω γενομένου ἢν ἄν οἶμαι χολῆς
ποιητικὸν, εἰ δὲ τι γλυκὸ καὶ χρηστὸν, ὡς ἂν
οὐδὲ τὸ βραχύτατον ἐξ αὐτοῦ χολῆς ἐγεννᾶτο. καὶ
μὴν οὐ τὸ μέλι μόνον, ἀλλὰ καὶ τῶν ἄλλων ἐκαστον
τῶν γλυκέων τοῖς προειρημένοις σῶμασι τοῖς δὲ
ὁτιοῦν τῶν εἰρημένων θερμὸς οὐσιν εἰς χολὴν
ἐτοίμως ἔξισται.

Καίτοι ταύτ’ οὐκ οἶδ’ ὅπως ἐξηνέχθην εἴπεῖν
οὐ προελόμενος ἄλλ’ ὑπ’ αὐτῆς τοῦ λόγου τῆς
ἀκολούθιας ἀναγκασθεῖσ. εἴρηται δὲ ἐπὶ πλεῖστον
ὑπὲρ αὐτῶν Ἀριστοτέλει τε καὶ Πραξιγόρα
τὴν Ἰπποκράτους καὶ Πλάτωνος γνώμην ὅρθως
ἐξηγησαμένοις.

IX

Μὴ τοίνυν ὡς ἀποδεῖξεις ὑφ’ ἡμῶν εἰρήσθαι
νομίζειν τὰ τουαῦτα μᾶλλον ἢ περὶ τῆς τῶν
ἄλλως γεγυγκούσων ἀναίσθησιας εἴδεξεις, οὐ
μηδὲ τὰ πρὸς ἀπάντων ὁμολογούμενα καὶ καθ’
ἐκάστην ἡμέραν φαινόμενα γεγυγκουσιν τὰς
δ’ ἀποδείξεις αὐτῶν τὰς κατ’ ἐπιστήμην ἐξ
ἐκείνων χρὴ λαμβάνειν τῶν ἄρχων, δὲν ἦδη
126 καὶ πρόσθεν || εἴπομεν, ὡς τὸ δρᾶν καὶ πᾶσχεν
εἰς ἄλληλα τοῖς σώμασιν ὑπάρχει κατὰ τὸ
θερμὸν καὶ ψυχρὸν καὶ ἔξηρον καὶ ὕγρον. καὶ

1 Lit. anaesthesia. Linacre renders it indocilitas.
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accomplished in the body. For if all articles of food contained bile from the beginning and of themselves, and did not produce it by undergoing change in the animal body, then they would produce it similarly in all bodies; the food which was bitter to the taste would, I take it, be productive of bile, while that which tasted good and sweet would not generate even the smallest quantity of bile. Moreover, not only honey but all other sweet substances are readily converted into bile in the aforesaid bodies which are warm for any of the reasons mentioned.

Well, I have somehow or other been led into this discussion,—not in accordance with my plan, but compelled by the course of the argument. This subject has been treated at great length by Aristotle and Praxagoras, who have correctly expounded the view of Hippocrates and Plato.

IX

For this reason the things that we have said are not to be looked upon as proofs but rather as indications of the dulness¹ of those who think differently, and who do not even recognise what is agreed on by everyone and is a matter of daily observation. As for the scientific proofs of all this, they are to be drawn from these principles of which I have already spoken²—namely, that bodies act upon and are acted upon by each other in virtue of the Warm, Cold, Moist and Dry. And if one is

¹ p. 15.

² p. 15.
GALEN

eἰτὲ φλέβας εἰθ' ἢπαρ εἰτ' ἀρτηρίας εἰτὲ καρδίαν εἰτ' ἀλλο τι μόριον ἐνεργεῖν τις
φήσειν ἦντινοῦ ἐνέργειαν, ἄφύκτως ἀνάγκαις ἀναγκασθῆσαι διὰ τὴν ἐκ τῶν τεττάρων ποιῶν
κράσιν ὁμολογῆσαι τὴν ἐνέργειαν ὑπάρχειν αὐτῷ. διὰ τὶ γὰρ ἡ γαστὴρ περιστέλλεται τοῖς συντοις,
diα τὶ δ' αἰ φλέβες αἰμα γεννώσι, παρά τῶν Ἐρασιστρατείων ἐδεόμην ἄκοψαι. τὸ γὰρ ὅτι
περιστέλλεται μόνον αὐτὸ καθ' εαυτό γεγνώσκειν ὀυδέπω χρηστόν, εἰ μὴ καὶ τὴν αὐτίαν εἰδείημεν;
οὕτω γὰρ ἄν οἷμαι καὶ τὰ σφάλματα θεραπεύσαιμεν. οὐ μέλει, φασίν, ἡμῖν οὐδὲ πολυ-
πραγμονοῦμεν ἢτι τὰς τοιοῦτας αἰτίας. ύπὲρ ἰατρῶν γὰρ εἰς καὶ τῷ φυσικῷ προσήκουσι.
πότερον οὐν οὐδ' ἀντερεῖτε τὸ φάσκοντι τὴν μὲν ἐνυκρασίαν τὴν κατὰ φύσιν αὐτίαν εἶναι τῆς ἐνερ-
γείας ἐκάστῳ τῶν ὀργάνων, τὴν δ' αὖ δυσκρασίαν

127 νόσον τ' ἦδη καλεῖσθαι καὶ πάντως ὑπ' αὖτὶ τῆς
βλάπτεσθαι τὴν ἐνέργειαν; ἡ πεισθήσεσθε ταῖς
τῶν παλαιῶν ἀποδείξεως; ἡ τρίτον τι καὶ μέσον
ἐκατέρω τούτων πράξεσθε μὴ' ώς ἀληθεύσι τοῖς
λόγοις ἐξ' ἀνάγκης πειθόμενοι μὴ' ἀντιλέγοντες
ὡς ψευδέοις, ἀλλ' ἀπορητικοὶ τινες ἡξαίφης καὶ
Πυρρώνειοι γενήσεσθε; καὶ μὴν εἰ τοῦτο δράσετε,
tὴν ἐμπειρίαν ἀναγκαῖον ύμῖν προστήσασθαι. τῷ
gὰρ ἄν ἐτὶ τρόπῳ καὶ τῶν ἰαμάτων εὐποροιήτε
tὴν οὐσίαν ἐκάστου τῶν νοσημάτων ἀγνοοῦντες;
tί οὖν οὖν ἐξ' ἀρχῆς ἐμπειρίκους ύμᾶς αὑτοὺς
ἐκαλέσατε; τὶ δὲ πράγμαθ' ἡμῖν παρέχετε φύ-

1 Iatros: lit. “healer.”
2 Lit. “physicist” or “physiologist,” the student of the physicis. cf. p. 70, note 2.

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speaking of any activity, whether it be exercised by vein, liver, arteries, heart, alimentary canal, or any part, one will be inevitably compelled to acknowledge that this activity depends upon the way in which the four qualities are blended. Thus I should like to ask the Erasistrateans why it is that the stomach contracts upon the food, and why the veins generate blood. There is no use in recognizing the mere fact of contraction, without also knowing the cause; if we know this, we shall also be able to rectify the failures of function. "This is no concern of ours," they say; "we do not occupy ourselves with such causes as these; they are outside the sphere of the practitioner, and belong to that of the scientific investigator." 2 Are you, then, going to oppose those who maintain that the cause of the function of every organ is a natural eucrasia, that the dyscrasia is itself known as a disease, and that it is certainly by this that the activity becomes impaired? Or, on the other hand, will you be convinced by the proofs which the ancient writers furnished? Or will you take a midway course between these two, neither perforce accepting these arguments as true nor contradicting them as false, but suddenly becoming sceptics—Pyrrhonists, in fact? But if you do this you will have to shelter yourselves behind the Empiricist teaching. For how are you going to be successful in treatment, if you do not understand the real essence of each disease? Why, then, did you not call yourselves Empiricists from the beginning? Why do you confuse us by announcing that you are

3 That is, a blending of the four principles in their natural proportion; Lat. temperies. Dyscrasia = intemperies, "dis-temper."
Galen

σικάς ἐνεργείας ἐπαγγελλόμενοι ζητεῖν ιάσεως ἔνεκεν; εἰ γὰρ ἀδύνατος ἢ γαστήρ ἔστι τινι περιστέλλεσθαι καὶ τρίβειν, πῶς αὐτήν εἰς τὸ κατὰ φύσιν ἐπανάξομεν ἀγνοοῦντες τὴν αἰτίαν τῆς ἀδύναμίας; ἐγὼ μὲν φημὶ τὴν μὲν ὑπερτεθερμασμένην ἐμψυκτέον ἡμῖν εἶναι, τὴν δ' ἐψυχομένην θερμαντέον σοῦ? δὲ καὶ τὴν ἐξηρασμένην υγραντέον, τὴν δ' υγρασμένην ξηραντέον. ἀλλὰ 128 καὶ || κατὰ συζυγίαν, εἰ θερμοτέρα τοῦ κατὰ φύσιν ἁμα καὶ ξηροτέρα τύχοι γεγενημένη, κεφάλαιον εἶναι τῆς ιάσεως ἐμψυχικῆς θ' ἁμα καὶ υγραίνειν· εἰ δ' αὖ ψυχοτέρα τε καὶ υγροτέρα, θερμαίνειν τε καὶ ξηραίνειν κατὰ τῶν ἄλλων ὀσαυτῶς· οί δ' ἀπ' Ἐρασιστράτου τί ποτε καὶ πράξωσιν οὐδ' ὦλως ζητεϊν τῶν ἐνεργειῶν τὰς αἰτίας ὁμολογοῦντες; ὁ γὰρ τοις χαρτοκιστήριοι τῆς περὶ τῶν ἐνεργειῶν ζητήσεως οὐτός ἔστι, τὸ τὰς αἰτίας τῶν ὑσλακτικῶν εἴδοτα εἰς τὸ κατὰ φύσιν ἐπανάγειν αὐτάς, ὡς αὐτὸ γε μόνον τὸ γνώσασθαι τὴν ἔκαστον τῶν ὀργάνων ἐνέργειαν ἡτις ἔστιν οὕτω χρήστον εἰς τὰς ἱάσεις.

Ἔρασιστράτος δέ μοι δοκεῖ καὶ αὐτὸ τοῦτ' ἀγνοεῖν, ὡς, ἦτις ἂν ἐν τῷ σώματι διάθεσις βλάπτη τὴν ἐνέργειαν μὴ κατὰ τι συμβεβηκός ἄλλα πρώτως τε καὶ καθ' ἑαυτήν, αὕτη τὸ νόσημα ἔστιν αὐτὸ. πῶς οὖν ἔτι διαγνωστικός τε καὶ ἰατικὸς ἔσται τῶν νοσημάτων ἀγνοοῦν ὄλως αὐτὰ τίνα τ' ἔστι καὶ πόσα καὶ ποῖα; κατὰ μὲν δὴ τὴν γαστήρα τὸ γε τοσοῦτον Ἐρασιστράτος ἢξιώσε 198
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investigating natural activities with a view to treatment? If the stomach is, in a particular case, unable to exercise its peristaltic and grinding functions, how are we going to bring it back to the normal if we do not know the cause of its disability? What I say is¹ that we must cool the over-heated stomach and warm the chilled one; so also we must moisten the one which has become dried up, and conversely; so, too, in combinations of these conditions; if the stomach becomes at the same time warmer and drier than normally, the first principle of treatment is at once to chill and moisten it; and if it become colder and moister, it must be warmed and dried; so also in other cases. But how on earth are the followers of Erasistratus going to act, confessing as they do that they make no sort of investigation into the cause of disease? For the fruit of the enquiry into activities is that by knowing the causes of the dyscrasiae one may bring them back to the normal, since it is of no use for the purposes of treatment merely to know what the activity of each organ is.

Now, it seems to me that Erasistratus is unaware of this fact also, that the actual disease is that condition of the body which, not accidentally, but primarily and of itself, impairs the normal function. How, then, is he going to diagnose or cure diseases if he is entirely ignorant of what they are, and of what kind and number? As regards the stomach, certainly, Erasistratus held that one should at least

¹ This is the orthodox Hippocratic treatment, that of opposites by opposites. Contrast the homoeopathic principle which is the basis of our modern methods of immunisation (similia similibus curentur, Hahnemann).
129 ζητείσθαι τὸ πῶς πέττεται τὰ σιτία. ἢ τὸ δ’ ἦτε πρώτῃ τε καὶ ἀρχηγὸς αὐτία τοῦτου, πῶς οὐκ ἔπεσκέψατο; κατὰ δὲ τὰς φλέβας καὶ τὸ αἷμα καὶ αὐτὸ τὸ πῶς παρέλιπεν.

Ἀλλ’ οὖθ’ Ὅποιος οὐτ’ ἄλλος τῆς δὲν ὀλίγῳ πρόσθεν ἐμνημόνευσα φιλοσόφουν ἢ ἰατρῶν ἄξιον φετ’ εἶναι παραλιπεῖν ἀλλὰ τὴν κατὰ φύσιν ἐν ἐκάστῳ ζῷον θερμασίαν εὐκρατὸν τε καὶ μετρίως ύγραν οὕσαν αἷματος εἶναι φασὶ γεννητικήν καὶ δι’ αὐτὸ γε τοῦτο καὶ τὸ αἷμα θερμὸν καὶ ύγρὸν εἶναι φασὶ τῇ δυνάμει χυμὸν, ὡσπερ τὴν ξανθὴν χολὴν θερμὴν καὶ ξηρὰν εἶναι, εἰ καὶ οὗτοι μάλιστ’ ύγρα φαίνεται. Διαφέρει γὰρ αὐτοῖς δοκεῖ τὸ κατὰ φαντασίαν ύγρὸν τοῦ κατὰ δύναμιν. ἢ τίς οὖκ οἶδεν, ὃς ἄλλη μὲν καὶ θάλαττα ταρχεύει τὰ κρέα καὶ ἀσηπτὰ διαφυλάττει, τὸ δ’ ἄλλο πάν ύδωρ τὸ πότιμον ἐτοίμως διαφθείρει τε καὶ σῆμεν; τίς δ’ οὖκ οἶδεν, ὃς ξανθῆς χολῆς ἐν τῇ γαστρὶ περιεχομένης τολλῆς ἀπαύστῳ δὴ τε συνεχόμεθα καὶ ὡς ἐμέσαντες αὐτὴν εὐθὺς ἄδιψοι γιγνόμεθα μᾶλλον ἢ εἰ 130 πάμπολυ ποτὸν προσηράμεθα; ἢ θερμὸς οὖν εὐλόγως ὁ χυμὸς οὗτος εἰρηται καὶ ξηρὸς κατὰ δύναμιν, ὡσπερ γε καὶ τὸ φλέγμα ψυχρὸν καὶ ύγρόν. ἐναργεῖς γὰρ καὶ περὶ τοῦτον πίστεις Ὅποιοι παραλίπει τε καὶ τοῖς ἄλλοις εἰρηται παλαιοῖς.

Πρόδικος δ’ ἐν τῷ περὶ φύσεως ἀνθρώπου γράμματι τὸ συγκεκαμένον καὶ οἷον ὑπερωπτημένον ἐν τοῖς χυμοῖς ὀνομάζων φλέγμα παρὰ τὸ πεφλέχθαι τῇ λέξει μὲν ἐτέρως χρῆται, φυλάττει
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investigate *how* it digests the food. But why was not investigation also made as to the primary originative cause of this? And, as regards the veins and the blood, he omitted even to ask the question "*how*?"

Yet neither Hippocrates nor any of the other physicians or philosophers whom I mentioned a short while ago thought it right to omit this; they say that when the heat which exists naturally in every animal is well blended and moderately moist it generates blood; for this reason they also say that the blood is a *virtually* warm and moist humour, and similarly also that yellow bile is warm and dry, even though for the most part it appears moist. (For in them the *apparently* dry would seem to differ from the *virtually* dry.) Who does not know that brine and sea-water preserve meat and keep it uncorrupted,¹ whilst all other water—the drinkable kind—readily spoils and rots it? And who does not know that when yellow bile is contained in large quantity in the stomach, we are troubled with an unquenchable thirst, and that when we vomit this up, we at once become much freer from thirst than if we had drunk very large quantities of fluid? Therefore this humour has been very properly termed warm, and also virtually dry. And, similarly, *phlegm* has been called cold and moist; for about this also clear proofs have been given by Hippocrates and the other Ancients.

Prodicus ² also, when in his book "On the Nature of Man" he gives the name "phlegm" (from the verb ἐφλέγχει) to that element in the humours which has been burned or, as it were, over-roasted, while using

¹ Lit. *aseptic.*
² Prodicus of Ceos, a Sophist, contemporary of Socrates.
μέντοι τὸ πρᾶγμα κατὰ ταὐτὸ τοῖς ἄλλοις. τὴν δὲ ἐν τοῖς ὄνομασὶ τάνδρος τούτοις καινοτομίαν ἱκανῶς εὐδείκνυται καὶ Πλάτων. ἀλλὰ τοῦτο γε τὸ πρὸς ἀπάντων ἄνθρωπων ὄνομαζόμενον φλέγμα τὸ λευκὸν τὴν χρόαν, δ' ἤλεγχαν ὄνομάζει Πρόδικος, ὁ ψυχρός καὶ ὕγρος χυμός ἐστὶν οὕτως καὶ πλείστος τοῖς τε γέρουσι καὶ τοῖς ὀπωσδήποτε ψυγείσιν ἄθροίζεται καὶ οὔδεὶς οὖδὲ μαινόμενος ἄν ἄλλο τε ἡ ψυχρόν καὶ ὕγρον εἴποι ἂν αὐτὸν.

Ἀρ' οὖν θερμὸς μὲν τὶς ἐστὶ καὶ ὕγρος χυμὸς καὶ θερμὸς καὶ ξηρὸς ἔτερος καὶ ψυχρὸς καὶ ψυχρὸς ἄλλος, οὔδεὶς δ' ἐστὶν ψυχρὸς καὶ ξηρὸς τὴν δύναμιν, ἀλλ' ἡ τετάρτη συζύγια τῶν κράτων σεων || ἐν ἀπασί τοῖς ἄλλοις ὑπάρχουσα μόνοις τοῖς χυμοῖς οὐχ ὑπάρχει; καὶ μὴν ἢ γε μέλαινα χολὴ τοιοῦτός ἐστὶ χυμός, ὅτι οἱ σωφρονοῦντες ἰατροὶ καὶ φιλόσοφοι πλεονεκτεῖν ἔφασαν τῶν μὲν ὃρῶν τοῦ ἐτους ἐν φθινοπώρῳ μάλιστα, τῶν δ' ἡλικιών ἐν ταῖς μετὰ τὴν ἀκμῆν. οὔτω δὲ καὶ διαιτήματα καὶ χωρία καὶ καταστάσεις καὶ νόσους τινὰς ψυχρὰς καὶ ξηρὰς εἶναι φασίν οὐ γὰρ δὴ χωρὴν ἐν ταύτῃ μόνῃ τῇ συζύγιᾳ τὴν φύσιν εἶναι νομίζουσιν ἀλλ' ὢσπερ τὰς ἄλλας τρεῖς οὔτω καὶ τήνδε διὰ πάντων ἐκτετάσθαι.

Ἡ ἰδέαν οὖν κἂν ταῦθ' ἐρωτήσαι δύνασθαι τὸν ἕρασίστρατον, εἰ μηδὲν ὀργανὸν ἡ τεχνικὴ φύσις ἐξημούργησε καθαρτικὸν τοῦ τοιοῦτον χυμοῦ, ἀλλὰ τῶν μὲν ὄψων ἀρὰ τῆς διακρίσεως ἐστὶν ὀργανὰ δύο καὶ τῆς ξανθῆς χωλῆς ἔτερον οὐ
a different terminology, still keeps to the fact just as the others do; this man's innovations in nomenclature have also been amply done justice to by Plato. Thus, the white-coloured substance which everyone else calls *phlegm*, and which Prodicus calls *bleenna* [mucus], is the well-known cold, moist humour which collects mostly in old people and in those who have been chilled in some way, and not even a lunatic could say that this was anything else than cold and moist.

If, then, there is a warm and moist humour, and another which is warm and dry, and yet another which is moist and cold, is there none which is virtually *cold and dry*? Is the fourth combination of temperaments, which exists in all other things, non-existent in the humours alone? No; the *black bile* is such a humour. This, according to intelligent physicians and philosophers, tends to be in excess, as regards seasons, mainly in the fall of the year, and, as regards ages, mainly after the prime of life. And, similarly, also they say that there are cold and dry modes of life, regions, constitutions, and diseases. Nature, they suppose, is not defective in this single combination; like the three other combinations, it extends everywhere.

At this point, also, I would gladly have been able to ask Erasistratus whether his "artistic" Nature has not constructed any organ for *clearing away* a humour such as this. For whilst there are two organs for the excretion of urine, and another of considerable size for that of yellow bile, does the

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2 *cf.* the term *bleennorrhoea*, which is still used.
3 *cf.* the Scotch term "colder" for "affected with a cold"; Germ. *erkältet*.
σμικρόν, ὁ δὲ τούτων κακοηθέστερος χυμὸς ἀλάται διὰ παντὸς ἐν ταῖς φλεψὶν ἀναμεμημένος τῷ αἵματι. καίτοι "Δυσεντερίη," φησί ποὺ Ἰπποκράτης, "ἡ ἀπὸ χολῆς μελαίνης ἀρξῆ-132 ταῖ, θανάσιμον," οὐ μὴν ἢ γ' ἀπὸ τῆς ξανθῆς χολῆς ἄρχομενη πάντως ὀλέθριος, ἀλλ' οἱ πλείους ἐξ αὐτῆς διασώζονται. τοσούτω κακοθεστέρα τε καὶ δριμύτερα τὴν δύναμιν ἢ μέλαινα χολὴ τῆς ξανθῆς ἐστὶν. ἅρ' οὖν οὐτε τῶν ἄλλων ἀνέγνω τι τῶν τοῦ Ἰπποκράτους γραμμάτων ὁ Ἐρασίστρατος οὐδὲν οὔτε τὸ περὶ φύσεως ἀνθρώ-που βιβλίον, ἵν' οὔτως ἀργῶς παρέλθω τὴν περὶ τῶν χυμῶν ἐπίσκεψιν, ἢ γυγνώσκει μὲν, ἐκών δὲ παραλείπει καλλίστην τῆς τέχνης θεωρίαν; ἐχρῆν οὖν αὐτὸν μηδὲ περὶ τοῦ σπλήνος εἰρη-κέναι τι μηδ' ἀσχημονεῖν ὑπὸ τῆς τεχνικῆς φύ-σεως ὄργανον τηλικούτον μάτην ἤγομενον κατε-σκεύασθαι. καὶ μὴν οὐχ Ἰπποκράτης μόνον ἢ Πλάτων, οὐδὲν τι χείρος Ἐρασίστρατο κερ-φύσιν ἀνδρεῖ, ἐν τῇ τῶν καθαιρῶν τῷ αἷμα καὶ τούτ', εἰναι φασι τὸ σπλάγχνον, ἀλλὰ καὶ μυρίοι σὺν αὐτοῖς ἄλλοι τῶν παλαιῶν ἰατρῶν τε καὶ φιλοσόφων, διὸ ἀπάντων προσποιησάμενος ὑπερφρονεῖν ὁ γενναίος Ἐρασίστρατος οὔτ' ἀντεῖπεν οὔθ' ὁλος τῆς δόξης αὐτῶν ἐμνημόνευσε. καὶ μὴν ὅσοις γε τὸ σῶμα θάλλει, τούτος ὁ σπλήν φθίνει, φησίν Ἰπποκράτης, καὶ οἱ ἀπὸ τῆς ἐμπειρίας ὀρμῶμενοι πάντες ὀμολογούσιν ἰατροῖ. καὶ ὅσοις γ' αὐ μέγας καὶ ὑπουλος 204
humour which is more pernicious than these wander about persistently in the veins mingled with the blood? Yet Hippocrates says, "Dysentery is a fatal condition if it proceeds from black bile"; while that proceeding from yellow bile is by no means deadly, and most people recover from it; this proves how much more pernicious and acrid in its potentialities is black than yellow bile. Has Erasistratus, then, not read the book, "On the Nature of Man," any more than any of the rest of Hippocrates's writings, that he so carelessly passes over the consideration of the humours? Or, does he know it, and yet voluntarily neglect one of the finest studies\(^1\) in medicine? Thus he ought not to have said anything about the spleen,\(^2\) nor have stultified himself by holding that an artistic Nature would have prepared so large an organ for no purpose. As a matter of fact, not only Hippocrates and Plato—who are no less authorities on Nature than is Erasistratus—say that this viscus also is one of those which cleanse the blood, but there are thousands of the ancient physicians and philosophers as well who are in agreement with them. Now, all of these the high and mighty Erasistratus affected to despise, and he neither contradicted them nor even so much as mentioned their opinion. Hippocrates, indeed, says that the spleen wastes in those people in whom the body is in good condition, and all those physicians also who base themselves on experience\(^3\) agree with this. Again, in those cases in which the spleen is large and is increasing from

\(^1\) The word *theoria* used here is not the same as our *theory*. It is rather a "contemplation," the process by which a theory is arrived at. *cf.* p. 226, note 2.

\(^2\) Erasistratus on the uselessness of the spleen. *cf.* p. 143.

αὐξάνεται, τούτοις καταφθείρει τε καὶ κακόχυμα τὰ σώματα τίθησιν, ὡς καὶ τούτο πάλιν οὐχ Ἰπποκράτης μόνον ἀλλὰ καὶ Πλάτων ἀλλοι τε πολλοὶ καὶ οἱ ἀπὸ τῆς ἐμπειρίας ὀμολογοῦσιν ιατροί. καὶ οἱ ἀπὸ σπληνὸς δὲ κακοπραγοῦντος ἱκτεροί μελάντεροι καὶ τῶν ἐλκῶν αἱ οὐλαὶ μέλαιναι. καθόλου γὰρ, ὅταν ἐνεδεστερον ἢ προσήκειν εἰς ἑαυτὸν ἐλκη τὸν μελαγχολικὸν χυμὸν, ἀκάθαρτον μὲν τὸ αἷμα, κακόχρονον δὲ τὸ πάν γίγνεται σώμα. ποτὲ δὲ ἐνεδεστερον ἐλκει; ἢ δήλον ὅτι κακῶς διακείμενος; ὡσπερ οὖν τοῖς νεφροῖς ἐνεργείας οὕσης ἐλκεὶν τὰ ὑφα κακῶς ἐλκεῖν ὑπάρχει κακοπραγοῦσιν, οὕτω καὶ τῷ σπληνὶ ποιότητος μελαγχολικῆς ἐλκτικῆν ἐν ἑαυτῷ δύναμιν ἔχοντι σύμφωνον ἀρρωστήσαντί ποτε ταύτην ἀναγκαῖον ἐλκεῖν κακῶς καὶ τὸδε παχύτερον ἡδὴ καὶ μελάντερον γίγνεσθαι τὸ αἷμα.

Ταῦτα οὖν ἄπαντα πρὸς τὲ τὰς διαγνώσεις τῶν νοσημάτων καὶ τὰς ἱάσεις μεγίστην παρεχόμενα χρέλαν | ὑπερεπήθησε τελέως ὁ Ἐρασίστρατος καὶ καταφροεῖν προσεποίησατο τηλικούτων ἀνδρῶν ὁ μηδὲ τῶν τυχόντων καταφροῦν ἀλλ᾽ ἀεὶ φιλοτίμους ἀντιλέγων ταῖς ἐλθιωτάταις δόξαις. οὐ καὶ δήλοι, ὡς οὐδὲν ἔχων οὔτ᾽ ἀντειπεῖν τοῖς πρεσβυτέροις ὑπὲρ δὲν ἀπεφήγαντο περὶ σπληνὸς ἐνεργείας τε καὶ χρείας οὔτ᾽ αὐτὸς ἔξευρήσκων τι καινοῦ εἰς τὸ μηδὲν ὅλως εἰσπέν ἄφικετο. ἀλλ᾽ ἡμεῖς γε πρῶτον μὲν ἐκ τῶν αἰτίῶν, οἷς ἄπαντα διοικεῖται τὰ κατὰ τὰς

1. Enlargement and suppuration (?) of spleen associated with toxaemia or “cacochymy.”
2. Lit. “melancholic.”
internal suppuration, it destroys the body and fills it with evil humours;¹ this again is agreed on, not only by Hippocrates, but also by Plato and many others, including the Empiric physicians. And the jaundice which occurs when the spleen is out of order is darker in colour, and the cicatrices of ulcers are dark. For, generally speaking, when the spleen is drawing the atrabiliary² humour into itself to a less degree than is proper, the blood is unpurified, and the whole body takes on a bad colour. And when does it draw this in to a less degree than proper? Obviously, when it [the spleen] is in a bad condition. Thus, just as the kidneys, whose function it is to attract the urine, do this badly when they are out of order, so also the spleen, which has in itself a native power of attracting an atrabiliary quality,³ if it ever happens to be weak, must necessarily exercise this attraction badly, with the result that the blood becomes thicker and darker.

Now all these points, affording as they do the greatest help in the diagnosis and in the cure of disease were entirely passed over by Erasistratus, and he pretended to despise these great men—he who does not despise ordinary people, but always jealously attacks the most absurd doctrines. Hence, it was clearly because he had nothing to say against the statements made by the ancients regarding the function and utility of the spleen, and also because he could discover nothing new himself, that he ended by saying nothing at all. I, however, for my part, have demonstrated, firstly from the causes by which everything throughout nature is governed (by

¹ i.e. the combination of sensible qualities which we call black bile.  cf. p. 8, note 3.
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φυσεις, τοῦ θερμοῦ λέγω καὶ ψυχροῦ καὶ ξηροῦ καὶ ύγροῦ, δέιτερον δ’ ἐξ αὐτῶν τῶν ἐναργῶς φαινομένων κατὰ τὸ σῶμα ψυχροῦ καὶ ξηροῦ εἶναι τινὰ χρῆναι χυμὸν ἀπεδείξαμεν. ἔξης δ’, ὅτι καὶ μελαγχολικὸς οὕτος ὑπάρχει καὶ τὸ καθαίρον αὐτὸν σπλάγχχον ὅ σπλήν ἐστιν, διὰ βραχέως ὡς ἐνι μάλιστα τῶν τοῖς παλαιοῖς ἀποδεδειγμένων ἀναμνήσαντες ἐπὶ τὸ λείπον ἐτι τοῖς παροῦσι λόγοις ἀφιξόμεθα.

Τί δ’ ἂν εἴη λείπον ἀλλο γ’ ἢ ἐξηγήσασθαι 135 σαφῶς, οἷον τι βούλονται τε || καὶ ἀποδεικνύονσι περὶ τὴν τῶν χυμῶν γένεσιν οἱ παλαιοὶ συμβαίνειν. ἐναργείστερον δ’ ἂν γνωσθεὶ γιὰ παραδείγματος. οἷον δὴ μοι νοεῖ γλεύκινον οὐ πρὸ πολλοῦ τῶν σταφυλῶν ἐκτεθλημένον ξέοντα τε καὶ ἀλλοιούμενον ὑπὸ τῆς ἐν αὐτῷ θερμασίας· ἐπεῖτα κατὰ τὴν αὐτοῦ μεταβολῆν δύο γεννώμενα περιττόματα τὸ μὲν κουφότερον τε καὶ ἀερωδέστερον, τὸ δὲ βαρύτερον τε καὶ γεωδέστερον, ὅν τὸ μὲν ἀνθος, οἶμαι, τὸ δὲ τρύγα καλοῦσι. τούτων τῷ μὲν ἐτέρῳ τὴν ξανθὴν χολήν, τῷ δ’ ἐτέρῳ τὴν μέλαιναν εἰκάζων οὐκ ἄν ἀμάρτως, οὐ τὴν αὐτὴν ἔχοντων ἱδέαν τῶν χυμῶν τούτων ἐν τῷ κατὰ φύσιν διοικεῖσθαι τὸ ζῦον, οἶαν καὶ παρὰ φύσιν ἔχοντος ἐτιφαίνονται πολλάκις. ἢ μὲν γὰρ ξανθὴ λεκιθώδης γίγνεται· καὶ γὰρ ὀνομάζουσιν οὔτως αὐτὴν, ὅτι ταῖς τῶν ὦν λεκίθωσι ὁμοιοῦται κατὰ τῃ χρόνῃ καὶ πάχος. ἢ δ’ αὖ μέλαινα κακοθέστερα μὲν πολὺ καὶ

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the causes I mean the Warm, Cold, Dry and Moist) and secondly, from obvious bodily phenomena, that there must needs be a cold and dry humour.¹ And having in the next place drawn attention to the fact that this humour is black bile [aatabiliary] and that the viscus which clears it away is the spleen—having pointed this out by help of as few as possible of the proofs given by ancient writers, I shall now proceed to what remains of the subject in hand.

What else, then, remains but to explain clearly what it is that happens in the generation of the humours, according to the belief and demonstration of the Ancients? This will be more clearly understood from a comparison. Imagine, then, some new wine which has been not long ago pressed from the grape, and which is fermenting and undergoing alteration through the agency of its contained heat.² Imagine next two residual substances produced during this process of alteration, the one tending to be light and air-like and the other to be heavy and more of the nature of earth; of these the one, as I understand, they call the flower and the other the lees. Now you may correctly compare yellow bile to the first of these, and black bile to the latter, although these humours have not the same appearance when the animal is in normal health as that which they often show when it is not so; for then the yellow bile becomes vitelline,³ being so termed because it becomes like the yolk of an egg, both in colour and density; and again, even the black bile itself becomes much more malignant than when in

¹ Thus Galen has demonstrated the functions of the spleen both deductively and inductively. For another example of the combined method cf. Book III., chaps. i. and ii.; cf. also Introd. p. xxxii. ² i.e. its innate heat. ³ Lit. lecithoid.
αὕτη τής κατὰ φύσιν ὄνομα δ' οὐδὲν ἰδιον κεῖται τῷ τοιούτῳ χυμῷ, πλὴν εἰ ποὺ τιμεῖ ἢ ξυστικὸν ἢ ὀξύῳ κεκλήκασιν αὐτόν, ὅτι καὶ δριμὺς ὁμοίως

136 ὥξει γίγνεται καὶ || ξύει γε τὸ σῶμα τοῦ ξύου καὶ τὴν γῆν, εἰ κατ' αὐτὴς ἐκχυθεῖ, καὶ τῶν μετὰ πομφολύγων οἶνον ξύμωσιν τε καὶ ξέσιν ἐργάζεται, σηπεδόνος ἐπικτήτου προσελθούσης ἐκεῖνῳ τῷ κατὰ φύσιν ἔχοντι χυμῷ τῷ μέλανι. καὶ μοι δοκοῦσιν οἱ πλεῖστοι τῶν παλαιῶν ἰατρῶν αὐτῷ μὲν τὸ κατὰ φύσιν ἔχον τοῦ τοιούτου χυμοῦ καὶ διαχωροῦν κάτω καὶ πολλάκις ἐπι-πολάξου ἄνω μέλανα καλεῖν χυμόν, οὗ μέλαιναν χολήν, τὸ δ' ἐκ συγκαύσεως τινος καὶ σηπεδόνος εἰς τὴν ὥξειαν μεθυστάμενον ποιότητα μελαίναν ὄνομάζειν χολήν. ἀλλὰ περὶ μὲν τῶν ὄνομά-των οὐ χρῆ διαφέρεσθαι, τὸ δ' ἄλθείς ὁδ' ἔχον εἰδέναι.

Κατὰ τὴν τοῦ αἶματος γένεσιν οὕσον ἂν ἰκανῶς παχύ καὶ γεώδες ἐκ τῆς τῶν σιτίων φύσεως ἐμφερομένου τῇ τροφῇ μὴ δέξηται καλῶς τὴν ἐκ τῆς ἐμφύτου θερμασίας ἀλλούσιν, ὁ σπλήν εἰς ἑαυτὸν ἔλκει τοῦτο. τὸ δ' ὀπτηθέν, ὡς ἂν τις εἴποι, καὶ συγκαυθεὶς τῆς τροφῆς, εἴη δ' ἂν τοῦτο τὸ θερμότατον ἐν αὐτῇ καὶ γλυκύτατον, οἶνον τὸ τε μέλι καὶ ἡ πιμελή, ξανθὴ γενόμενον χολή διὰ τῶν χοληδόχων ὅμορμαζομένων ἀγγείων 137 ἐκκαθαίρεται. || λεπτὸν δ' ἐστὶ τοῦτο καὶ ὕγρον καὶ ρυτὸν οὐχ ὄσπερ ὅταν ὀπτηθέν ἐσχάτως ξανθόν καὶ πυρῶδες καὶ παχύ γένηται ταῖς τῶν

1 Note that there can be “normal” black bile.
2 The term food here means the food as introduced into the stomach; the term nutriment (trophē) means the same
its normal condition, but no particular name has been given to [such a condition of] the humour, except that some people have called it corrosive or acetose, because it also becomes sharp like vinegar and corrodes the animal’s body—as also the earth, if it be poured out upon it—and it produces a kind of fermentation and seething, accompanied by bubbles—an abnormal putrefaction having become added to the natural condition of the black humour. It seems to me also that most of the ancient physicians give the name black humour and not black bile to the normal portion of this humour, which is discharged from the bowel and which also frequently rises to the top [of the stomach-contents]; and they call black bile that part which, through a kind of combustion and putrefaction, has had its quality changed to acid. There is no need, however, to dispute about names, but we must realise the facts, which are as follow:—

In the genesis of blood, everything in the nutriment which belongs naturally to the thick and earth-like part of the food, and which does not take on well the alteration produced by the innate heat—all this the spleen draws into itself. On the other hand, that part of the nutriment which is roasted, so to speak, or burnt (this will be the warmest and sweetest part of it, like honey and fat), becomes yellow bile, and is cleared away through the so-called biliary vessels; now, this is thin, moist, and fluid, not like what it is when, having been roasted to an excessive degree, it becomes yellow, fiery, and thick, like the yolk of food in the digested condition, as it is conveyed to the tissues. cf. pp. 41–43. Note idea of imperfectly oxidized material being absorbed by the spleen. cf. p. 214, note 1.

Lit. choledochous, bile-receiving.
ωῶν ὅμοιον λεκίθοις. τούτο μὲν γὰρ ἣδη παρά
φύσιν θάτερον δὲ τὸ πρῶτον εἰρημένον κατὰ
φύσιν ἔστιν ὡσπερ γε καὶ τοῦ μέλανος χυμοῦ
τοῦ μὲν μῆτρα τὴν οἶνον ἥξεων τε καὶ ἥξιωσιν τῆς
γῆς ἔργαζόμενον κατὰ φύσιν ἔστι, τὸ δ’ εἰς
tοιαύτην μεθιστάμενον ἄδειαν τε καὶ δύναμιν ἢδη
παρὰ φύσιν, ὡς ἂν τὴν ἑκ τῆς συγκαύσεως τοῦ
παρὰ φύσιν θερμοῦ προσειληφός δρμύητα καὶ
οἶνον τέφρα τις ἢδη γεγονός. ὦδε πως καὶ ἢ
κεκαυμένη τρὺξ τῆς ἀκαύστου διήνεγκε. θερμὸν
γάρ τι χρήμα αὐτὴ γ’ ἱκανῶς ἔστιν, ὡστε καλεῖν
τε καὶ τήκειν καὶ διαφθείρειν τὴν σάρκα. τῇ δ’
ἔτερα τῇ μῆτρᾳ κεκαυμένη τοὺς ἰατροὺς ἔστιν
εὐρείν χρωμένους εἰς ὁσαπερ καὶ τῇ γῇ τῇ καλοῦ-
μένῃ κεραμίτιδι καὶ τοῖς ἄλλοις, ὅσα ξηραίνειν θ’
άμα καὶ ψύχειν πέφυκεν.

Εἰς τὴν τῆς οὔτω συγκαυθείσης μελαίνης
χολῆς ἱδέαν καὶ ἡ λεκιθώδης ἐκείνη μεθίσταται
πολλάκις, ὅταν καὶ αὐτὴ ποθ’ οἶνον ὀπτηθείσα
138 τύχῃ πυρώδεις θερμασία. τὰ δ’ ἄλλα || τῶν χολῶν
eἰδή σύμπαντα τὰ μὲν ἐκ τῆς τῶν εἰρημένων
κράσεως γίγνεται, τὰ δ’ οἶνον ὀδοὶ τινὲς εἰσὶ τῆς
tούτων γενέσεως τε καὶ εἰς ἅλληλα μεταβολῆς.
dιαφέρουσι δὲ τῷ τὰς μὲν ἀκράτους εἶναι καὶ
μόνας, τὰ δ’ οἶνον ὀρροὶ τισιν ἔξυγγρασμένας. ἀλλ’
oi μὲν ὀρροὶ τῶν χυμῶν ἀπαντεῖ περιττύματα
καὶ καθαρόν αὐτῶν εἶναι δεῖται τοῦ ἄχου τὸ σῶμα.
tῶν δ’ εἰρημένων χυμῶν ἐστὶ τις χρεία τῇ φύσει
καὶ τοῦ παχέος καὶ τοῦ λεπτοῦ καὶ καθαίρεται
πρὸς τε τοῦ σπληνῶς καὶ τῆς ἐπὶ τῷ ἕπτα
κύστεως τὸ αἷμα καὶ ἀποτίθεται τοσοῦτον τε καὶ
tοιοῦτον ἐκάτερον μέρος, ὅσον καὶ οἶνον, εἴπεο εἰς
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eggs; for this latter is already abnormal, while the previously mentioned state is natural. Similarly with the black humour: that which does not yet produce, as I say, this seething and fermentation on the ground, is natural, while that which has taken over this character and faculty is unnatural; it has assumed an acridity owing to the combustion caused by abnormal heat, and has practically become transformed into ashes.¹ In somewhat the same way burned lees differ from unburned. The former is a warm substance, able to burn, dissolve, and destroy the flesh. The other kind, which has not yet undergone combustion, one may find the physicians employing for the same purposes that one uses the so-called potter’s earth and other substances which have naturally a combined drying and chilling action.

Now the vitelline bile also may take on the appearance of this combusted black bile, if ever it chance to be roasted, so to say, by fiery heat. And all the other forms of bile are produced, some from a blending of those mentioned, others being, as it were, transition-stages in the genesis of these or in their conversion into one another. And they differ in that those first mentioned are unmixed and unique, while the latter forms are diluted with various kinds of serum. And all the serums in the humours are waste substances, and the animal body needs to be purified from them. There is, however, a natural use for the humours first mentioned, both thick and thin; the blood is purified both by the spleen and by the bladder beside the liver, and a part of each of the two humours is put away, of such quantity and

¹ Thus over-roasting—shall we say excessive oxidation?—produces the abnormal forms of both black and yellow bile.
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ολον ἡνέχθη τοῦ ζώου τὸ σῶμα, βλάβην ἀν τῶν εἰργάσατο. τὸ γάρ ἰκανὸς παχὺ καὶ γεώδες καὶ τελέως διαπεφυγός τὴν ἐν τῷ ἥπατι μεταβολὴν ὁ σπλήν εἰς ἐαυτὸν ἐλκεῖ· τὸ δ' ἄλλο τὸ μετρίως παχὺ σὺν τῷ κατειργάσθαι πάντη φέρεται. δεῖται γάρ ἐν πολλοῖς τοῦ ζώου μορίως παχύτητός τινος τὸ αἷμα καθάπερ οἴμαι καὶ τῶν || ἐμφερομένων ἰνῶν. καὶ εἰρήται μὲν καὶ Πλάτωνι περὶ τῆς χρείας αὐτῶν, εἰρήσεται δὲ καὶ ἡμῖν ἐν έκείνους τοὺς γράμμασιν, ἐν οἷς ἀν τὰς χρείας τῶν μορίων διερχώμεθα. δεῖται δ' οὖν ἥκιστα καὶ τοῦ ξανθοῦ χυμοῦ τοῦ μῆπω πυρώδους ἐσχάτως γεγενημένου τὸ αἷμα καὶ τίς αὐτῷ καὶ ἡ παρὰ τούτῳ χρεία, δι' ἐκείνων εἰρήσεται.

Φλέγματος δ' οὐδὲν ἐποίησεν ἡ φύσις ὅργανον καθαρτικόν, ὅτι ψυχρόν καὶ ἅγιόν ἐστι καὶ οἷον ἡμόπεπτος τις τροφή. δεῖται τοῖς οὐ κενοῦσθαι τὸ τοιοῦτον ἄλλ' ἐν τῷ σώματι μένον ἀλλοιοῦσθαι. τὸ δ' ἐξ ἐγκεφάλου κατάρρευσαν περίπτωμα τάχα μὲν ἀν οὐδὲ φλέγμα τις ὀρθῶς ἄλλα βλέπων τε καὶ κόρυξαν, ὥσπερ οὖν καὶ ὀνομάζεται, καλοῖ. εἰ δὲ μὴ, ἀλλ' ὅτι γε τῆς τοῦτον κενωσεως ὀρθῶς ἡ φύσις προονοίσται, καὶ τοῦτ' ἐν τοῖς περὶ χρείας μορίων εἰρήσεται. καὶ γὰρ οὖν καὶ τὸ κατὰ τὴν γαστέρα καὶ τὰ ἐντερα συνιστάμενον φλέγμα ὅπως ἀν ἐκκενωθῇ καὶ αὐτὸ τάχιστα τε καὶ κάλλιστα, τὸ παρεσκευασμένον τῇ φύσει μηχάνημα δι' ἐκείνων εἰρήσεται καὶ αὐτὸ τῶν

1 cf. p. 277, note 2.
2 Timaeus, 82 c-d.
3 cf. p. 90, note 1. The term “catarrh” refers to this “running down,” which was supposed to take place through
quality that, if it were carried all over the body, it would do a certain amount of harm. For that which is decidedly thick and earthy in nature, and has entirely escaped alteration in the liver, is drawn by the spleen into itself\(^1\); the other part which is only moderately thick, after being elaborated [in the liver], is carried all over the body. For the blood in many parts of the body has need of a certain amount of thickening, as also, I take it, of the fibres which it contains. And the use of these has been discussed by Plato,\(^2\) and it will also be discussed by me in such of my treatises as may deal with the use of parts. And the blood also needs, not least, the yellow humour, which has as yet not reached the extreme stage of combustion; in the treatises mentioned it will be pointed out what purpose is subserved by this.

Now Nature has made no organ for clearing away phlegm, this being cold and moist, and, as it were, half-digested nutriment; such a substance, therefore, does not need to be evacuated, but remains in the body and undergoes alteration there. And perhaps one cannot properly give the name of phlegm to the surplus-substance which runs down from the brain,\(^3\) but one should call it mucus [blenna] or coryza—as, in fact, it is actually termed; in any case it will be pointed out, in the treatise “On the Use of Parts,” how Nature has provided for the evacuation of this substance. Further, the device provided by Nature which ensures that the phlegm which forms in the stomach and intestines may be evacuated in the most rapid and effective way possible—this also will be described in that com-

the pores of the cribiform plate of the ethmoid into the nose.
140 ὑπομνήματων. ὡσον οὖν ἐμφέρεται ταῖς φλεψὶ
φλέγμα χρήσιμον ὑπάρχον τοῖς ἥψους, οὔδεμιᾶς
deiTai keνώσεως. προσέχειν δὲ χρὴ κάνταῤῥα
τὸν νοῦν καὶ γνωρίσκειν, ὡσπερ τῶν χολῶν
ἐκατέρας τὸ μὲν τι χρήσιμον ἐστὶ καὶ κατὰ φόσιν
τοῖς ἥψους, τὸ δ’ ἄχρηστον τε καὶ παρὰ φύσιν,
οὕτω καὶ τοῦ φλέγματος, ὡσον μὲν ἄν ἦ γάλκυ,
χρηστὸν εἶναι τούτο τῷ ἥψῳ καὶ κατὰ φύσιν, ὡσον
δ’ ὅξυ καὶ ἀλμυρὸν ἐγένετο, τὸ μὲν ὅξυ τελέως
ἡπετηθοῦσα, τὸ δ’ ἀλμυρὸν διασεσῆθαι. τελείαν
δ’ ἀπεφίαν φλέγματος ἀκούειν χρὴ τὴν τῆς
dευτέρας πέψεως δηλονότι τῆς ἐν φλεψίν’ οὖ
γαρ δὴ τῆς γε πρώτης τῆς κατὰ τὴν κοιλίαν·
ἢ οὐδ’ ἄν ἐγεγένητο τὴν ἄρχην χυμός, εἰ καὶ
ταῦτην διεσπεφεύγει.

Ταῦτ’ ἄρκειν μοι δοκεῖ περὶ γενέσεως τε καὶ
dιαφθορὰς χυμῶν ὑπομνήματ’ εἶναι τῶν Ἰππο-
kρατεί τε καὶ Πλάτωνι καὶ Ἀριστοτέλει καὶ
Πραξιγόρα καὶ Διοκλεί καὶ πολλοῖς ἄλλοις τῶν
παλαιῶν εἰρημένων· οὐ γαρ ἐδικαίωσα πάντα
μεταφέρειν εἰς τόνδε τὸν λόγον τὰ τελέως ἐκεῖνοις
γεγραμμένα. τοσοῦτον δὲ μόνον ὑπὲρ ἐκάστου

141 ἐξπον, ὡσον ἐξορμήσει τε τοὺς || ἐνυγχάνοντας,
ei mh pαντάπασιν εἶν σκαῖοι, τοῖς τῶν παλαιῶν
ὀμιλήσαι γράμμασι καὶ τὴν εἰς τὸ βάθον αὐτῶς
συνεῖναι βοήθειαν παρέξει. γέγραπται δὲ που
καὶ δὲ ἐτέρου λόγου περὶ τῶν κατὰ Πραξιγόραν
τῶν Νικάρχου χυμῶν. εἰ γαρ καὶ ὅτι μάλιστα
mentary. As to that portion of the phlegm which is carried in the veins, seeing that this is of service to the animal it requires no evacuation. Here too, then, we must pay attention and recognise that, just as in the case of each of the two kinds of bile, there is one part which is useful to the animal and in accordance with its nature, while the other part is useless and contrary to nature, so also is it with the phlegm; such of it as is sweet is useful to the animal and according to nature, while, as to such of it as has become bitter or salt, that part which is bitter is completely undigested, while that part which is salt has undergone putrefaction. And the term "complete indigestion" refers of course to the second digestion—that which takes place in the veins; it is not a failure of the first digestion—that in the alimentary canal—for it would not have become a humour at the outset if it had escaped this digestion also.

It seems to me that I have made enough reference to what has been said regarding the genesis and destruction of humours by Hippocrates, Plato, Aristotle, Praxagoras, and Diocles, and many others among the Ancients; I did not deem it right to transport the whole of their final pronouncements into this treatise. I have said only so much regarding each of the humours as will stir up the reader, unless he be absolutely inept, to make himself familiar with the writings of the Ancients, and will help him to gain more easy access to them. In another treatise I have written on the humours according to Praxagoras, son of Nicarchus; although this authority makes as many as ten humours, not

1 Now lost.
Δέκα ποιεῖ χωρὶς τοῦ αἵματος, ἐνδέκατος γὰρ ἂν εἰη χυμὸς αὐτὸ τὸ αἵμα, τῆς Ἰπποκράτους οὐκ ἀποχωρεῖ διδασκαλίας. ἀλλ’ εἰς εἰδὴ τινὰ καὶ διαφορὰς τέμνει τοὺς ὑπ’ ἐκεῖνον πρῶτον πάντων ἁμα ταῖς οἰκείαις ἀποδείξεις εἰρημένους χυμοῦς.

Ἔπαινεῖν μὲν οὖν χρῆ τοὺς τ’ ἐξηγησαμένους τὰ καλῶς εἰρημένα καὶ τοὺς εἰ τι παραλέλειπται προστιθέντας· οὐ γὰρ οἶλον τε τὸν αὐτὸν ἀρξασθαί τε καὶ τελείωσαι μέμφεσθαι δὲ τοὺς οὕτως ἀταλαπάτους, ὡς μηδὲν ὑπομένειν μαθεῖν τῶν ὀρθῶς εἰρημένων, καὶ τοὺς εἰς τοσούτοις φιλοτίμους, ὥστ’ ἐπιθυμίᾳ νεωτέρων δογμάτων ἀεὶ πανοργεῖν τι καὶ σοφίζεσθαι, τὰ μὲν ἐκόντας παραλπόντας, ὡσπερ Ἔρασίστρατος ἐπὶ τῶν χυμῶν ἐποίησε, τὰ δὲ παραόργως ἀντιλέγοντας, ὡσπερ αὐτὸς θ’ οὕτος καὶ ἄλλοι πολλοὶ τῶν νεωτέρων.

Ἀλλ’ οὗτος μὲν ὁ λόγος ἐνταυθοὶ τελευτάτω, τὸ δ’ ὑπόλοιπον ἄπαν ἐν τῷ τρίτῳ προσθήσω.
including the blood (the blood itself being an eleventh), this is not a departure from the teaching of Hippocrates; for Praxagoras divides into species and varieties the humours which Hippocrates first mentioned, with the demonstration proper to each.

Those, then, are to be praised who explain the points which have been duly mentioned, as also those who add what has been left out; for it is not possible for the same man to make both a beginning and an end. Those, on the other hand, deserve censure who are so impatient that they will not wait to learn any of the things which have been duly mentioned, as do also those who are so ambitious that, in their lust after novel doctrines, they are always attempting some fraudulent sophistry, either purposely neglecting certain subjects, as Erasistratus does in the case of the humours, or unscrupulously attacking other people, as does this same writer, as well as many of the more recent authorities.

But let this discussion come to an end here, and I shall add in the third book all that remains.
BOOK III
Γ

Ι

143 Ὅτι μὲν οὖν ἡ θρέψις ἀλλοιουμένου τε καὶ ὁμοιουμένου γίγνεται τοῦ τρέφοντος τῷ τρεφομένῳ καὶ ὡς ἐν ἑκάστῳ τῶν τοῦ ζωῆς μορίων ἦστι τῆς δύναμις, ἢν ἀπὸ τῆς ἐνεργείας ἀλλοιωτικῆς μὲν κατὰ γένος, ὁμοιωτικῆς δὲ καὶ θρεπτικῆς καὶ ἑιδοὶ ὀνομάζομεν, ἐν τῷ πρόσθεν δεδηλωται λόγῳ. τὴν δὲ εὐπορίαν τῆς ὕλης, ἢν τροφὴν ἐαυτῷ ποιεῖται τὸ τρεφόμενον, ἐξ ἑτέρας τινὸς ἐχεῖν ἑδείκνυτο δυνάμεως ἐπιστάσθαι πεφυκός τὸν οἴκειον χυμὸν, εἶναι δὲ οἰκεῖον ἑκάστῳ τῶν μορίων χυμὸν, διὸς ἀν || ἐπιτήδειος εἰς τὴν ἐξομοίωσιν ὧς καὶ τὴν ἐξανασφάλισαν αὐτὸν δύναμιν ἀπὸ τῆς ἐνεργείας ἐλεκτικῆς τῇ τινα καὶ ἐπισταστικῆς ὀνομαζομένης. δεδείκΤαι δὲ καὶ, ὡς πρὸ μὲν τῆς ὁμοιώσεως ἡ πρόσφυσις ἐστὶν, ἐκείνης δὲ ἐμπρόσθεν ἡ πρόσθεσις γίγνεται, τέλος, ὡς ἄν εἴποι τις, οὕσα τῆς κατὰ τὴν ἐπισταστικῆς δύναμις ἐνεργείας. αὐτὸ μὲν γὰρ τὸ παράγεσθαι τὴν τροφὴν ἐκ τῶν φλεβῶν εἰς ἑκαστὸν τῶν μορίων τῆς ἐλεκτικῆς ἐνεργούσης γίγνεται δυνά-

1 "Of food to feeder," i.e. of the environment to the organism. cf. p. 39, chap. xi.

222
BOOK III

I

It has been made clear in the preceding discussion that nutrition occurs by an *alteration* or *assimilation* of that which nourishes to that which receives nourishment,¹ and that there exists in every part of the animal a faculty which in view of its activity we call, in general terms, *alterative*, or, more specifically, *assimilative* and *nutritive*. It was also shown that a sufficient supply of the matter which the part being nourished makes into nutriment for itself is ensured by virtue of another faculty which naturally attracts its *proper juice* [humour] that that juice is proper to each part which is adapted for assimilation, and that the faculty which attracts the juice is called, by reason of its activity, *attractive* or *epispastic*.² It has also been shown that assimilation is preceded by *adhesion*, and this, again, by *presentation*,³ the latter stage being, as one might say, the end or goal of the activity corresponding to the attractive faculty. For the actual bringing up of nutriment from the veins into each of the parts takes place through the activation of the attractive faculty,⁴ whilst to

³ For these terms (*prosthesia* and *prophysis* in Greek) cf. p. 39, notes 5 and 6.
⁴ Lit. "through the *energizing* (or *functioning*) of the attractive faculty"; the faculty (*δύναμις*) *in operation* is an activity (*ἐνέργεια*). cf. p. 3, note 2.
μεως, τὸ δὲ ἢδη παρηχθαί τε καὶ προστίθεσθαι τῷ μορίῳ τὸ τέλος ἐστὶν αὐτό, δι᾿ ὃ καὶ τῆς τοιαύτης ἐνεργείας ἐδεήθημεν. ἦνα γὰρ προστεθῇ, διὰ τούθεν ἔλκεται. χρόνον δὲ ἐνεύθεν ἢδη πλείονος εἰς τὴν θρέψιν τοῦ ξύου δεῖ. ἔλημεν μὲν γὰρ καὶ διὰ ταχέων τι δύναται, προσφύγοι δὲ καὶ ἀλλοωθήμεν καὶ τελέως ὄμωθημεν τῷ τρεφομένῳ καὶ μέρος αὐτοῦ γενέσθαι παραχρῆμα μὲν οὐχ οἶνον τε, χρόνῳ δὲ ἄν πλείονι συμβαίνοι καλῶς. ἀλλʼ εἰ μὴ μένοι κατὰ τὸ μέρος ὁ προστεθείς οὕτως χυμός, εἰς ἔτερον δὲ τὶ μεθύσται καὶ παραρρέοι διὰ παντὸς ἅμείβοι τε καὶ ὑπαλ. 145 λάττων τὰ χωρία, κατʼ οὐδὲν αὐτῶν || οὐτε πρὸς φυσις οὐτε ἐξομοίωσις ἐσταὶ. δεῖ δὲ κάνταυθα τινος τῇ φύσει δυνάμεως ἔτερας εἰς πολυχρόνιον μονὴν τοῦ προστεθέντος τῷ μορίῳ χυμοῦ καὶ ταύτης οὐκ ἔξωθεν ποθὲν ἐπιρρεοῦσας ἀλλʼ ἐν αὐτῷ τῷ θρεψομένῳ κατορκισμένης, ἣν ἀπὸ τῆς ἐνεργείας πάλιν οἱ πρὸ ἡμῶν ἡναγκασθησαν ὅνωμάσαι καθεκτικῆν.

Ὁ μὲν δὴ λόγος ἦδη σαφῶς ἐνεδείξατο τὴν ἀνάγκην τῆς γενέσεως τῆς τοιαύτης δυνάμεως καὶ ὅστις ἀκολουθίας σύνεσιν ἔχει, πέπεισται βεβαιῶς ἐξ ὧν εἴπομεν, ὡς ὑποκειμένου τε καὶ προαποδεδειγμένου τοῦ τεχνικῆν εἶναι τὴν φύσιν καὶ τοῦ ξύου κηδεμοικῆν ἀναγκαίον ὑπάρχειν αὐτῇ καὶ τὴν τοιαύτην δύναμιν.
have been finally brought up and presented to the part is the actual end for which we desired such an activity; it is attracted in order that it may be presented. After this, considerable time is needed for the nutrition of the animal; whilst a thing may be even rapidly attracted, on the other hand to become adherent, altered, and entirely assimilated to the part which is being nourished and to become a part of it, cannot take place suddenly, but requires a considerable amount of time. But if the nutritive juice, so presented, does not remain in the part, but withdraws to another one, and keeps flowing away, and constantly changing and shifting its position, neither adhesion nor complete assimilation will take place in any of them. Here too, then, the [animal's] nature has need of some other faculty for ensuring a prolonged stay of the presented juice at the part, and this not a faculty which comes in from somewhere outside but one which is resident in the part which is to be nourished. This faculty, again, in view of its activity our predecessors were obliged to call retentive.

Thus our argument has clearly shown the necessity for the genesis of such a faculty, and whoever has an appreciation of logical sequence must be firmly persuaded from what we have said that, if it be laid down and proved by previous demonstration that Nature is artistic and solicitous for the animal's welfare, it necessarily follows that she must also possess a faculty of this kind.

1 This chapter is an excellent example of Galen's method of reasoning a priori. The complementary inductive method, however, is employed in the next chapter. cf. p. 209, note 1.
'Αλλ' ἡμεῖς οὖν τούτῳ μόνῳ τῷ γένει τῆς ἀπο-
deίξεως εἰθισμένοι χρῆσθαι, προστιθέντες δ' αὐτῷ
καὶ ταῦτα ἐκ τῶν ἐναργῶς φαινομένων ἀναγκαζούσας
ταῦτα διαξομένας πίστεις ἐπὶ τὰς τοιαύτας καὶ
νῦν ἀφιξόμεθα καὶ δείξομεν ἐπὶ μὲν τῶν μορίων
τοῦ σώματος οὗτος ἐναργή τὴν καθεκτικὴν δύ-
ναμιν, ὡς αὐταῖς ταῖς αἰσθήσεις διαγεγραμ-
σκέσθαι τὴν ἐνέργειαν αὐτῆς, ἐπὶ δὲ τῶν ἠττῶν
μὲν ἐναργῶς ταῖς αἰσθήσεις, λόγῳ δὲ κανταῦθα
φωράθηναι δυναμένην.

Ἀρξώμεθ' οὖν τῆς διδασκαλίας ἀπ' αὐτοῦ τοῦ
τέως πρῶτον μεθόδῳ τοίς προχειρισσαθαί μόρι
ἀττα τοῦ σώματος, ἐφ' ὅν ἀκριβῶς ἔστι βασανι-
σαί τε καὶ ζητήσαι τὴν καθεκτικὴν δύναμιν ὅποια
ποτ' ἐστίν.

Ἀρ' οὖν ἀμεινον ἂν τις ἐτέρωθεν ή ἂπ' τῶν
μεγίστων τε καὶ κοιλότατων ὄργανων ὑπάρξαι τῆς
ζητήσεως; ἔμοι μὲν οὖν ὅν ἀν δοκεῖ βέλτιον.
ἐναργεῖς γοῦν εἰκὸς ἐπὶ τούτῳ φανῆναι τὰς ἐνερ-
γείας διὰ τὸ μέγεθός· ὡς τὰ γε σμικρὰ τὰχ' ἂν,
εἰ καὶ σφοδρὰν ἔχει τὴν τοιαύτην δύναμιν, ἀλλὰ
οὖν αἰσθήσεις γ' ἐτοίμην διαγεγραμμένης τὴν
ἐνεργείαν αὐτῆς.

Ἀλλ' ἐστίν ἐν τοῖς μάλιστα κοιλότατα καὶ μέ-
γιστα τῶν τοῦ ζῶου μορίων ἢ τε γαστὴρ καὶ <αἰ>
μῆτραι τε καὶ ύστεραι καλοῦμεναι. τι οὖν κωλύει
ταύτα πρῶτα προχειρισσαμένους ἐπισκέψασθαι
τὰς ἐνεργείας αὐτῶν, ὅσι μὲν καὶ πρὸ τῆς ἀνατομῆς

1 The deductive.
2 The logos is the argument or "theory" arrived at by the
ON THE NATURAL FACULTIES, III. II

II

Since, however, it is not our habit to employ this kind of demonstration alone, but to add thereto cogent and compelling proofs drawn from obvious facts, we will also proceed to the latter kind in the present instance: we will demonstrate that in certain parts of the body the retentive faculty is so obvious that its operation can be actually recognised by the senses, whilst in other parts it is less obvious to the senses, but is capable even here of being detected by the argument. 3

Let us begin our exposition, then, by first dealing systematically for a while with certain definite parts of the body, in reference to which we may accurately test and enquire what sort of thing the retentive faculty is.

Now, could one begin the enquiry in any better way than with the largest and hollowest organs? Personally I do not think one could. It is to be expected that in these, owing to their size, the activities will show quite clearly, whereas with respect to the small organs, even if they possess a strong faculty of this kind, its activation will not at once be recognisable to sense.

Now those parts of the animal which are especially hollow and large are the stomach and the organ which is called the womb or uterus. 3 What prevents us, then, from taking up these first and considering their activities, conducting the enquiry on our own process of λογικὴ θεωρία or "theorizing"; cf. p. 151, note 3; p. 205, note 1.

3 The Greek words for the uterus (μέτραe and κυστeρεae) probably owe their plural form to the belief that the organ was bicornuate in the human, as it is in some of the lower species.
Δήλαι, τὴν ἐξετασίν ἐφ' ἡμῶν αὐτῶν ποιουμένους, ὡσι δ' ἀμύδροτεραι, τὰ παραπλήσια διαιροῦντας ἁνθρώπῳ ξῶς, || ὁιχ ὡς οὐκ ἅν ἰκανὸς τὸ γε καθόλου περὶ τῆς ἤτοιμήνης δυνάμεως καὶ τῶν ἀνομοίων ἐνδειξομένων, ἀλλ' ὡς ἢν ἄμα τῷ κοινῷ καὶ τὸ ἔδοιον ἐφ' ἡμῶν αὐτῶν ἐγγυκότες εἰς τε τὰς διαγνώσεις τῶν νοσημάτων καὶ τὰς ἰάσεις εὐπορότεροι γιγνώμεθα.

Περὶ μὲν οὖν ἀμφοτέρων τῶν ὑργάνων ἄμα λέγειν ἀδύνατον, ἐν μέρει δ' ὑπὲρ ἐκατέρου ποιησόμεθα τῶν λόγων ἀπὸ τοῦ σαφέστερον ἐνδείξασθαι δυναμένου τὴν καθεκτικὴν δύναμιν ἀρξάμενου. κατέχει μὲν γὰρ καὶ ἡ γαστὴρ τὰ σιτία, μέχρι περὶ ἀν ἐκπέψῃ, κατέχουσι δὲ καὶ αἱ μῆτραι τὸ ἐμβρυον, ἔστω ἀν τελεώσωσιν ἀλλ' πολλαπλάσιος ἔστιν ὁ τῆς τῶν ἐμβρύων τελειώσεως χρόνος τῆς τῶν σιτίων πέψεως.

III

Εἰκὸς οὖν καὶ τὴν δύναμιν ἐναργέστερον ἐν ταῖς μήτραις φωράσειν ἡμᾶς τὴν καθεκτικήν, δόσι καὶ πολυχρονιστέραν τῆς γαστροὶ τῆς ἐνέργειαν κέκτηται. μησὶ γὰρ ἐννέα ποι ταῖς πλείσταις τῶν γυναικῶν ἐν αὐτοῖς τελειώται τὰ κυήματα, μεμυκώοις μὲν ἀπαντὶ τῷ αὐχένι, περιεχοῦσαι δὲ πανταχόθεν αὐτὰ σὺν τῷ χορίῳ. || 148 καὶ πέρας γε τῆς τοῦ στάματος μύσεως καὶ τῆς τοῦ κυομένου κατὰ τὰς μήτρας μονῆς ἡ χρεία τῆς ἐνεργείας ἐστὶν οὗ γὰρ ὡς ἐτυχεῖν οὐδὲ ἀλόγως ἰκανὰς περιστέλλεσθαι καὶ κατέχειν τὸ
persons in regard to those activities which are obvious without dissection, and, in the case of those which are more obscure, dissecting animals which are near to man;¹ not that even animals unlike him will not show, in a general way, the faculty in question, but because in this manner we may find out at once what is common to all and what is peculiar to ourselves, and so may become more resourceful in the diagnosis and treatment of disease.

Now it is impossible to speak of both organs at once, so we shall deal with each in turn, beginning with the one which is capable of demonstrating the retentive faculty most plainly. For the stomach retains the food until it has quite digested it, and the uterus retains the embryo until it brings it to completion, but the time taken for the completion of the embryo is many times more than that for the digestion of food.

III

We may expect, then, to detect the retentive faculty in the uterus more clearly in proportion to the longer duration of its activity as compared with that of the stomach. For, as we know, it takes nine months in most women for the foetus to attain maturity in the womb, this organ having its neck quite closed, and entirely surrounding the embryo together with the chorion. Further, it is the utility of the function which determines the closure of the os and the stay of the foetus in the uterus. For it is not casually nor without reason that Nature has made

¹ Note this expression. For Galen's views on the origin of species, cf. Introduction, p. xxxi., footnote.
Γαλέν

ἐμβρυον ἡ φύσις ἀπείρασσατο τὰς ὑστέρας, ἄλλῃ ἢν εἰς τὸ πρέπουν ἀφίκηται μέγεθος τὸ κυούμενον. ὅταν οὖν, οὐ χάριν ἐνήργουν τῇ καθεκτικῇ δύναμι, συμπεπληρωμένου ἢ, ταύτην μὲν ἀνέπαυσάν τε καὶ εἰς ἤρεμιαν ἐπανήγαγον, ἀντ' αὐτῆς δ' ἔτερα χρώνται τῇ τέως ἡσυχαζουσι, τῇ προωστικῇ. ἦν δ' ἄρα καὶ τῆς ἐκείνης ἡσυχίας ὅρος ἡ χρεία καὶ τῆς γ' ἐνεργείας ὡσαύτως ἡ χρεία καλούσης μὲν γὰρ αὐτῆς ἐνεργεί, μὴ καλούσης δ' ἡσυχάζει.

Καὶ χρὴ πάλιν κανταῦθα καταμαθεῖν τῆς φύσεως τὴν τέχνην, ὥς οὐ μόνον ἐνεργειῶν χρησίμων δυνάμεις ἐνέθηκεν ἐκάστῳ τῶν ὀργῶν, ἀλλὰ καὶ τοῦ τῶν ἡσυχῶν τε καὶ κινήσεως καιροῦ προούσατο. καλῶς μὲν γὰρ ἀπάντων γεγονόμενων τῶν κατὰ τὴν κύησιν ἡ ἀποκριτικὴ δύναμις ἡσυχάζει τελέως ὡσπερ οὐκ ὀυδά, κακοπραγίας δὲ τινος γενομένης ἢ περὶ τὸ χορίον ἢ 149 περὶ τινα τῶν ἄλλων || ύμένων ἢ περὶ τὸ κυούμενον αὐτὸ καὶ τῆς τελειώσεως αὐτοῦ παντάπασιν ἀπογνωσθείσης οὐκέτι ἀναμένουσι τὸν ἐνιαίμηνον αἰ μὴτραι χρόνον, ἀλλ' ἢ μὲν καθεκτικὴ δύναμις αὐτίκα δὴ πέπαυται καὶ παραγωρεῖ κινεῖσθαι τῇ πρότερον ἀργοῦσι, πράττει δ' ἢ δ' τι καὶ πραγματεύεται χρηστὸν ἡ ἀποκριτικὴ τε καὶ προωστικὴ τι καὶ γὰρ οὖν καὶ ταύτην οὕτως ἔκαλεσαν ἀπὸ τῶν ἐνεργειῶν αὐτῆς τὰ ὄνοματα θέμενοι καθάπερ καὶ ταῖς ἄλλαις.

Καὶ πῶς ὁ λόγος ἐοικεν ὑπὲρ ἀμφοτέρων ἀποδείξειν ἀμα: καὶ γὰρ τοι καὶ διαδεχομένας αὐτὰς ἅλληλας καὶ παραχωροῦσαν ἀεὶ τὴν ἐτέραν τῇ λοιπῇ, καθότι ἀν ἡ χρεία κελεύῃ, καὶ 230
the uterus capable of contracting upon, and of retaining the embryo, but in order that the latter may arrive at a proper size. When, therefore, the object for which the uterus brought its retentive faculty into play has been fulfilled, it then stops this faculty and brings it back to a state of rest, and employs instead of it another faculty hitherto quiescent—the *propulsive* faculty. In this case again the quiescent and active states are both determined by utility; when this calls, there is activity; when it does not, there is rest.

Here, then, once more, we must observe well the Art [artistic tendency] of Nature—how she has not merely placed in each organ the capabilities of useful activities, but has also fore-ordained the times both of rest and movement. For when everything connected with the pregnancy proceeds properly, the *eliminative* faculty remains quiescent as though it did not exist, but if anything goes wrong in connection either with the chorion or any of the other membranes or with the foetus itself, and its completion is entirely despaired of, then the uterus no longer awaits the nine-months period, but the retentive faculty forthwith ceases and allows the heretofore inoperative faculty to come into action. Now it is that something is done—in fact, useful work effected—by the *eliminative or propulsive faculty* (for so it, too, has been called, receiving, like the rest, its names from the corresponding activities).

Further, our theory can, I think, demonstrate both together; for seeing that they succeed each other, and that the one keeps giving place to the other according as utility demands, it seems not unreason-
τὴν διδασκαλίαν κοινὴν οὐκ ἀπεικόσ ἐστὶ δέχεσθαι. τῆς μὲν οὖν καθεκτικῆς δυνάμεως ἐργον περιστείλαι τὰς μήτρας τῷ κυνουμένῳ πανταχόθεν, ὡστε εὐλόγως ἀποτομέαναι μὲν ταῖς μαίευτρίαις τὸ στόμα μεμυκὸς αὐτών φαίνεται, ταῖς κυνοῦσαις δὲ αὐταῖς κατὰ τὰς πρώτας ἡμέρας καὶ μᾶλιστα κατ’ αὐτὴν ἐκείνην, ἐν ἦπερ ἄν ἡ τῆς γονής σύλληψις γένηται, κυνουμένων τε καὶ συν-150 τρεχουσῶν εἰς ἑαυτὰς τῶν ύστερῶν αἰσθησιῶν γίγνεται καὶ ἢν ἀμφο ταύτα συμβῇ, μόνος μὲν τὸ στόμα χωρὶς φλεγμονῆς ἡ τινος ἄλλου παθήματος, αἰσθητῷ δὲ τῆς κατὰ τὰς μήτρας κινήσεως ἀκολουθήσαι, πρὸς αὐτάς ἡδὴ τὸ σπέρμα τὸ παρά ταῦτο εἰληφέναι τε καὶ κατέχειν αἱ γυναικεῖς νομίζουσι.

Ταύτα δ’ οὖν ἡμεῖς νῦν ἀναπλάττομεν ἡμῖν αὐτοίς, ἀλλ’ ἐκ μακρᾶς πείρας δοκιμασθέντα πάσι γέγραπται σχεδὸν τι τοῖς περὶ τούτων πραγματευσάμενοι. Ἡρόφιλος μὲν γε καὶ ὃς οὐδὲ πυρήνα μῆλης ἀν δέχοιτο τῶν μητρῶν τὸ στόμα, πρὶν ἀποκυεῖν τὴν γυναίκα, καὶ ὃς οὐδὲ τούλαχιστον ἔτι διέστηκεν, ἢν ὕπάρξῃται κύριοι, καὶ ὃς ἐπὶ πλέον ἀναστομοῦνται κατὰ τὰς τῶν ἑπιμηνίων φοράς, οὐκ ἀκυρωθεὶ γράφειν συνομολογοῦσι δ’ αὐτῷ καὶ οἱ ἄλλοι πάντες οἱ περὶ τούτων πραγματευσάμενοι καὶ πρῶτος γ’ ἀπαντῶν ἱατρῶν τε καὶ φιλοσοφῶν ἤπειρον. Ἱπποκράτης ἀπεφήματο μύειν τὸ στόμα τῶν ύστερῶν ἐν τε ταῖς κυήσεσι καὶ ταῖς φλεγμοναῖς, ἀλλ’ ἐν μὲν ταῖς κυΗσεσιν οὐκ ἐξιστάμενον τῆς φύσεως, ἐν δὲ ταῖς φλεγμοναῖς σκληρῶν γυγρόμενον.
ON THE NATURAL FACULTIES, III.

able to accept a common demonstration also for both. Thus it is the work of the retentive faculty to make the uterus contract upon the foetus at every point, so that, naturally enough, when the midwives palpate it, the os is found to be closed, whilst the pregnant women themselves, during the first days—and particularly on that on which conception takes place—experience a sensation as if the uterus were moving and contracting upon itself. Now, if both of these things occur—if the os closes apart from inflammation or any other disease, and if this is accompanied by a feeling of movement in the uterus—then the women believe that they have received the semen which comes from the male, and that they are retaining it.

Now we are not inventing this for ourselves: one may say the statement is based on prolonged experience of those who occupy themselves with such matters. Thus Herophilus¹ does not hesitate to state in his writings that up to the time of labour the os uteri will not admit so much as the tip of a probe, that it no longer opens to the slightest degree if pregnancy has begun—that, in fact, it dilates more widely at the times of the menstrual flow. With him are in agreement all the others who have applied themselves to this subject; and particularly Hippocrates, who was the first of all physicians and philosophers to declare that the os uteri closes during pregnancy and inflammation, albeit in pregnancy it does not depart from its own nature, whilst in inflammation it becomes hard.

¹ Herophilus of Chalcedon (circa 300 B.C.) was, like Erasistratus, a representative of the anatomical school of Alexandria. His book on Midwifery was known for centuries. cf. Introduction, p. xii.
Ἐπὶ δὲ γε τῆς ἑναντίας τῆς ἐκκριτικῆς ἀνοίγνυται μὲν τὸ στόμα, προέρχεται δ' ὁ πυθμήν || 151 ἀπασ ὁσον οἶνον τ' ἐγγυτάτῳ τοῦ στόματος ἀπωθούμενος ἤξω τὸ ἐμβρυνόν, ἀμα δ' αὐτῷ καὶ τὰ συνεχὴ μέρη τὰ οἶνον πλευρὰ τοῦ παιντός ὀργάνου συνεπιλαμβανόμενα τοῦ ἑργον θλίβει τε καὶ προωθεὶ πάν ἤξω τὸ ἐμβρυνόν. καὶ πολλαῖς τῶν γυναικῶν ὡδῖνες βίαιοι τὰς μήτρας ὅλας ἐκπεσεῖν ἡνάγκασαν ἀμέτρως χρησαμέναις τῇ τοιαύτῃ δυνάμει, παραπλησίου τινὸς γυνομένου τῷ πολλάκις ἐν πάλαις τισὶ καὶ φιλονεικίας συμβαίνοντι, ὅταν ἀνατρέψῃ τε καὶ καταβαλεῖν ἑτέρους σπεύδοντες αὐτοῖς συγκαταπέσωμεν, οὕτω γὰρ καὶ αἱ μήτραι τὸ ἐμβρυνόν ὡθουσαί συνεξέπεσον ἐνίοτε καὶ μάλισθ', ὅταν οἱ πρὸς τὴν ῥάχιν αὐτῶν σύνδεσμοι χαλαροὶ φύσει τυγχάνοσιν ὄντες.

"Εστι δὲ καὶ τούτο θαυμαστῶν τι τῆς φύσεως σώφισμα, τὸ ξύντος μὲν τοῦ κυήματος ἀκριβῶς πάνυ μεμυκέναι τὸ στόμα τῶν μητρῶν, ἀποθανόντος δὲ παραχρῆμα διανοίγεσθαι τοσοῦτον, ὅσον εἰς τὴν ἤξων αὐτοῦ διαφέρει. καὶ μέντοι καὶ αἱ μαίαι τὰς τικτοῦσας οὐκ εὐθὺς ἀνιστάσιν οὐδ’ ἐπὶ τὸν δίφρον καθίζουσιν, ἀλλ’ ἀπτοῦνται 152 πρότερον ἀνοιγόμενον τοῦ στόματος || κατὰ βραχὺ καὶ πρῶτον μὲν, ὡστε τῶν μικρῶν δάκτυλον καθιέναι, διεστηκέναι φασιν, ἔπειτ’ ἤδη καὶ μείζον καὶ κατὰ βραχὺ δὴ πυθανομένου ἡμῖν ἀποκρίνονται τὸ μέγεθος τῆς διαστάσεως ἐπαυξήκομεν. ὅταν δ’ ἴκανον ἢ πρὸς τὴν τοῦ κυνομένου δίοδον, ἀνιστάσιν αὐτῶς καὶ καθίζουσι
ON THE NATURAL FACULTIES, III. iii

In the case of the opposite (the eliminative) faculty, the os opens, whilst the whole fundus approaches as near as possible to the os, expelling the embryo as it does so; and along with the fundus the contiguous parts—which form as it were a girdle round the whole organ—co-operate in the work; they squeeze upon the embryo and propel it bodily outwards. And, in many women who exercise such a faculty immoderately, violent pains cause forcible prolapse of the whole womb; here almost the same thing happens as frequently occurs in wrestling-bouts and struggles, when in our eagerness to overturn and throw others we are ourselves upset along with them; for similarly when the uterus is forcing the embryo forward it sometimes becomes entirely prolapsed, and particularly when the ligaments connecting it with the spine happen to be naturally lax.¹

A wonderful device of Nature's also is this—that, when the foetus is alive, the os uteri is closed with perfect accuracy, but if it dies, the os at once opens up to the extent which is necessary for the foetus to make its exit. The midwife, however, does not make the parturient woman get up at once and sit down on the [obstetric] chair, but she begins by palpating the os as it gradually dilates, and the first thing she says is that it has dilated "enough to admit the little finger," then that "it is bigger now," and as we make enquiries from time to time, she answers that the size of the dilatation is increasing. And when it is sufficient to allow of the transit of the foetus,² she then makes the patient get up from her bed and

¹ Relaxation of utero-sacral ligaments as an important predisposing cause of prolapsus uteri.
² That is, at the end of the first stage of labour.
καὶ προθυμεῖσθαι κελεύονσιν ἀπώσασθαι τὸ παιδίον. ἔστι δ' ἡδή τούτο τὸ ἔργον, δ' παρ' ἑαυτῶν αἱ κύουσαι προστιθέασιν, οὐκέτι τῶν ύστερών, ἀλλὰ τῶν κατ' ἐπιγάστριον μυὼν, οἱ πρὸς τὴν ἀποπάτησιν τε καὶ τὴν οὐρήσιν ἡμῖν συνεργοῦσιν.

IV

Οὗτω μὲν ἐπὶ τῶν μητρῶν ἑναργώς αἱ δύο φαίνονται δυνάμεις, ἐπὶ δὲ τῆς γαστρὸς ὠδε. πρῶτον μὲν τοῖς κλύδωσιν, οὐδὲ καὶ πεπίστευνται τοῖς ἱστροῖς ἀρρώστου κοιλίας εἶναι συμπτώματα καὶ κατὰ λόγον πεπίστευνται· ἐνίοτε μὲν γὰρ ἑλάχιστα προσενηχημένων οὐ γίγνονται περιστελλομένης ἀκριβῶς αὐτοῖς τῆς γαστρὸς καὶ σφυγγούσῃς πανταχόθεν, ἐνίοτε δὲ μεστῇ μὲν ἦν 153 γαστήρ ἐστιν, οἱ κλύδωνες δ' ὡς ἐπὶ κενῆς ἑξακούονται. κατὰ φύσιν μὲν γὰρ ἔχουσα καὶ χρωμένη καλῶς τῇ περισταλτικῇ δυνάμει, κἀπεὶ ὁλόγον ἦ τὸ περιεχόμενον, ἀπαν ἄνευ περιλαμβάνουσα χῶραν οὐδεμίαν ἀπολείπει κενῆ, ἀρρωστοῦσα δὲ, καθότι ἄν ἀδυνατήσῃ περιλαβεῖν ἀκριβῶς, ἑνταῦθ' εὐρυχώριαν τιν' ἐργαζομένη συγχωρεῖ τοῖς περιεχομένοις ύγροῖς κατὰ τὰς τῶν σχημάτων μεταλλαγὰς ἄλλοτ' ἀλλαχοῦσε μεταρρέουσι κλύδωνας ἀποτελεῖν.

Εὐλόγως οὖν, ὅτι μηδὲ πέψουσιν ἰκανῶς, οἱ ἐν τῶς τῷ συμπτώματι γενόμενοι προσδοκῶσιν· οὐ γὰρ ἐνδέχεται πέψαι καλῶς ἀρρώστου γαστέρα. τοῖς τοιούτοις δὲ καὶ μέχρι πλείονος ἐν αὐτῇ
sit on the chair, and bids her make every effort to expel the child. Now, this additional work which the patient does of herself is no longer the work of the uterus but of the epigastric muscles, which also help us in defaecation and micturition.

IV

Thus the two faculties are clearly to be seen in the case of the uterus; in the case of the stomach they appear as follows:—Firstly in the condition of gurgling, which physicians are persuaded, and with reason, to be a symptom of weakness of the stomach; for sometimes when the very smallest quantity of food has been ingested this does not occur, owing to the fact that the stomach is contracting accurately upon the food and constricting it at every point; sometimes when the stomach is full the gurglings yet make themselves heard as though it were empty. For if it be in a natural condition, employing its contractile faculty in the ordinary way, then, even if its contents be very small, it grasps the whole of them and does not leave any empty space. When it is weak, however, being unable to lay hold of its contents accurately, it produces a certain amount of vacant space, and allows the liquid contents to flow about in different directions in accordance with its changes of shape, and so to produce gurglings.

Thus those who are troubled with this symptom expect, with good reason, that they will also be unable to digest adequately; proper digestion cannot take place in a weak stomach. In such people also, the mass of food may be plainly seen to remain
φαίνεται παραμένων τὸ βάρος, ός ἂν καὶ βραδύ- 
tερον πέπτοισι. καὶ μὴν θανμάσειν ἂν τις ἐπ' 
αὐτῶν τούτων μάλιστα τὸ πολυχρόνιον τῆς ἐν τῇ 
γαστρὶ διατριβῆς οὐ τῶν σιτίων μόνον ἀλλὰ καὶ 
tοῦ πόματος· οὐ γὰρ, ὅπερ ἂν οἰηθεὶ ἡ τὶς, ὡς ὁ 
tῆς γαστρῶς στόμα τὸ κάτω στενῶν ἴκανῶς 
ὑπάρχων οὐδὲν παρίσης πρὶν ἀκριβῶς λεωθήναι, 
tούτ' αἰτιον ὄντως ἔστι· πολλὰ γοῦν πολλάκις 

154 ὅπω ὄρων ὡστά μέγιστα καταπίνουσι || πάμπολλοι 
καὶ τῖς δακτύλιοι κρυσοῦν ἐν τῷ στόματι φυ- 
λάττων ἅκων κατέπιε καὶ ἄλλος τῶν νόμισμα καὶ 
ἀλλος ἄλλο τῇ σκληρῷ καὶ δυσκατέργαστον, 
ἀλλ' ὅμως ἀπαντεὶ οὗτοι ῥαδίως ἀπεπάτησαν, ἂ 
κατέπιον, οὖν ἄλλοις αὐτοῖς ἀκολουθήσαντος συμ- 
πτόματος. εἰ δὲ γ' ἢ στενότης τοῦ πόρου τῆς 
γαστρῶς αἰτία τοῦ μένειν ἐπὶ πλέον ἢν τοῖς 
ἀτρίπτοις σιτίοις, οὐδὲν ἂν τούτων ποτὲ διεχώρ 
ῥησιν. ἀλλὰ καὶ τὰ πόματ' αὐτοῖς ἐν τῇ 
γαστρὶ παραμένειν ἐπὶ πλεῖστον ἴκανὸν ἀπάγειν 
τὴν ὑπόνοιαν τοῦ πόρου τῆς στενότητος· ὅλως 
γάρ, εἴπερ ἢν ἐν τῷ κεχυλώσθαι τὸ βᾶττον 
ὑπέναι, τὰ τέρον ἢματ' ἂν οὐτῶ καὶ τὸ γάλα καὶ 
ὁ τῆς πτισάνης χυλὸς αὐτίκα διεξῆ πᾶσιν. 
ἀλλ' οὐχ ὡδ' ἔχει τοῖς μὲν γάρ ἀσθενεῖσιν ἐπὶ 
πλεῖστον ἐμπλεῖ ταῦτα καὶ κλύδωνας ἐργάζεται 
παραμένοντα καὶ θλίβει καὶ βαρύνει τὴν γαστέρα, 
τοῖς δ' ἵσχυροίς οὐ μόνον τούτων οὐδὲν συμβαίνει, 
ἀλλὰ καὶ πολὺ πλήθος ἄρτων καὶ κρεών ὑπο- 
χωρεῖ ταχέως.

1 The pylorus.
ON THE NATURAL FACULTIES; III. iv

an abnormally long time in the stomach, as would be natural if their digestion were slow. Indeed, the chief way in which these people will surprise one is in the length of time that not food alone but even fluids will remain in their stomachs. Now, the actual cause of this is not, as one would imagine, that the lower outlet of the stomach, being fairly narrow, will allow nothing to pass before being reduced to a fine state of division. There are a great many people who frequently swallow large quantities of big fruit-stones; one person, who was holding a gold ring in his mouth, inadvertently swallowed it; another swallowed a coin, and various people have swallowed various hard and indigestible objects; yet all these people easily passed by the bowel what they had swallowed, without there being any subsequent symptoms. Now surely if narrowness of the gastric outlet were the cause of untrituated food remaining for an abnormally long time, none of these articles I have mentioned would ever have escaped. Furthermore, the fact that it is liquids which remain longest in these people’s stomachs is sufficient to put the idea of narrowness of the outlet out of court. For, supposing a rapid descent were dependent upon emulsification, then soups, milk, and barley-emulsion would at once pass along in every case. But as a matter of fact this is not so. For in people who are extremely asthenic it is just these fluids which remain undigested, which accumulate and produce gurglings, and which oppress and overload the stomach, whereas in strong persons not merely do none of these things happen, but even a large quantity of bread or meat passes rapidly down.

3 Lit. barley-“chyle,” i.e. barley-water.
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Οὐ μόνον δ' ἐκ τοῦ περιτετάσθαι τήν γαστέρα καὶ βαρύνεσθαι || καὶ μεταρρεῖν ἄλλοτ' εἰς ἄλλα μέρη μετὰ κλύδωνος τὸ παραμένειν ἐπὶ πλέον ἐν αὐτῇ πάντως τοῖς οὕτως ἔχουσι τεκμηρίαν αὖ τις ἄλλα κἂν τῶν ἐμέτων. ἔνιοι γὰρ οὗ μετὰ τρεῖς ὃρας ἢ τέταρτας ἄλλα νυκτῶν ἢ ἡ μέσων παμπόλλου μεταξύ χρόνου διελθόντος ἐπὶ ταῖς προσφοραῖς ἀνήμεσαν ἀκριβῶς ἀπαντα τὰ ἐδη- δεσμένα.

Καὶ μὲν δὴ καὶ ξύφων ὁπιοῦν ἐμπλήσας υγρᾶς τροφῆς, ὁσπερ ἡμεῖς πολλάκις ἐπὶ συνὸν ἐπειρά- θήμεν ἐξ ἀλεύρων μέθ' ὕδατος οἰον κυκεκώνα τινα δόντες αὐτοὺς, ἐπείτα μετὰ τρεῖς ποὺ καὶ τέταρτας ὃρας ἀνατεμόντες, εἶ ἐνότω καὶ σὺ πράξειας, εὐρήσεις ἐτι κατὰ τὴν γαστέρα τὰ ἐδηδεσμένα: πέρας γὰρ αὐτοῖς ἔστι τῆς ἐνταύθα μονῆς οὐχ ἡ χύλωσις, ἢ τὰ ἐκτὸς ἐν τοῖς μηχανήσασθαι δυνατὸν ἐστιν, ἀλλ' ἡ πέψις, ἔτερος τοῖς χυλό- σεως οὐσα, καθάπερ αἰμάτωσις τε καὶ θρέψις. ὡς γὰρ κάκεινα δέδεικται ποιοτήτων μεταβολῆς γεγονόμενα, τὸν αὐτὸν τρόπον καὶ ἡ ἐν τῇ γαστρὶ πέψις τῶν συτίων εἰς τὴν οἰκείαν ἐστὶ τῷ τρεφο- μένῳ ποιότητα || μεταβολῆ καὶ όταν γε πεφθή τελέως, ἀνοίγωνται μὲν τηνικάυτα τὸ κάτω στόμα, διεκπίπτει δ' αὐτοῦ τὰ συτία ῥαδίως, εἶ καὶ πλήθος τι μεθ' ἐαυτῶν ἔχοντα τοὺχοι λίθων ἢ ὀστῶν ἡ γυγάρτων ἢ τινος ἄλλου χυλωθήναι μὴ δυναμένου. καὶ σοι τούτ' ἐνεστίν ἐπὶ ξύφων
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And it is not only because the stomach is distended and loaded and because the fluid runs from one part of it to another accompanied by gurglings—it is not only for these reasons that one would judge that there was an unduly long continuance of the food in it, in those people who are so disposed, but also from the vomiting. Thus, there are some who vomit up every particle of what they have eaten, not after three or four hours, but actually in the middle of the night, a lengthy period having elapsed since their meal.

Suppose you fill any animal whatsoever with liquid food—an experiment I have often carried out in pigs, to whom I give a sort of mess of wheaten flour and water, thereafter cutting them open after three or four hours; if you will do this yourself, you will find the food still in the stomach. For it is not chylification which determines the length of its stay here—since this can also be effected outside the stomach; the determining factor is digestion which is a different thing from chylification, as are blood-production and nutrition. For, just as it has been shown that these two processes depend upon a change of qualities, similarly also the digestion of food in the stomach involves a transmutation of it into the quality proper to that which is receiving nourishment. Then, when it is completely digested, the lower outlet opens and the food is quickly ejected through it, even if there should be amongst it abundance of stones, bones, grape-pips, or other things which cannot be reduced to chyle. And you may observe this

1 i.e. not the mere mechanical breaking down of food, but a distinctively vital action of "alteration."
2 Pepsis.
3 Book I., chaps. x., xi.
θεάσασθαι στοχασμένοι τὸν καιρὸν τῆς κάτω διεξόδου. καὶ μὲν γε καὶ εἰ σφαλεῖς ποτὲ τοῦ καιροῦ καὶ μηδὲν μῆτω κάτω παρέρχοιτο πεττομένων ἔτι κατὰ τὴν γαστέρα τῶν σιτίων, οὐδ' οὖτως ἀκαρπὸς ἢ ἀνατομή σοι γεννήσεται: θεάση γὰρ ἐπ' αὐτῶν, ὅπερ ὅλιγῳ πρόσθεν ἐλέγομεν, ἀκριβῶς μὲν μεμυκότα τὸν πυλωρόν, ἀπασαν δὲ τὴν γαστέρα περισταλμένην τοῖς σιτίοις τρόπον ὁμοίοτατον, ομόπερ καὶ αἱ μὴ τραὶ τοῖς κυνομένοις. οὐ γὰρ ἐστιν οὐδέποτε κενὴν εὑρεῖν χώραν οὗτε κατὰ τὰς ύστερας οὗτε κατὰ τὴν κοιλίαν οὗτε κατὰ τὰς κύστεις ἀμφοτέρας οὔτε κατὰ τὴν χοληδόχουν όνομαζομένην οὔτε τὴν ἐτέραν ἀλλ' εἰτ' ὅλιγον εἰτ' τὸ περιεχόμενον ἐν αὐταῖς εἰτ' πολύ, μεσταὶ καὶ πληρεῖς αὐτῶν αἱ κοιλίαι φαίνονται περιστελλομένων ἀεὶ τῶν χειτών τοῖς περιεχόμενοις, ὅταν γε κατὰ φύσιν ἔχῃ τὸ ζῷον. ||

157 'Ερασίστρατος δ' οὖκ οἶδ' ὅπως τὴν περιστολὴν τῆς γαστρὸς ἀπάντων αὐτίαν ἀποφαίνει καὶ τῆς λείωσεως τῶν σιτίων καὶ τῆς τῶν περιττομάτων ὑποχωρήσεως καὶ τῆς τῶν κεχυλωμένων ἀναδόσεως.

Ἐγὼ μὲν γὰρ μυριάκις ἕτι ζωντος ἐτὶ τοῦ ζῶον διελὼν τὸ περιστάτον εὐρων ἀεὶ τὰ μὲν ἐντερὰ πάντα περιστελλόμενα τοῖς ἐνυπάρχοις, τὴν κοιλίαν δ' οὖχ ἀπλῶς, ἀλλ' ἕτι μὲν ταῖς ἐδώδαις ἀνωθέν τε καὶ κάτωθεν αὐτὰ καὶ πανταχόθεν ἀκρι-
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yourself in an animal, if you will try to hit upon the time at which the descent of food from the stomach takes place. But even if you should fail to discover the time, and nothing was yet passing down, and the food was still undergoing digestion in the stomach, still even then you would find dissection not without its uses. You will observe, as we have just said, that the pylorus is accurately closed, and that the whole stomach is in a state of contraction upon the food very much as the womb contracts upon the foetus. For it is never possible to find a vacant space in the uterus, the stomach, or in either of the two bladders—that is, either in that called bile-receiving\(^1\) or in the other; whether their contents be abundant or scanty, their cavities are seen to be replete and full, owing to the fact that their coats contract constantly upon the contents—so long, at least, as the animal is in a natural condition.

Now Erasistratus for some reason declares that it is the contractions\(^2\) of the stomach which are the cause of everything—that is to say, of the softening of the food,\(^3\) the removal of waste matter, and the absorption of the food when chylified [emulsified].

Now I have personally, on countless occasions, divided the peritoneum of a still living animal and have always found all the intestines contracting peristaltically\(^4\) upon their contents. The condition of the stomach, however, is found less simple; as regards the substances freshly swallowed, it had grasped these accurately both above and below, in fact at every point, and was as devoid of movement the gross movements or structure of organs with which he concerned himself. Where an organ had no obvious function, he dubbed it "useless"; e.g. the spleen (cf. p. 143).

\(^4\) i.e. contracting and dilating; no longitudinal movements involved; cf. p. 263, note 2.
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βῶς περιεληφθαίναν ἀκίνητον, ὡς δοκεῖν ἦνόσθαι καὶ περιπεφυκέναι τοῖς στίλοις· ἐν δὲ τούτῳ καὶ τὸν πυλωρὸν εὐρισκόν ἀεὶ μεμυκότα καὶ κεκλεισµένον ἀκριβῶς ὡσπερ τὸ τῶν ύστερῶν στόμα ταῖς ἐγκύμοσιν.

Ἐπὶ μέντοι ταῖς πέψεις συμπεπληρωμέναις ἀνέφκτο μὲν ὁ πυλωρός, ἡ γαστήρ δὲ περισταλτικῶς ἐκινεῖτο παραπλησίας τοῖς ἐντέροις.

V

"Ἀπαντ' οὖν ἀλλήλοις ὁμολογεῖ ταῦτα καὶ τῇ γαστρῇ καὶ ταῖς ύστεραις καὶ ταῖς κύστεσιν εἰναὶ τινας ἐμφύτους δυνάμεις καθεκτικὰς μὲν τῶν 158 οἰκείων ποιοτήτων, || ἀποκριτικὰς δὲ τῶν ἄλλοτρῶν. ὃτι μὲν γὰρ ἐλκεὶ τὴν χολὴν εἰς ἑαυτὴν ἢ ἐπὶ τῷ ἡπατι κύστις, ἐμπροσθεν δεδεικται, ὅτι δὲ καὶ ἀποκρίνει καθ' ἐκάστην ἤμεραν εἰς τὴν γαστέρα, καὶ τούτ' ἐναργῶς φαίνεται. καὶ μὴν εἰ διεδέχετο τὴν ἐλκτικὴν δύναμιν ἢ ἐκκριτικὴ καὶ μὴ μέση τις ἄμφοι ἢν ἡ καθεκτικὴ, διὰ παντὸς ἐχρήν ἀνατεμνομένων τῶν ξύφων ἵσον πλήθος χολῆς εὐρίσκεσθαι κατὰ τὴν κύστιν" οὔ μὴν εὐρίσκεται γε. ποτὲ μὲν γὰρ πληρεστάτη, ποτὲ δὲ κενοτάτη, ποτὲ δὲ τὰς ἐν τῷ μεταξὶ διαφορὰς ἔχουσα θεωρεῖται, καθάπερ καὶ ἡ ἑτέρα κύστις ἢ τὸ ὠδὸν ὑποδεχόμενη. ταύτης μὲν γε καὶ πρὸ τῆς ἀνατομῆς αἰσθανόμεθα, πρὶν ἀνιαθήναι τῷ πλήθει βαρυνθείσαν ἡ τῇ δριμύτητι δηχθεῖσαν,

2 Book II., chaps. ii. and viii.
as though it had grown round and become united with the food.¹ At the same time I found the pylorus persistently closed and accurately shut, like the os uteri on the foetus.

In the cases, however, where digestion had been completed the pylorus had opened, and the stomach was undergoing peristaltic movements, similar to those of the intestines.

V

Thus all these facts agree that the stomach, uterus, and bladders possess certain inborn faculties which are retentive of their own proper qualities and eliminative of those that are foreign. For it has been already shown² that the bladder by the liver draws bile into itself, while it is also quite obvious that it eliminates this daily into the stomach. Now, of course, if the eliminative were to succeed the attractive faculty and there were not a retentive faculty between the two, there would be found, on every occasion that animals were dissected, an equal quantity of bile in the gall-bladder. This however, we do not find. For the bladder is sometimes observed to be very full, sometimes quite empty, while at other times you find in it various intermediate degrees of fulness, just as is the case with the other bladder—that which receives the urine; for even without resorting to anatomy we may observe that the urinary bladder continues to collect urine up to the time that it becomes uncomfortable through the increasing quantity of urine or the irritation caused by its acidity—the presumption

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ΓΑΛΕΝ

άθροιζούσης ἐτὶ τὸ σύρον, ὡς οὐσίας τινὸς κανταῦθα δυνάμεως καθεκτικῆς.

Οὐτω δὲ καὶ ἡ γαστήρ ὑπὸ δριμύτητος πολλάκις δηχθέεισα πρωιαίτερον τοῦ δέοντος ἀπεπτοῦν ἐτὶ τὴν τροφὴν ἀποτρίβεται. αὕτης δὲ ἂν ποτε τῷ πλήθει βαρυνθείσα ἢ καὶ κατὰ ἀμφῶς συνέλθοντα κακῶς διατεθείσα διαρροίαις ἐάλω. καὶ μὲν γε καὶ οἱ ἔμετοι, τῷ πλήθει βαρυνθείσης || 159 αὐτῆς ἡ τὴν ποιότητα τῶν ἐν αὐτῇ σιτίων τε καὶ περιττωμάτων μὴ φερούσης, ἄναλογον τι ταῖς διαρροίαις πάθημα τῆς ἀνω γαστρός ἑστιν. ὅταν μὲν γὰρ ἐν τοῖς κάτω μέρεσιν αὐτῆς ἡ τοιαύτη γένεται διάθεσις, ἔρρωμένων τῶν κατὰ τὸν στόμαχον, εἰς διαρροίας ἑτελεύτησιν, ὅταν δὲ ἐν τοῖς κατὰ τὸ στόμα, τῶν ἄλλων εὐρωστούντων, εἰς ἔμετοις.

VI

"Ενεστὶ δὲ καὶ τούτο πολλάκις ἐναργῶς ἰδεῖν ἐπὶ τῶν ἀποσίτων ἀναγκαζόμενοι γὰρ ἐσθειν οὕτε καταπίνειν εὐςθενούσιν οὐτ', εἰ καὶ βιασωμένο, κατέχουσιν, ἀλλ' εὔθυς ἀνεμοῦσι. καὶ οἱ ἄλλως δὲ τῶν ἔδεαμάτων πρὸς ὅτιον δυσχεραίνοντες βιάσθεντες ἐνίοτε προσάραθαι ταχέως ἑξεμοῦσιν, ἢ εἰ κατασχοιεὶν βιασάμενοι, ναυτιώδεις τ' εἰσὶ καὶ τῆς γαστρός ὕπτιας αἰσθάνονται καὶ σπευδούσῃς ἀποθέσθαι τὸ λυπότον.

Οὕτως ἔξ ἀπάντων τῶν φαινομένων, ὅπερ ἔξ ἀρχῆς ἐρρέθη, μαρτυρεῖται τὸ δεῖν ὑπάρχειν τοῖς τοῦ ζωῆς μορίοις σχεδὸν ἀπασιν ἐφεσιν μὲν τινα

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thus being that here, too, there is a retentive faculty.

Similarly, too, the stomach, when, as often happens, it is irritated by acidity, gets rid of the food, although still undigested, earlier than proper; or again, when oppressed by the quantity of its contents, or disordered from the co-existence of both conditions, it is seized with diarrhoea. Vomiting also is an affection of the upper [part of the] stomach analogous to diarrhoea, and it occurs when the stomach is overloaded or is unable to stand the quality of the food or surplus substances which it contains. Thus, when such a condition develops in the lower parts of the stomach, while the parts about the inlet are normal, it ends in diarrhoea, whereas if this condition is in the upper stomach, the lower parts being normal, it ends in vomiting.

VI

This may often be clearly observed in those who are disinclined for food; when obliged to eat, they have not the strength to swallow, and, even if they force themselves to do so, they cannot retain the food, but at once vomit it up. And those especially who have a dislike to some particular kind of food, sometimes take it under compulsion, and then promptly bring it up; or, if they force themselves to keep it down, they are nauseated and feel their stomach turned up, and endeavouring to relieve itself of its discomfort.

Thus, as was said at the beginning, all the observed facts testify that there must exist in almost all parts of the animal a certain inclination towards, or, so to
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καὶ οἶλον ὀρέξων τῆς οἰκείας ποιότητος, ἀποστροφή
160 δὲ τίνα || καὶ οἶλον μίσος τι τῆς ἀλλοτρίας. ἀλλ’ ἐφιέμενα μὲν ἐλκεῖν εὐλογοῦν, ἀποστρεφόμενα δὲ ἐκκρίνειν.

Κἂν τούτων πάλιν ἢ θ’ ἐλκτική δύναμις ἀποδείκνυται καθ’ ἀπαν ὑπάρχουσα καὶ ἡ προ-
ωτική.

'Αλλ’ εἶπερ ἔφεσιν τέ τις ἐστι καὶ ἐλείμι, εἰὴ ἄν τις καὶ ἀπολαύσις. οὐδὲν γὰρ τῶν ὄντων ἐλκεῖ τι δὲ αὐτὸ τὸ ἐλκεῖν, ἀλλ’ ἐν ἀπολαύσῃ τοῦ διὰ τῆς ὀλκῆς εὐπορισθέντος. καὶ μὴν ἀπολαῦειν οὐ δύναται μὴ κατασχόν. κἂν τούτῳ πάλιν ἢ καθεκτική δύναμις ἀποδείκνυται τῆς γένεσιν ἀναγκαλῶν ἔχουσα· σαφῶς γὰρ ἔφηται μὲν τῶν οἰκείων ποιοτήτων ἡ γαστήρ, ἀποστρέφεται δὲ τὰς ἀλλοτρίας.

'Αλλ’ εἶπερ ἔφηται τε καὶ ἐλκεῖ καὶ ἀπολαύει κατέχουσα καὶ περιστελλομένη, εἰὴ ἄν τι καὶ πέρας αὐτῆ τῆς ἀπολαύσεως κατὶ τῷ δ’ ὁ καιρὸς ἦδη τῆς ἐκκριτικῆς δυνάμεως ἐνεργοῦσης.

VII

'Αλλ’ εἰ καὶ κατέχει καὶ ἀπολαύει, κατα-
χρῆται πρὸς ὃ πέφυκε. πέφυκε δὲ τοῦ προσ-
161 ἡκοντος ἐαυτῆ || κατὰ ποιότητα καὶ οἰκείου

1 Note use of psychological terms in biology. cf. also p. 133, note 3.
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speak, an appetite for their own special quality, and an aversion to, or, as it were, a hatred of the foreign quality. And it is natural that when they feel an inclination they should attract, and that when they feel aversion they should expel.

From these facts, then, again, both the attractive and the propulsive faculties have been demonstrated to exist in everything.  

But if there be an inclination or attraction, there will also be some benefit derived; for no existing thing attracts anything else for the mere sake of attracting, but in order to benefit by what is acquired by the attraction. And of course it cannot benefit by it if it cannot retain it. 'Herein, then, again, the retentive faculty is shown to have its necessary origin: for the stomach obviously inclines towards its own proper qualities and turns away from those that are foreign to it.

But if it aims at and attracts its food and benefits by it while retaining and contracting upon it, we may also expect that there will be some termination to the benefit received, and that thereafter will come the time for the exercise of the eliminative faculty.

VII

But if the stomach both retains and benefits by its food, then it employs it for the end for which it [the stomach] naturally exists. And it exists to partake of that which is of a quality befitting and proper to

3 Galen confuses the nutrition of organs with that of the ultimate living elements or cells; the stomach does not, of course, feed itself in the way a cell does. cf. Introduction, p. xxxii.
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μεταλαμβάνειν· ὡσθ’ ἔλκει τῶν σιτίων ὅσον χρηστότατον ἀτμοδός τε καὶ κατὰ βραχὺ καὶ τούτο τοῖς ἐαυτῆς χυτώσιν ἐναποτίθεται τε καὶ προστίθεσιν. ὅταν δὲ ἱκανὸς ἐμπλησθῇ, καθά-περ ἄχθος τι τὴν λοιπὴν ἀποτίθεται τροφὴν ἐσχηκών τι χρηστὸν ἡδη καὶ αὐτὴν ἐκ τῆς πρὸς τὴν γαστέρα κοινωνίας· οὔδε γὰρ ἐνδέχεται δύο σώματα δρᾶν καὶ πάσχειν ἐπιτηδείᾳ συνελθόντα μὴ ὦκ ἦτοι πάσχειν θ’ ἀμα καὶ δρᾶν ἡ θάτερον μὲν δρᾶν, θάτερον δὲ πάσχειν. εἶν μὲν γὰρ ἰσάξῃ ταῖς δυνάμεσιν, εξ ἰσον δρᾶσει τε καὶ πείσεται, ἀν δ’ ὑπερέχῃ πολὺ καὶ κρατῇ θάτερον, ἐνεργηθεὶς περὶ τὸ πάσχον ὡστε δρᾶσει μέγα μὲν τι καὶ αἰσθητὸν, αὐτὸ δ’ ἦτοι σμικρὸν τι καὶ οὐκ αἰσθητὸν ἡ παντάπασιν οὔδεν πείσεται. ἀλλ’ ἐν τούτῳ δὴ καὶ μάλιστα διηνεγκεί φαρμάκον δηλητηρίου τροφῆς τὸ μὲν γὰρ κρατεῖ τῆς ἐν τῷ σώματι δυνάμεως, ἡ δὲ κρατεῖται.

Οὕκον τινὶ ἐνδέχεται τροφὴν μὲν εἰναί τι τῷ ζῷῳ προσήκουσαν, οὐ μὴν καὶ κρατεῖσθαι γ’ ὀμοίως 162 πρὸς τῶν || ἐν τῷ ζῷῳ ποιοτήτων τὸ κρατεῖσθαι δ’ ἦν ἀλλοιοῦσθαι. ἀλλ’ ἔπει τὰ μὲν ἰσχυρότερα ταῖς δυνάμεσιν ἐστὶ μόρια, τὰ δ’ ἀρθενέστερα, κρατήσει μὲν πάντα τῆς οἰκείαις τῷ ζῷῳ τροφῆς, οὐχ ὀμοίως δὲ πάντα· κρατήσει δ’ ἀρα καὶ ἡ γαστήρ καὶ ἀλλοιώσει μὲν τὴν τροφήν, οὐ μὴν ὀμοίως ἦπατι καὶ φλεψὶ καὶ ἀρτηρίαις καὶ καρδίᾳ.

Πόσον οὖν ἐστιν, δ’ ἀλλοιοί, καὶ δὴ θεασώμεθα· πλέον μὲν ἡ κατὰ τὸ στόμα, μεῖον δ’ ἡ κατὰ τὸ

1 cf. Asclepiades’s theory regarding the urine, p. 51.
2 The process of application or prosthesis. cf. p. 223, note 3.

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it. Thus it attracts all the most useful parts of the food in a vaporous \(^1\) and finely divided condition, storing this up in its own coats, and applying \(^2\) it to them. And when it is sufficiently full it puts away from it, as one might something troublesome, the rest of the food, this having itself meanwhile obtained some profit from its association with the stomach. For it is impossible for two bodies which are adapted for acting and being acted upon to come together without either both acting or being acted upon, or else one acting and the other being acted upon. For if their forces are equal they will act and be acted upon equally, and if the one be much superior in strength, it will exert its activity upon its passive neighbour; thus, while producing a great and appreciable effect, it will itself be acted upon either little or not at all. But it is herein also that the main difference lies between nourishing food and a deleterious drug; the latter masters the forces of the body, whereas the former is mastered by them.\(^3\)

There cannot, then, be food which is suited for the animal which is not also correspondingly subdued by the qualities existing in the animal. And to be subdued means to undergo alteration.\(^4\) Now, some parts are stronger in power and others weaker; therefore, while all will subdue the nutriment which is proper to the animal, they will not all do so equally. Thus the stomach will subdue and alter its food, but not to the same extent as will the liver, veins, arteries, and heart.

We must therefore observe to what extent it does alter it. The alteration is more than that which

\(^3\) Mutual influence of organism and environment.

\(^4\) Qualitative change. cf. Book I., chap. ii.
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HeaderText

163 Θεάσασθαι τὸ μέγεθος τῆς ἐν τῷ στόματι || τῶν σιτίων ἀλλοιώσεως, εἰ πυροῦς μασησάμενος ἐπιθείης ἀπέπτως δοθῆσιν ὡς ὁ γὰρ αὐτοὺς τάχιστα μεταβάλλοντάς τε καὶ συμπέττοντας, οὐδὲν τοιοῦτον, ὅταν ὑδατι φυραθώσιν, ἐργάζασθαι δυναμένους. καὶ μὴ θαυμάσῃς τὸ γὰρ τοι φλέγμα τουτὶ τὸ κατὰ τὸ στόμα καὶ λειχὴνων ἐστὶν ἄκος καὶ σκορπίους ἀναιρεῖ παραχρῆμα καὶ πολλὰ τῶν ἱοβόλων θηρίων τὰ μὲν εὐθέως ἀποκτείνει, τὰ δὲ ὡς ὑστεροῦ ἀπαντα γοῦν βλάπτει μεγάλως. ἄλλα τὰ μεμασημένα σιτία πρῶτον μὲν τοῦτῳ τῷ φλέγματι βέβρεκται τε καὶ πεφύραται, δεύτερον δὲ καὶ τῷ χρωτὶ τοῦ στόματος ἀπαντα πεπλησίακεν, ὡστε πλεῖονα μεταβολὴν εἰληφὲ τῶν ἐν ταῖς κεναῖς χώραις τῶν ὑδόντων ἐσφηνωμένων.

Ἀλλ᾽ ὡς τὰ μεμασημένα τούτων ἐπὶ πλέον ἠλλοιώται, τοσοῦτον ἐκεῖνων τὰ καταποθέντα.
occurs in the mouth, but less than that in the liver and veins. For the latter alteration changes the nutriment into the _substance_ of blood, whereas that in the mouth obviously changes it into a new _form_, but certainly does not completely transmute it. This you may discover in the food which is left in the intervals between the teeth, and which remains there all night; the bread is not exactly bread, nor the meat meat, for they have a smell similar to that of the animal's mouth, and have been disintegrated and dissolved, and have had the qualities of the animal's flesh impressed upon them. And you may observe the extent of the alteration which occurs to food in the mouth if you will chew some corn and then apply it to an unripe [undigested] boil: you will see it rapidly transmuting—in fact entirely digesting—the boil, though it cannot do anything of the kind if you mix it with water. And do not let this surprise you; this phlegm [saliva] in the mouth is also a cure for _lichens_¹; it even rapidly destroys scorpions; while, as regards the animals which emit venom, some it kills at once, and others after an interval; to all of them in any case it does great damage. Now, the masticated food is all, firstly, soaked in and mixed up with this phlegm; and secondly, it is brought into contact with the actual skin of the mouth; thus it undergoes more change than the food which is wedged into the vacant spaces between the teeth.

But just as masticated food is more altered than the latter kind, so is food which has been swallowed more altered than that which has been merely

¹ Apparently skin-diseases in which a superficial crust (resembling the lichen on a tree-trunk) forms—*e.g.* psoriasis.
 Gale

μὴ γὰρ οὔδὲ παραβλητῶν ἢ τὸ τῆς ὑπερβολῆς, εἰ τὸ κατὰ τὴν κοιλίαν ἐννοῆσαιμεν φλέγμα καὶ χολὴν καὶ πνεῦμα καὶ θερμασίαν καὶ ὅλην τὴν υόσιαν τῆς γαστρός. εἰ δὲ καὶ συνεπιστησαίς

164 αὐτὴ τὰ παρακείμενα διὰ σπλάγχνα καθάπερ τυφικῶς μεγάλοι πυρὸς ἑστίας πολλὰς, εἰ δεξιῶν μὲν τὸ ἡπαρ, ἦς ἀριστερῶν δὲ τῶν σπλάγχνα, τὴν καρδίαν δὲ ἐκ τῶν ἄνω, σύν αὐτῇ δὲ καὶ τὰς φρένας αἰωρούμενας τε καὶ διὰ παντὸς κινουμένας,

εἴ ἀπασί δὲ τούτοις σκέψων τὸ ἑπιπλοῦν, ἐξαισιών τινα πεισθῆναι τὴν ἀλλοίωσιν γίγνεσθαι τῶν εἰς τὴν γαστέρα καταποθέντων σιτίων.

Πῶς δὲ ἄν ἡδύνατο ῥαδίως αἰματοῦσθαι μὴ προπαρασκευασθέντα τῇ τοιαύτῃ μεταβολῇ; δεδεκται γὰρ οὐκ καὶ πρόσθεν, ὡς οὔδεν εἰς τὴν ἐναντίαν ἄθροίως μεθισταται ποιότητα. πῶς οὖν ὁ ἀρτος αἴμα γίγνεται, πῶς δὲ τὸ τεύτλον ἢ ὁ κύκλος ἢ τι τῶν ἄλλων, εἰ μὴ πρότερον των ἐτέρων ἀλλοίωσιν ἐδέξατο; πῶς δὲ ἡ κοπρος ἐν τοῖς λεπτοῖς ἐντέρους ἄθροίως γεννηθῆσαται; τί γὰρ ἐν τούτοις σφοδρότερον εἰς ἀλλοϊώσιν ἠστι τῶν κατά τὴν γαστέρα; ποτέρα τῶν χιτώνων τὸ πλήθος ἢ τῶν γευσιών σπλάγχνων ἢ περιθεσίς ἢ τῆς μονῆς ὁ χρόνος ἢ σύμφωνος τις ἐν τοῖς ὁργάνοις θερμασία; καὶ μὴν κατ' οὔδὲν τούτων πλεονεκτεῖ τὰ ἐντέρα τῆς γαστρός. τί ποτ' οὖν ἐν μὲν τῇ γαστρὶ ὑπκτός διὰ ὅλης πολλάκις μείναντα τῶν ἄρτων ἐτει φυλάττεσθαι βούλονται τὰς ἄρχαις διασφόρουντα ποιότητας, ἐπειδ' ἄπαξ ἐμπέσῃ

1 Note especially pneuma and innate heat, which practically stand for oxygen and the heat generated in oxidation. cf. p. 41, note 3.  
2 Book I., chap. x.
masticated. Indeed, there is no comparison between these two processes; we have only to consider what the stomach contains—phlegm, bile, pneuma, [innate] heat,¹ and, indeed the whole substance of the stomach. And if one considers along with this the adjacent viscera, like a lot of burning hearths around a great cauldron—to the right the liver, to the left the spleen, the heart above, and along with it the diaphragm (suspended and in a state of constant movement), and the omentum sheltering them all—you may believe what an extraordinary alteration it is which occurs in the food taken into the stomach.

How could it easily become blood if it were not previously prepared by means of a change of this kind? It has already been shown ² that nothing is altered all at once from one quality to its opposite. How then could bread, beef, beans, or any other food turn into blood if they had not previously undergone some other alteration? And how could the faeces be generated right away in the small intestine?³ For what is there in this organ more potent in producing alteration than the factors in the stomach? Is it the number of the coats, or the way it is surrounded by neighbouring viscera, or the time that the food remains in it, or some kind of innate heat which it contains? Most assuredly the intestines have the advantage of the stomach in none of these respects. For what possible reason, then, will objects have it that bread may often remain a whole night in the stomach and still preserve its original qualities, whereas when once it is projected into the

¹ That is to say, faeces are obviously altered food. This alteration cannot have taken place entirely in the small intestine: therefore alteration of food must take place in the stomach.
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toîs èntérous, eûthûs gînvesthai kóprov; ei mév
gâr ò tosouîtos xrônos âdûnatos álloioûn, ou'd' ò
brâxhûs ikanôs. ei ð' ouîs aûtârkhês, pòs ou
polû màllon o makrôs; âp' ouî álloioûtai mév
êtrofî kàtá tìn koîlián, âllhê dé tin' álloioû-
sin kai ouî oîan èk tîs fûswos ìschei toû metau-
balloûtos órgânov; ÷ tâùtnîn mév, ouî mîh tîn
y' oikeîan tî toû fîânu sómati; makrîn toû
âdûnataînterôn èstî. kai mîh ouî állo y' ÷ nh
êtphîs ÷ álloioûsin èis tîn oikeîan toû trêfomênou
poiôtt thereafter. eîpere ouî ÷ øetphî fîânu èstî kai ÷
êtrofî kàtá tìn gastéra dêdeiktau dechomênh
poiôttar tî mèllonti proûs aûtîs threphesthai xîfh
proshekousan, ikanôs apodédeiktau to pêttsethai
kàtâ tin' gastéra tîn trofîn.

Kaî gêloîos mév 'Aseklepiâðhîs ou't' èn tâis
èrneiâs lêgôn êmfaînvesthai pote tîn poiôttâ
 tôv pefthinwos sîtîwos ou't' èn tôis èmètois ou't'
166 èn tâis ânaîtômâîs: aûtô gâr dê toû sómatos
êxòzein aûtâ tîs koîliás èstî to pêpefbhâi. ÷ o' ou
ôtow ÷ estîn eun'hêsì, wast, êpeidh tîwv palaiwv
âkouî leghîntwv épî tî xhrestôv èn tî gastri
metabálleîn tâ sîtia, dokimâzêi xhêtew ou tî
kata dûnâmôn allâ tî kata gëwsw xhrestôv,
ôspere ÷ tîv mîlou mëlwadesthôv—xhî gâr
ôtow aûtîf diadégesthai—gînwmênou kata tîn
koîliân ÷ tôv mélotos melitadesthôv.

1 cf. p. 39.
2 Asclepiades held that there was no such thing as real
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intestines, it straightway becomes ordure? For, if such a long period of time is incapable of altering it, neither will the short period be sufficient, or, if the latter is enough, surely the longer time will be much more so! Well, then, can it be that, while the nutriment does undergo an alteration in the stomach, this is a different kind of alteration and one which is not dependent on the nature of the organ which alters it? Or if it be an alteration of this latter kind, yet one perhaps which is not proper to the body of the animal? This is still more impossible. Digestion was shown to be nothing else than an alteration to the quality proper to that which is receiving nourishment.¹ Since, then, this is what digestion means and since the nutriment has been shown to take on in the stomach a quality appropriate to the animal which is about to be nourished by it, it has been demonstrated adequately that nutriment does undergo digestion in the stomach.

And Asclepiades is absurd when he states that the quality of the digested food never shows itself either in eructations or in the vomited matter, or on dissection.² For of course the mere fact that the food smells of the body shows that it has undergone gastric digestion. But this man is so foolish that, when he hears the Ancients saying that the food is converted in the stomach into something "good," he thinks it proper to look out not for what is good in its possible effects, but for what is good to the taste: this is like saying that apples (for so one has to argue with him) become more apple-like [in flavour] in the stomach, or honey more honey-like!

¹ Qualitative change; the food was merely broken up into its constituent molecules, and absorbed unaltered. cf. p. 49, note 5.

²
Πολὺ δ’ εὐθὲστερός ἦστι καὶ γελοιότερος ὁ Ἑρασίστρατος ἢ μὴ νοῶν, ὅπως εἰρηται πρὸς τῶν παλαιῶν ἢ πέψις ἐψήσει παραπλήσιος ὑπάρχειν, ἢ ἕκων σοφίζομενος έαυτόν. ἐψήσει μὲν οὖν, ἐπεὶ τοῖς ἐλαφρῶς ἔχουσιν θερμασίαιν οὐκ εἰκὸς εἶναι παραπλησίαν τὴν πέψιν, ὥσπερ ἢ τὴν Ἀἴτιην δέον ὑποθεϊναι τῇ γαστρὶ ἢ ἄλλης αὐτῆς ἀλλοιώσαι τὰ σιτία μὴ δυναμένης ἢ δυναμένης μὲν ἀλλοιῶν, οὐ κατὰ τὴν ἐμφυτον δὲ θερμασίαν, ἢ γράφαν οὐσαν δηλονότι καὶ διὰ τοῦθ’ ἐψειν οὐκ ὀπτάν εἰρημένην.

Ἐχθῆ δ’ αὐτὸν, εἰπερ περὶ πραγμάτων ἀντιλέγειν ἐβούλετο, πειραθῆναι δεῖξαι μάλιστα μὲν 167 καὶ πρῶτον, ὡς οὐδὲ μεταβάλλει τὴν ἀρχὴν οὐδ’ ἀλλοιώται κατὰ ποιότητα πρὸς τῆς γαστρὸς τὰ σιτία, δεύτερον δ’, εἰπερ μὴ οἶός τ’ ἂν τοῦτο πιστώσασθαι, τὸ τὴν ἄλλοισιν αὐτῶν ἀχρηστὸν εἶναι τῷ ζόφῳ εἰ δὲ μηδὲ τούτ’ εἰχε διαβάλλειν, ἐξελεγξεῖ τὴν περὶ τὰς δραστικὰς ἀρχὰς ὑπόληψιν καὶ δεῖξαι τὰς ἐνεργείας ἐν τοῖς μορίοις οὐ διὰ τὴν ἐκ θερμοῦ καὶ ψυχροῦ καὶ ἔρημοι καὶ ὑγροὶ ποιῶν κράσιν ὑπάρχειν ἄλλα δι’ ἄλλο τι: εἰ δὲ μηδὲ τούτ’ ἐτόλμα διαβάλλειν, ἄλλ’ ὅτι γε μὴ τὸ θερμὸν ἐστὶν ἐν τοῖς ὕπω φύσεως διοικοῦμενοι τὸ τῶν ἄλλων δραστικώτατον. ἢ εἰ μήτε τούτο μήτε τῶν ἄλλων τι τῶν ἐμπροσθεν εἰχεν ἀποδεικνύναι, μὴ ληρεῖν ὀνόματι προσπαλαίοντα

1 i.e. denial of forethought in the Physis.

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Erasistratus, however, is still more foolish and absurd, either through not perceiving in what sense the Ancients said that digestion is similar to the process of \textit{boiling}, or because he purposely confused himself with sophistries. It is, he says, inconceivable that digestion, involving as it does such trifling warmth, should be related to the boiling process. This is as if we were to suppose that it was necessary to put the fires of Etna under the stomach before it could manage to alter the food; or else that, while it was capable of altering the food, it did not do this by virtue of its innate heat, which of course was moist, so that the word \textit{boil} was used instead of \textit{bake}.

What he ought to have done, if it was facts that he wished to dispute about, was to have tried to show, first and foremost, that the food is not transmuted or altered in quality by the stomach at all, and secondly, if he could not be confident of this, he ought to have tried to show that this alteration was not of any advantage to the animal.\textsuperscript{1} If, again, he were unable even to make this misrepresentation, he ought to have attempted to confute the postulate concerning \textit{the active principles}—to show, in fact, that the functions taking place in the various parts do not depend on the way in which the Warm, Cold, Dry, and Moist are mixed, but on some other factor. And if he had not the audacity to misrepresent facts even so far as this, still he should have tried at least to show that the Warm is not the most active of all the principles which play a part in things governed by Nature. But if he was unable to demonstrate this any more than any of the previous propositions, then he ought not to have made himself ridiculous by quarrelling uselessly
μάτην, ὥσπερ οὖ σάφῶς Ἄριστοτέλους ἐν τ' ἄλλοις πολλοῖς καὶ τῷ τετάρτῳ τῶν μετεωρολογικῶν ὁπως ἡ πέψις ἐψήσει παραπλήσιος εἶναι λέγεται, καὶ ὅτι μὴ πρῶτος μὴδὲ κυρίως ὅνομα-
ζόντων, εἰρηκότος.

ἀλλ', ὥς ἦδη λέλεκται πολλάκις, ἀρχὴ τούτων ἀπάντων ἔστι μία τὸ περὶ θερμοῦ καὶ ψυχροῦ καὶ ἐν τῷ νυκτὸς διασκέψασθαι, καθάπερ Ἀριστο-
τέλης ἐποίησεν ἐν τῷ δεύτερῳ περὶ γενέσεως καὶ
168 φθορᾶς, ἀπὸ δείξεις ἀπάσας τὰς κατὰ τὰ σώματα μεταβολὰς καὶ ἀλλοιώσεις ὑπὸ τούτων γίγνεσθαι. ἀλλ', Ἐρασίστρατος οὐτε τούτως οὔτ᾽ ἄλλω τινὶ
tῶν προειρημένων ἀντειπὼν ἐπὶ τοῦνομα μόνον ἐτράπητο τῆς ἐψήσεως.

VIII

Ἐπὶ μὲν οὖν τῆς πέψεως, εἰ καὶ τὰλλα πάντα παρέλιπε, τὸ γοῦν ὅτι διαφέρει τῆς ἐκτὸς ἐψήσεως ἢ ἐν τοῖς ἱερῶν πέψεις, ἐπειράθη δεικνύουσα, περὶ
de τῆς καταπόσεως οὐδ᾽ ἄχρι τοσοῦτος. τὶ γάρ
φησιν;

"Ὅλη μὲν οὖν τῆς κοιλίας οὐδὲμία φαίνεται

καὶ μὴν δύο χιτώνας ἡ γαστήρ ἔχει πάντως
ev ενεκά του γεγονότας καὶ διήκουσιν οὕτωι μέχρι
tοῦ στόματος, ὅ μὲν ἐνδον, οὗς ἐστὶ katὰ tῆν
gastērά, toioûtοs diaméνων, ὁ δὲ ἐτερος ἐπὶ τὸ
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with a mere name—as though Aristotle had not clearly stated in the fourth book of his "Meteorology," as well as in many other passages, in what way digestion can be said to be allied to boiling, and also that the latter expression is not used in its primitive or strict sense.

But, as has been frequently said already, the one starting-point of all this is a thoroughgoing enquiry into the question of the Warm, Cold, Dry and Moist; this Aristotle carried out in the second of his books "On Genesis and Destruction," where he shows that all the transmutations and alterations throughout the body take place as a result of these principles. Erasistratus, however, advanced nothing against these or anything else that has been said above, but occupied himself merely with the word "boiling."

VIII

Thus, as regards digestion, even though he neglected everything else, he did at least attempt to prove his point—namely, that digestion in animals differs from boiling carried on outside; in regard to the question of deglutition, however, he did not go even so far as this. What are his words?

"The stomach does not appear to exercise any traction."  

Now the fact is that the stomach possesses two coats, which certainly exist for some purpose; they extend as far as the mouth, the internal one remaining throughout similar to what it is in the stomach, and the other one tending to become of a more fleshy

1 v. p. 9, et passim.  
2 cf. p. 97.

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σαρκωδέστερον ἐν τῷ στομάχῳ τρεπόμενος. ὅτι μὲν οὖν ἐναντίας ἀλλήλαις τὰς ἐπιβολὰς τῶν ἱνῶν ἔχουσιν οἱ χιτώνες οὗτοι, τὸ φαινόμενον αὐτὸ μαρτυρεῖ. τίνος δὲ ἔνεκα τοιοῦτοι γεγονασιν, Ἐρασίστρατος μὲν οὖν ἐπεχείρησεν εἰπεῖν, ἥμεις δὲ ἐροῦμεν.

'Ὁ μὲν ἐνδον εὐθείας ἔχει τὰς ἱνας, ὅλης γὰρ 169 ἔνεκα γέγονεν· ὅ δὲ ἐξωθὲν ἐγκαρσίας ὑπὲρ τοῦ κατὰ κύκλον περιστελλέσθαι· ἐκάστῳ γὰρ τῶν κινουμένων ὀργάνων ἐν τοῖς σώμασι κατὰ τὰς τῶν ἱνῶν θέσεις αἱ κινήσεις εἰσίν. ἐπ' αὐτῶν δὲ πρῶτον τῶν μυῶν, εἰ βούλει, βασάνισον τὸν λόγον, ἐφ' ὦν καὶ αἱ ἱνὲς ἐναργέσταται καὶ αἱ κινήσεις αὐτῶν ὁρῶνται διὰ σφοδρότητα. μετὰ δὲ τοὺς μύς ἐπὶ τὰ φυσικὰ τῶν ὀργάνων ἵδι καὶ πάντ' ὧστε κατὰ τὰς ἱνὰς κινούμενα καὶ διὰ τοῦθ' ἐκάστῳ μὲν τῶν ἐντέρων στρογγύλαι καθ' ἐκατερον τῶν χιτώνων αἱ ἱνὲς εἰσί· περιστελλούνται γὰρ μόνον, ἐλκούσι δ' οὐδὲν. ἂ γαστὴρ δὲ τῶν ἱνῶν τὰς μὲν εὐθείας ἔχει χάριν ὅλης, τὰς δὲ ἐγκαρσίας ἔνεκα περιστολῆς· ὧστε γὰρ ἐν τοῖς μυσίν ἐκάστης τῶν ἱνῶν τεινομένης τε καὶ πρὸς τὴν ἀρχὴν ἐλκομένης αἱ κινήσεις γίνονται, κατὰ τῶν αὐτῶν λόγον καὶ τῇ γαστρὶ· τῶν μὲν οὖν ἐγκαρσίων ἱνῶν τεινομένων ἔλαττον ἀνάγκη γί-

1 It appears to me, from comparison between this and other passages in Galen's writings (notably Use of Parts, iv., 8), that he means by the "two coats" simply the mucous and the muscular coats. In this case the "straight" or "longitudinal" fibres of the inner coat would be the rugae; the "circular" fibres of the inner intestinal coat would be the valvulae conniventes.

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nature in the gullet. Now simple observation will testify that these coats have their fibres inserted in contrary directions.\(^1\) And, although Erasistratus did not attempt to say for what reason they are like this, I am going to do so.

The inner coat has its fibres straight, since it exists for the purpose of traction. The outer coat has its fibres transverse, for the purpose of peristalsis.\(^2\) In fact, the movements of each of the mobile organs of the body depend on the setting of the fibres. Now please test this assertion first in the muscles themselves; in these the fibres are most distinct, and their movements visible owing to their vigour. And after the muscles, pass to the physical organs,\(^3\) and you will see that they all move in correspondence with their fibres. This is why the fibres throughout the intestines are circular in both coats—they only contract peristaltically, they do not exercise traction. The stomach, again, has some of its fibres longitudinal for the purpose of traction and the others transverse for the purpose of peristalsis.\(^2\) For just as the movements in the muscles\(^4\) take place when each of the fibres becomes tightened and drawn towards its origin, such also is what happens in the stomach; when the transverse fibres tighten, the breadth of

\(^1\) The term here rendered peristalsis is peristolé in Greek; it is applied only to the intermittent movements of muscles placed circularly round a lumen or cavity, and comprehends systolé or contraction and diastolé or dilatation. In its modern significance, peristalsis, however, also includes the movements of longitudinal fibres. cf. p. 97, note 1.

\(^2\) i.e. those containing non-striped or "involuntary" muscle fibres; organs governed by the "natural" pneuma; cf. p. 186, note 3.

\(^3\) By this term is meant only what we should call the "voluntary" muscles.
GALEN

γνεσθαι τὸ εὗρος τῆς περιεχομένης ὑπ' αὐτῶν κοιλότητος, τῶν δ' εὐθείων ἐλκομένων τε καὶ εἰς ἑαυτὰς συναγομένων οὐκ ἐνδέχεται μὴ οὐ συναι- 170 πείσθαι τὸ μήκος. ἀλλὰ μὴν || ἑναργῶς γε φαίνεται καταπινόντων συναιρούμενον καὶ τοσούτον ὁ λάρυγξ ἀνατρέχων, ὅσον ὁ στόμαχος κατασπᾶ- ται, καὶ ὅταν γε συμπληρωθείσης τῆς ἐν τῷ καταπίνειν ἐνεργείας ἀφεθῇ τῆς τάσεως ὁ στόμα- χος, ἑναργῶς πάλιν φαίνεται καταφερόμενος ὁ λάρυγξ. ὁ γὰρ ἐνὸν χιτῶν τῆς γαστρῶς ὁ τάς εὐθείας ἱνας ἔχων ὁ καὶ τὸν στόμαχον ὑπαλείφων καὶ τὸ στόμα τοῖς ἑντὸς μέρεσιν ἐπεκτείνεται τοῦ λάρυγγος, ὡστ' οὖν ἐνδέχεται κατασπόμενον αὐτὸν ὑπὸ τῆς κοιλίας μὴ οὐ συνεπισπάσθαι καὶ τὸν λάρυγγα.

"Οτι δ' αἰ περιπερεῖς ίνες, αἰς περιστέλλεται τά τ' ἄλλα μόρια καὶ ἡ γαστήρ, οὐ συναιροῦσι τὸ μήκος, ἀλλὰ συστέλλουσι καὶ στενοῦσι τὴν εὐρύτητα, καὶ παρ' αὐτοῦ λαβεῖν ἐστιν ὀμολογοῦ- μενον 'Ερασιστράτων. περιστέλλεσθαι γὰρ φησι τοῖς σιτίοις τὴν γαστέρα κατὰ τὸν τῆς πέψεως ἀπαντα χρόνον. ἀλλ' εἰ περιστελλείται μὲν, οὐδὲν δὲ τοῦ μήκους ἀφαίρεται τῆς κοιλίας, οὐκ ἐστὶ τῆς περισταλτικῆς κινήσεως ἱδιον τὸ κατα- σπᾶν κατὸ τὸν στόμαχον. ὅπερ γὰρ αὐτὸς ὁ 'Ερασιστράτος εἶπε, τοῦτο μόνον αὐτὸ συμ-

171 βήσεται τὸ τῶν ἀνω συστελλόμενων διαστέλ- λεσθαι τὰ κάτω. τοῦτο δ' ὅτι, κἂν εἰς νεκροῦ τὸν στόμαχον ὑδατὸς ἐγχέσης, φαίνεται γιγνόμενον, οὐδεὶς ἄγνοει. ταῖς γὰρ τῶν ὑλῶν διὰ στενοῦ

1 cf. p. 97.
the cavity contained by them becomes less; and when the longitudinal fibres contract and draw in upon themselves, the length must necessarily be curtailed. This curtailment of length, indeed, is well seen in the act of swallowing: the larynx is seen to rise upwards to exactly the same degree that the gullet is drawn downwards; while, after the process of swallowing has been completed and the gullet is released from tension, the larynx can be clearly seen to sink down again. This is because the inner coat of the stomach, which has the longitudinal fibres and which also lines the gullet and the mouth, extends to the interior of the larynx, and it is thus impossible for it to be drawn down by the stomach without the larynx being involved in the traction.

Further, it will be found acknowledged in Erasistratus's own writings that the circular fibres (by which the stomach as well as other parts performs its contractions) do not curtail its length, but contract and lessen its breadth. For he says that the stomach contracts peristaltically round the food during the whole period of digestion. But if it contracts, without in any way being diminished in length, this is because downward traction of the gullet is not a property of the movement of circular peristalsis. For what alone happens, as Erasistratus himself said, is that when the upper parts contract the lower ones dilate.¹ And everyone knows that this can be plainly seen happening even in a dead man, if water be poured down his throat; this symptom² results from the passage of matter through a narrow

¹ For "symptom," cf. p. 13, and p. 12, note 3. "Transitum namque materiae per angustum corpus id accidens consequitur" (Linacre). Less a "result" or "consequence" than an "accompaniment."
σώματος ὀδοιπορίας ἄκολουθόν ἦστι τὸ σύμπτωμα. θαυμαστῶν γάρ, εἰ διερχομένου τινὸς αὐτῶν ὅγκου μὴ διασταλῆσται. οὖκοιν τὸ μὲν τῶν ἀνώ συστελλομένων διαστέλλεσθαι τὰ κάτω κοινῶν ἦστι καὶ τοῖς νεκροῖς σώμασι, δι’ ὃν ὀπωσοῦν τι διεξέρχεται, καὶ τοῖς ξώσιν, εἴτε περιστέλλοιτο τοῖς διερχομένοις εἴθε ἐλκοίτο.

Τὸ δὲ τῆς τοῦ μῆκους συναίρεσεος ἱδιον τῶν τὰς εὐθείας ἱνα ἐχόντων ὀργάνων, ἵν’ ἐπιστάσασονται τι. ἀλλὰ μὴν ἐδείχθη κατασπάζομενος ὁ στόμαχος, οὐ γὰρ ἂν ἐλκεῖ τῶν λάρυγγας. δῆλον οὖν, ὡς ἡ γαστὴρ ἐλκεῖ τὰ σιτία διὰ τοῦ στομάχου.

Καὶ ἡ κατὰ τὸν ἐμετον δὲ τῶν ἐμομένων ἀχρὶ τοῦ στόματος φορὰ πάντως μὲν ποιεῖ καὶ αὐτὴ τὰ μὲν ὑπὸ τῶν ἀναφερομένων διατεινόμενα μέρη τοῦ στομάχου διεστῶτα κέκτηται, τῶν πρόσω δ’ ὃ τι ἄν ἐκάστοτ’ ἐπιλαμβάνεται, τούτ’ ἀρχόμενον 172 διαστέλλεται, τὸ δ’ ὅπισθεν καταλείπει δηλούντι συστελλόμενον, ὡσ’ ὁμοίαν εἶναι πάντη τῆν διάθεσιν τοῦ στομάχου κατὰ γε τούτο τῇ τῶν καταπνώντων ἀλλὰ τῆς ὅλης μὴ παρούσης τὸ μῆκος ὅλων ἴσων ἐν τοῖς τοιούτοις συμπτώμασι διαφυλάττεται.

Διὰ τούτο δὲ καὶ καταπίνειν ῥᾴδιον ἦστιν ἢ ἐμεῖν, ὅτι καταπίνεται μὲν ἄμφοι τῆς γαστρὸς τῶν χυτῶν ἐνεργούντων, τοῦ μὲν ἐντὸς ἐλκούστως, τοῦ δ’ ἐκτὸς περιστελλομένου τε καὶ συνεποθοῦντος, ἐμεῖται δὲ θατέρου μόνον τοῦ ἐξωθεὶν ἐνεργοῦντος,

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1 i.e. this is a purely mechanical process.
channel; it would be extraordinary if the channel did not dilate when a mass was passing through it.\textsuperscript{1} Obviously then the dilatation of the lower parts along with the contraction of the upper is common both to dead bodies, when anything whatsoever is passing through them, and to living ones, whether they contract peristaltically round their contents or attract them.\textsuperscript{2}

Curtailment of length, on the other hand, is peculiar to organs which possess longitudinal fibres for the purpose of attraction. But the gullet was shown to be pulled down; for otherwise it would not have drawn upon the larynx. It is therefore clear that the stomach attracts food by the gullet. Further, in \textit{vomiting}, the mere passive conveyance of rejected matter up to the mouth will certainly itself suffice to keep open those parts of the oesophagus which are distended by the returned food; as it occupies each part in front \textit{[above]}, it first dilates this, and of course leaves the part behind \textit{[below]} contracted. Thus, in this respect at least, the condition of the gullet is precisely similar to what it is in the act of swallowing.\textsuperscript{3} But there being no \textit{traction}, the whole length remains equal in such cases.

And for this reason it is easier to swallow than to vomit, for deglutition results from \textit{both} coats of the stomach being brought into action, the inner one exerting a pull and the outer one helping by peristalsis and propulsion, whereas emesis occurs from the outer coat alone functioning, without there

\textsuperscript{2} \textit{i.e.} this phenomenon is a proof neither of \textit{peristolé} nor of attraction. \textit{cf.} p. 97, note 2.

\textsuperscript{3} Contraction and dilatation of course being reversed.
οὐδενὸς ἐλκοντος εἰς τὸ στόμα. οὐ γὰρ δὴ ὡσπερ ἢ τῆς γαστρὸς ὀρέξεις προηγεῖτο τοῦ καταπίνειν τὰ σιτία, τὸν αὐτὸν τρόπον κἂν τοὺς ἐμέτοις ἐπιθυμεῖ τι τῶν κατὰ τὸ στόμα μορίων τοῦ γιγνομένου παθήματος, ἀλλ’ ἁμφοῖ τῆς γαστρὸς αὐτῆς εἰσὶν ἐναντία διαθέσεις, ὀρεγομένης μὲν καὶ προσιεμένης τὰ χρήσιμα τε καὶ οἰκεία, δυσχερανυόσης δὲ καὶ ἀποτριβομένης τὰ ἀλλότρια. διὸ καὶ τὸ καταπίνειν αὐτὸ τοῦτο μὲν ἵκανως ὀρεγομένους τῶν οἰκείων ἐδεσμάτων τῇ γαστρὶ τάχιστα γίγνεται, σαφῶς ἐλκούσης αὐτὰ καὶ καταστάσεως πρὸν ἢ μαστηθῆναι, τοῖς δὲ ἤτοι φάρμακον τι κατ’ 173 ἀνάγκην πίνουσιν ἢ σιτίον ἐν χώρα ψαρμάκου προσφερομένους ἀνιαρὰ καὶ μόνις ἡ κατάποσις αὐτῶν ἐπιτελεῖται.

Δήλος οὖν ἐστὶν ἐκ τῶν εἰρημένων ὁ μὲν ἐνδον χιτῶν τῆς γαστρὸς ὁ τὰς εὐθείας ἑχων ἑώς τῆς ἐκ τοῦ στόματος εἰς αὐτὴν ὀλκῆς ἕνεκα γεγονὸς καὶ διὰ τοῦτ’ ἐν ταῖς καταπόσεις μόναις ἑνεργῶν, ὁ δ’ ἔξωθεν ὁ τὰς ἐγκαρσίας ἑχων ἑνεκα μὲν τοῦ περιστέλλεσθαι τοῖς ἐνυπάρχουσι καὶ προωθεῖν αὐτὰ τοιοῦτος ἀποτελεσθεῖς, ἑνεργῶν δ’ οὐδὲν ἦττον ἐν τοῖς ἐμέτοις ἢ ταῖς καταπόσεις. ἑναρ- γέστατα δὲ μαρτυρεῖ τῷ λεγομένῳ καὶ τὸ κατὰ τὰς χάννας τε καὶ τοὺς συνόδους γιγνόμενον εὑρίσκεται γὰρ ἐνίοτε τούτων ἡ γαστὴρ ἐν τῷ στόματι καθάπερ καὶ ὁ Ἀριστοτέλης ἐν ταῖς περὶ

1 The channa is a kind of sea-perch; “a species of Serranus, either S. scriba or S. cabrilla” (D’Arcy W. Thompson). cf. Aristotle’s Nat. Hist. (D’Arcy Thompson’s edition, Oxford, 1910), IV., xi., 538 A, 20. The synodont “is not to be identified with certainty, but is supposed to be Dentex vul.
being any kind of pull towards the mouth. For, although the swallowing of food is ordinarily preceded by a feeling of desire on the part of the stomach, there is in the case of vomiting no corresponding desire from the mouth-parts for the experience; the two are opposite dispositions of the stomach itself; it yearns after and tends towards what is advantageous and proper to it, it loathes and rids itself of what is foreign. Thus the actual process of swallowing occurs very quickly in those who have a good appetite for such foods as are proper to the stomach; this organ obviously draws them in and down before they are masticated; whereas in the case of those who are forced to take a medicinal draught or who take food as medicine, the swallowing of these articles is accomplished with distress and difficulty.

From what has been said, then, it is clear that the inner coat of the stomach (that containing longitudinal fibres) exists for the purpose of exerting a pull from mouth to stomach, and that it is only in deglutition that it is active, whereas the external coat, which contains transverse fibres, has been so constituted in order that it may contract upon its contents and propel them forward; this coat furthermore, functions in vomiting no less than in swallowing. The truth of my statement is also borne out by what happens in the case of the *channae and synodonts*; the stomachs of these animals are sometimes found in their mouths, as also Aristotle writes in his *History* garis," that is, an edible Mediterranean perch. "It is not the stomach," adds Prof. Thompson, "but the air-bladder that gets everted and hangs out of the mouth in fishes, especially when they are hauled in from a considerable depth." cf. *H. A.*, VIII., ii., 591 b, 5.
ΓΑΛΕΝ

"Εξει γὰρ οὗτοι κατὰ τὰς σφοδρότερας ὁρέξεις ἀνω προστρέχει πᾶσι τοῖς ξύφοις ἡ γαστήρ, ὡστε τινὲς τοῦ πάθους αἰσθησιν ἐναργῆ σχόντες ἐξέρπειν αὐτοῖς φασί τὴν κοιλίαν, ἐνώπιον δὲ μασω-174 μένων ἔτι καὶ μήπω || καλῶς ἐν τῷ στόματι τὰ σιτία κατεργασαμένων ἐξαρπαξεὶ φανερῶς ἄκοντων. ἐφ' ὅν ξύφων φύσει λαμψάργων ὑπαρχόντων ἢ τ' εὐρυχώρια τοῦ στομάτος ἐστὶ δαψίλης ἢ τ' τής γαστρὸς θέσις ἐγγύς, ὡς ἐπὶ συνόδοντὸς τε καὶ χάνῃς, οὐδὲν θαμμαστόν, ὅταν ἰκανῶς πεινάσαντα διώκη τι τῶν μικρότερων ἥφων, εἰτ' ἤδη πλησίον ἢ τοῦ συλλαβείν, ἀνα- τρέχειν ἐπειγούσης τῆς ἐπιθυμίας εἰς τὸ στόμα τὴν γαστήρα. γενέσθαι δ' ἄλλως ἀμήχανον τοῦτο μή οὖχ ὅσπερ διὰ χειρὸς τοῦ στομάχου τῆς γαστρὸς ἐπιστωμένης εἰς ἑαυτὴν τὰ σιτία. καθά- περ γὰρ καὶ ἡμεῖς ύπὸ προθυμίας εἴσοδο τῇ χειρὶ συνεπεκτείνομεν ὅλους ἡμᾶς αὐτοὺς ἔνεκα τοῦ θάττον ἑπιδράζονυμι τοῦ προκειμένου σώματος, οὗτῳ καὶ ἡ γαστήρ ὅλη χειρὶ τῷ στομάχῳ συνεπεκτείνεται. καὶ διὰ τοῦτ' ἐφ' ὅν ξύφων ἁμα τὰ τρία ταυτὶ συνέπεσεν, ἐφεσῖς τε σφοδρὰ τῆς τροφῆς ὁ τε στομάχως μικρὸς ἢ τ' εὐρυχώρια τοῦ στομάτου δαψίλης, ἐπὶ τούτων ὀλίγη ῥοπή τῆς ἐπεκτάσεως εἰς τὸ στόμα τὴν κοιλίαν ὅλην ἀνα- φέρει.

"Ἡρκει μὲν οὖν ἵσως ἀνδρὶ φυσικῷ παρ' αὐτῆς 175 μόνης τῆς κατασκευῆς τῶν ὀργάνων τῆν ἐνδειξίων τῆς ἐνεργείας λαμβάνειν. οὐ γὰρ δὴ μάτην γ' 270
of Animals; he also adds the cause of this: he says that it is owing to their voracity.

The facts are as follows. In all animals, when the appetite is very intense, the stomach rises up, so that some people who have a clear perception of this condition say that their stomach "creeps out" of them; in others, who are still masticating their food and have not yet worked it up properly in the mouth, the stomach obviously snatches away the food from them against their will. In those animals, therefore, which are naturally voracious, in whom the mouth cavity is of generous proportions, and the stomach situated close to it (as in the case of the synodont and channa), it is in no way surprising that, when they are sufficiently hungry and are pursuing one of the smaller animals, and are just on the point of catching it, the stomach should, under the impulse of desire, spring into the mouth. And this cannot possibly take place in any other way than by the stomach drawing the food to itself by means of the gullet, as though by a hand. In fact, just as we ourselves, in our eagerness to grasp more quickly something lying before us, sometimes stretch out our whole bodies along with our hands, so also the stomach stretches itself forward along with the gullet, which is, as it were, its hand. And thus, in these animals in whom those three factors co-exist—an excessive propensity for food, a small gullet, and ample mouth proportions—in these, any slight tendency to movement forwards brings the whole stomach into the mouth.

Now the constitution of the organs might itself suffice to give a naturalist an indication of their functions. For Nature would never have purpose-
ἀν ἡ φύσις ἐκ δυοῖν χιτώνων ἐναντίως ἄλληλοις ἐχόντων ἄπειρογάσατο τοῦ οἰσοφάγου, εἰ μὴ καὶ διαφόρως ἐκάτερος αὐτῶν ἐνεργείν ἐμελλεν. ἀλλ’ ἐπεὶ πάντα μᾶλλον ἢ τὰ τῆς φύσεως ἔργα διαγνωσκειν οἱ περὶ τῶν Ἕρασιστράτων εἰσιν ἰκανοὶ, φέρε κάκ τῆς τῶν ζῴων ἀνατομῆς ἐπι- δείχωμεν αὐτοῖς, ὡς ἐκάτερος τῶν χιτώνων ἐνεργεῖ τὴν εἰρημένην ἐνεργείαν. εἰ δὴ τι λαβὼν ζῴων, εἶτα γνωσώσας αὐτοῦ τὰ περικείμενα τῷ στομάχῳ σώματα χωρίς τοῦ διατεμείν τινα τῶν νεύρων ἢ τῶν ἀρτηριῶν ἢ τῶν φλεβῶν τῶν αὐτοὶ τεταγμένων ἐθέλοις ἀπὸ τῆς γένους ἐως τοῦ θώρακος εὐθείας τομαίς διελεῖν τὸν ἐξω χιτῶνα τοῦ τάς ἐγκαρσίας ἰναὶ ἑχούσα κάπειτα τῷ ζῷῳ τροφῆν προσενέγκοις, ὅσοι καταπίνοντα αὐτὸ καίτοι τῆς περισταλτικῆς ἐνεργείας ἀπολογούνιας. εἰ δ’ αὐτό πάλιν ἐφ’ ἐτέρου ζῷου διατέμοις ἀμφότερους τοὺς χιτῶνας τομαίς ἐγκαρσίας, θέσῃ καὶ τοῦτο καταπίνον ὁὐκέτ’ ἐνεργοῦντο τοῦ ἐντός. δὴ δῆλον, ὅτι καὶ διὰ θατέρου μὲν αὐτῶν καταπίνειν οἷον ὑπὸ τ’ ἐστίν, || ἀλλὰ χείρον ἢ δὴ ἀμφότερον. πρὸς γὰρ αὐτὸ τοῖς ἀλλοις καὶ τούτ’ ἐστὶ θεάσασθαι σαφῶς ἐπὶ τῆς εἰρημένης ἀνατομῆς, ὡς ἐν τῷ καταπίνειν ὑποπίππλαται πνεύματος οἱ στόμαχος τοῦ συγκαταπινομένου τοῖς σιτίοις, ὁ περιστελλο- μένου μὲν τοῦ ἑξωθεν χιτῶνος ὑθεὶται ῥαδίως εἰς τὴν γαστέρα σῷν τοῖς ἐδέσμασι, μόνον δὲ τοῦ ἐνδον ὑπάρχοντος ἐμποδῶν ἴσταται τῇ φορᾷ τῶν

1 Under the term “neura,” tendons were often included as well as nerves. Similarly in modern Dutch the word zenuw (“sinew”) means both a tendon and a nerve; zenuwachtig = “nervous.”

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lessly constructed the oesophagus of two coats with contrary dispositions; they must also have each been meant to have a different action. The Erasistratian school, however, are capable of anything rather than of recognizing the effects of Nature. Come, therefore, let us demonstrate to them by animal dissection as well that each of the two coats does exercise the activity which I have stated. Take an animal, then; lay bare the structures surrounding the gullet, without severing any of the nerves, arteries, or veins which are there situated; next divide with vertical incisions, from the lower jaw to the thorax, the outer coat of the oesophagus (that containing transverse fibres); then give the animal food and you will see that it still swallows although the peristaltic function has been abolished. If, again, in another animal, you cut through both coats with transverse incisions, you will observe that this animal also swallows although the inner coat is no longer functioning. From this it is clear that the animal can also swallow by either of the two coats, although not so well as by both. For the following also, in addition to other points, may be distinctly observed in the dissection which I have described—that during deglutition the gullet becomes slightly filled with air which is swallowed along with the food, and that, when the outer coat is contracting, this air is easily forced with the food into the stomach, but that, when there only exists an inner coat, the air impedes the conveyance of

2 Rather than the alternative reading, τὸν ἐσωθὲν χιτώνα. Galen apparently supposes that the outer coat will not be damaged, as the cuts will pass between its fibres. These cuts would be, presumably, short ones, at various levels, no single one of them involving the whole circumference of the gullet.
σιτίων διατείνον τι αὐτὸν καὶ τὴν ἐνέργειαν ἐμποδίζουν.

'Αλλ' οὔτε τούτων οὔδ' ἔρασιστρατος εἴπεν οὔθ' ὡς ἡ σκολια θέσις τοῦ στομάχου διαβάλλει σαφῶς τὸ δόγμα τῶν νομιζόντων ὑπὸ τῆς ἀνωθέν βολῆς· μόνης ποδηγούμενα μέχρι τῆς γαστρὸς ἑναι τὰ καταπίνομενα. μόνον δ' ὅτι πολλὰ τῶν μακροτραχήλων ζώων ἐπικεκυφώτα καταπίνει, καλῶς εἶπεν. ὃ δὴλον, ὅτι τὸ φαινόμενον οὐ τὸ πῶς καταπίνομεν ἀποδείκνυσιν, ἀλλὰ τὸ πῶς οὐ καταπίνομεν· ὅτι γὰρ μὴ διὰ μόνης τῆς ἀνωθέν βολῆς, ἐκ τοῦτον δὴλον· οὐ μὴν εἴθ' ἐλκούσης τῆς κοιλίας εἴτε παράγωντος αὐτὰ τοῦ στομάχου, 177 δὴλον ἡδὴ τῶ. ἀλλ' ἤμεις γε || πάντας τοὺς λογισμοὺς εἴποντες τοὺς τ' ἐκ τῆς κατασκευῆς τῶν ὀργάνων ὀρμωμένους καὶ τοὺς ἀπὸ τῶν ἄλλων συμπτωμάτων τῶν τε πρὸ τοῦ γυμνωθῆναι τὸν στόμαχον καὶ γυμνωθέντος, ὡς ὅλῳς πρόσθεν ἐλέγομεν, ἰκανῶς ἐνεδειξάμεθα τοῦ μὲν ἔλκειν ἑνεκα τὸν ἑντὸς χιτῶνα, τοῦ δ' ἀπωθεῖν τὸν ἐκτὸς γεγονέναι.

Προύθεμεθα μὲν οὖν ἀποδέιξαι τὴν καθεκτικῆν δύναμιν ἐν ἐκάστῳ τῶν ὀργάνων οὖσαν, ὡσπερ ἐν τῷ πρόσθεν λόγῳ τὴν ἐλκτικῆν τε καὶ προσέτι τὴν ἄλλοιωτικῆν. ὑπὸ δὲ τῆς ἀκολουθίας τοῦ λόγου τὰς τέταρτας ἀποδείξαμεν ὑπαρχοῦσας τῇ γαστρί, τὴν ἐλκτικῆν μὲν ἐν τῷ καταπίνειν, τὴν καθεκτικὴν δ' ἐν τῷ πέττειν, τὴν ἄπωστικὴν δ' ἐν τοῖς ἐμέτοις καὶ ταῖς τῶν πεπεμμένων σιτίων εἰς τὸ λεπτὸν ἐντερον ὑποχωρήσειν, αὐτὴν δὲ τὴν πέψιν ἀλλοίωσιν ὑπάρχειν.

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food, by distending this coat and hindering its action.

But Erasistratus said nothing about this, nor did he point out that the oblique situation of the gullet clearly confutes the teaching of those who hold that it is simply by virtue of the impulse from above that food which is swallowed reaches the stomach. The only correct thing he said was that many of the long-necked animals bend down to swallow. Hence, clearly, the observed fact does not show how we swallow but how we do not swallow. For from this observation it is clear that swallowing is not due merely to the impulse from above; it is yet, however, not clear whether it results from the food being attracted by the stomach, or conducted by the gullet. For our part, however, having enumerated all the different considerations—those based on the constitution of the organs, as well as those based on the other symptoms which, as just mentioned, occur both before and after the gullet has been exposed—we have thus sufficiently proved that the inner coat exists for the purpose of attraction and the outer for the purpose of propulsion.

Now the original task we set before ourselves was to demonstrate that the retentive faculty exists in every one of the organs, just as in the previous book we proved the existence of the attractive, and, over and above this, the alterative faculty. Thus, in the natural course of our argument, we have demonstrated these four faculties existing in the stomach—the attractive faculty in connection with swallowing, the retentive with digestion, the expulsive with vomiting and with the descent of digested food into the small intestine—and digestion itself we have shown to be a process of alteration.
IX

Οὐκ οὖν ἢ ἀπορήσομεν οὐδὲ περὶ τοῦ σπληνός, εἰ ἐκεῖ μὲν τὸ οἰκεῖον, ἀποκρίνει δὲ τὸ ἀλλότριον, ἀλλοιοῦν δὲ καὶ κατέχειν, ὅσον ἂν ἐπιστάσηται, πέφυκεν, οὐδὲ περὶ ἦπατος ἢ φλεβός ἢ ἀρτηρίας 178 ἢ καρδίας ἢ τῶν ἄλλων τινός. ἀναγκαῖα γὰρ ἐδείχθησαν αἱ τέτταρες αὐτὰς δυνάμεις ἀπαντήμορφῳ τῷ μέλλοντι θρέψεσθαι καὶ διὰ τούτῳ αὐτὰς ὑπηρετικὰς εἴναι θρέψεως ἐφαρμονίζω—ὡς γὰρ τὸ τῶν ἀνθρώπων ἀποστάτημα τοῖς κυστὶς ἦδιστον, οὕτω καὶ τὰ τοῦ ἦπατος περιπτώματα τὸ μὲν τῷ σπληνί, τὸ δὲ τῇ χοληθόρῳ κύστει, τὸ δὲ τοῖς νεφροῖς οἰκεῖον.

X

Καὶ λέγειν ἢ τό περὶ τῆς τούτων γενέσεως οὐκ ἂν ἐθέλωμι μεθ’ Ἱπποκράτην καὶ Πλάτωνα καὶ Ἀριστοτέλην καὶ Διοκλέα καὶ Πραξιγόραν καὶ Φιλότιμον· οὐδὲ γὰρ οὐδὲ περὶ τῶν δυνάμεων ἐποιοῦν ἂν, εἰ τις τῶν ἐμπροσθεν ἀκριβῶς ἔξειργάζον μετέπερ αὐτῶν λόγων.

'Επει δ’ οἱ μὲν παλαιοὶ καλῶς ὑπὲρ αὐτῶν ἀποφηνάμενοι παρέλιπον ἀγωνίσασθαι τῷ λόγῳ, μηδ’ ὑπονοήσαντες ἔσσθαι τίνας εἰς τοσοῦτον ἀναισχύντους σοφιστάς, ὡς ἀντιλέγειν ἐπιχειρήσας τοῖς ἐναργέσιν, οἱ νεώτεροι δὲ τὸ μὲν τι

1 cf. p. 205.

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IX

Concerning the spleen, also, we shall therefore have no further doubts as to whether it attracts what is proper to it, rejects what is foreign, and has a natural power of altering and retaining all that it attracts; nor shall we be in any doubt as to the liver, veins, arteries, heart, or any other organ. For these four faculties have been shown to be necessary for every part which is to be nourished; this is why we have called these faculties the handmaids of nutrition. For just as human faeces are most pleasing to dogs, so the residual matters from the liver are, some of them, proper to the spleen, others to the gall-bladder, and others to the kidneys.

X

I should not have cared to say anything further as to the origin of these [surplus substances] after Hippocrates, Plato, Aristotle, Diocles, Praxagoras, and Philotimus, nor indeed should I even have said anything about the faculties, if any of our predecessors had worked out this subject thoroughly.

While, however, the statements which the Ancients made on these points were correct, they yet omitted to defend their arguments with logical proofs; of course they never suspected that there could be sophists so shameless as to try to contradict obvious facts. More recent physicians, again, have been

2 Thus Galen elsewhere calls the spleen a mere emunctory (ἐκμαγεῖον) of the liver. cf. p. 214, note 1.
nikaþéntes úpò tôn sofistmatwv épéíðhæsan aútoûs, to de ti kai anuilegei epixeirhæantes ãpodeiæw mou polû tìs tôn palaiwv ëodoxwv dunã-179 meww, || dià toûth', òws an ekeiæwv aútòv, eûper et' ëv tiws, aûnovásaæwâi mou dokei pròs toûs anatpé- pountas tìs tékhìs tà kàllìsta, kai aútòs ouwos épexraðhìn sundeínai toûs lògonwv.

"Oti ð' ë ouðèn ë pantaþàœin ánûsw ti smik- rûw, ouk aûnovod' pámpollà gær eûrískw teðèwsw mên ãpodeideigména toûs palaiwos, ouwte de suñeta toûs polloûs tûn wûn ði aûmabhiân all' ou'd' épixeiroûmena ëgynoûkeðhæi dià ràðhûmûn, ou't', eî kai ëgynoûkeðhì tivì, dikaios ëxetaxómena.

Xrhì gær toû ìélloûnta ëgynoûkeðhæi ti tûn pol- lûw aûmeiun eûðûs mûn kai tì fûswae kai tì prôwth dìdaskalìa polû tûwv ëlluwv ëiðeðhæiw' épexdañ de gënhetai meirakion, ãlûtheias tîwà ëcheië ërow- tikhì ìwânìan, ðôswper ëvthoniðìnta kai mûð' ëméras mîte wûktòs diàleîpeww spondeðantà te kai suñte- támënw ëkmabhæw, òswa toûs ënðoëtatósws ëyrhetai tûwv palaiwv' épexdañ ð' ëkmabhì, krîwew aútâ kai bâsanîzæwì xrhòsw pámpûlla kai ñkopëw, pòsa mnè ëmoloûgei toûs ënvarhìs ëfàwmemëños, 180 pòsa de diâfëretai, || kai ouwto tà mnè aûreiêswa, tà ð' ìpòstêreðhæi. tìf mnè dh' tòouûtw páwv sfôðra ëhrhìmûw ëtíwka toûs ëmetêroûs ëse-
ON THE NATURAL FACULTIES, III. x

partly conquered by the sophistries of these fellows and have given credence to them; whilst others who attempted to argue with them appear to me to lack to a great extent the power of the Ancients. For this reason I have attempted to put together my arguments in the way in which it seems to me the Ancients, had any of them been still alive, would have done, in opposition to those who would overturn the finest doctrines of our art.

I am not, however, unaware that I shall achieve either nothing at all or else very little. For I find that a great many things which have been conclusively demonstrated by the Ancients are unintelligible to the bulk of the Moderns owing to their ignorance—nay, that, by reason of their laziness, they will not even make an attempt to comprehend them; and even if any of them have understood them, they have not given them impartial examination.

The fact is that he whose purpose is to know anything better than the multitude do must far surpass all others both as regards his nature and his early training. And when he reaches early adolescence he must become possessed with an ardent love for truth, like one inspired; neither day nor night may he cease to urge and strain himself in order to learn thoroughly all that has been said by the most illustrious of the Ancients. And when he has learnt this, then for a prolonged period he must test and prove it, observing what part of it is in agreement, and what in disagreement with obvious fact; thus he will choose this and turn away from that. To such an one my hope has been that my treatise would prove of the very greatest assistance. . . .
ὅσα λόγους· ἐλεύθεραν ἠγάπησαν υἱοὶ τοῖς ἄλλοις οὖν γενήσται τὸ γράμμα περιτον, ὡς εἰ καὶ μύθον δύνατ' τις λέγοι.

X I

Συμπεραντεύον οὖν ἡμῖν τὸν λόγον ἑνεκα τῶν τῆς ἀληθείας ἐφιμένων δοσα λείπει καὶ αὐτὸν ἔτι προσθείσιν. ὡς γὰρ ἡ γαστὴρ ἐλκει μὲν ἐναργῶς καὶ καταστὰ τὰ σιτία τοῖς σφόδρα πεινώδεσι, πρὶν ἀκριβῶς ἐν τῷ στόματι λειωθήναι, δυσχεραίνει δὲ καὶ ἀπωθεῖται τοῖς ἀποσίτοις τε καὶ πρὸς ἀνάγκην ἐσθίουσιν, οὕτω καὶ τῶν ἄλλων ὀργάνων ἐκαστὸν ἀμφότερα ἔχει τὰς δυνάμεις, τὴν τε τῶν οἰκείων ἐλεκτικὴν καὶ τὴν τῶν ἀλλοτρίων ἀποκριτικὴν. καὶ διὰ τοῦτο, κἂν εἴ ἐνὸς ἢ χείτων ὀργανόν τι συνεστῶς, ὥσπερ καὶ αἱ κύστεις ἀμφότεραι καὶ αἱ μήτραι καὶ αἱ φλέβες, ἀμφότερα τῶν ἰνῶν ἔχει τὰ γένη, τῶν εὐθείων τε καὶ τῶν ἐγκαρσῶν.

181 Καὶ μὲν γε καὶ τρίτον τι ἡ γένος ἰνῶν ἐστὶ τῶν λοξῶν, ἔλαττον πολὺ τῷ πλῆθει τῶν προειρήμενων δύο γενῶν. εὐρίσκεται δ' ἐν μὲν τοῖς ἐκ δυοῖν χιτώνων συνεστηκόσιν ὀργάνοις ἐν θατέρῳ μόνῳ ταῖς εὐθείαις Ἕσσων ἀναμεμμεγένους, ἐν δὲ τοῖς εἴ ἐνὸς ἀμα τοῖς ἀλλοίς ὑπὸ γένεσι. συνεπιλαμβάνουσι δ' αὐταὶ μέγιστον τῷ τῆς καθεκτικῆς ὀνομασθείσης δυνάμεως ἐνεργείας. δεῖται γὰρ ἐν τούτῳ τῷ χρόνῳ πανταχόθεν ἐσφίγγχθαι καὶ περιτετάσθαι τοῖς εὐνυπάρχουσι τῷ μόριον, ἢ

1 cf. p. 269.
ON THE NATURAL FACULTIES, III. x.—xi

Still, such people may be expected to be quite few in number, while, as for the others, this book will be as superfluous to them as a tale told to an ass.

XI

For the sake, then, of those who are aiming at truth, we must complete this treatise by adding what is still wanting in it. Now, in people who are very hungry, the stomach obviously attracts or draws down the food before it has been thoroughly softened in the mouth, whilst in those who have no appetite or who are being forced to eat, the stomach is displeased and rejects the food. And in a similar way each of the other organs possesses both faculties—that of attracting what is proper to it, and that of rejecting what is foreign. Thus, even if there be any organ which consists of only one coat (such as the two bladders, the uterus, and the veins), it yet possesses both kinds of fibres, the longitudinal and the transverse.

But further, there are fibres of a third kind—the oblique—which are much fewer in number than the two kinds already spoken of. In the organs consisting of two coats this kind of fibre is found in the one coat only, mixed with the longitudinal fibres; but in the organs composed of one coat it is found along with the other two kinds. Now, these are of the greatest help to the action of the faculty which we have named retentive. For during this period the part needs to be tightly contracted and stretched over its contents at every point—the

2 The urinary bladders of pigs (such as Galen dissected) are thin, and appear to have only one coat.
μὲν γαστήρ ἐν τῷ τῆς πέψεως, οἱ μῆτραι δ' ἐν τῷ τῆς κυόσεως χρόνῳ παντὶ.

Ταύτ' ἄρα καὶ ὁ τῆς φλέβων χυτῶν εἰς ὁν ἐκ πολυειδῶν ἵνων ἐγένετο καὶ τῶν τῆς ἀρτηρίας οἱ μὲν ἔξωθεν ἐκ τῶν στρογγύλων, ὁ δ' ἔσωθεν ἐκ μὲν τῶν εὐθεῖων πλείστων, οἷον δὲ τινών συν αὐταῖς καὶ τῶν λοξῶν, ὡστε τὰς μὲν φλέβας ταῖς μῆτραις καὶ ταῖς κύστεσιν ἐσώκειν κατὰ γε τὴν τῶν ἵνων σύνθεσιν, εἰ καὶ τῷ πάχει λείπονται, ταῖς δ' ἀρτηρίας τῇ γαστρί. μόνα δὲ πάντων ὀργάνων ἐκ δυοῖν θ' ἀμα καὶ ἀμφοτέρων ἐγκαρσίας ἐκούστων τὰς ἴνας ἐγένετο τὰ ἑνετα. τὸ δ' ὅτι

βέλτιον ἦν || τῶν τ' ἄλλων ἐκάστῳ τοιούτῳ τῆς φύσιν ὑπάρχειν, οἰόνυτε καὶ νῦν ἔστι, τοῖς τ' ἑνετέροις ἐκ δυοῖν ὀμοίων χυτῶν συγκεῖσθαι, τῆς περὶ χρείας μορίων πραγματείας ἐστίν. οὐκούν νῦν χρῆ ποθεῖν ἀκούειν περὶ τῶν τοιοῦτων, ὡσπερ ούδ' ἀπα τῇ περὶ τοῦ πλήθους τῶν χυτῶν ἐκάστου τῶν ὀργάνων διαπεφώνηται τοῖς ἀνατομικοῖς ἀνδράσιν. ὑπὲρ μὲν γὰρ τούτων αὐτάρκειας ἐν τοῖς περὶ τῆς ἀνατομικῆς διαφωνίας εἰρηται· περὶ δὲ τοῦ διότι τοιοῦτον ἐκαστον ἐγένετο τῶν ὀργάνων, ἐν τοῖς περὶ χρείας μορίων εἰρήσεται.

XII

Νῦν δ' οὐδέτερον τοῦτων πρόκειται λέγειν, ἀλλὰ τὰς φυσικὰς δυνάμεις μόνας ἀποδεικνύειν ἐν ἐκαστῷ τῶν ὀργάνων τετταρας ὑπαρχούσας. ἐπὶ τούτῳ οὖν πάλιν ἐπανελθόντες ἀναμνησθεῖσαν τε

1 cf. p. 243.
2 My suggestion is that Galen refers to (1) the mucous
stomach during the whole period of digestion,\(^1\) and the uterus during that of gestation.

Thus too, the coat of a vein, being single, consists of various kinds of fibres; whilst the outer coat of an artery consists of circular fibres, and its inner coat mostly of longitudinal fibres, but with a few oblique ones also amongst them. Veins thus resemble the uterus or the bladder as regards the arrangement of their fibres, even though they are deficient in thickness; similarly arteries resemble the stomach. Alone of all organs the intestines consist of two coats of which both have their fibres transverse.\(^2\) Now the proof that it was for the best that all the organs should be naturally such as they are (that, for instance, the intestines should be composed of two coats) belongs to the subject of the use of parts; thus we must not now desire to hear about matters of this kind nor why the anatomists are at variance regarding the number of coats in each organ. For these questions have been sufficiently discussed in the treatise "On Disagreement in Anatomy." And the problem as to why each organ has such and such a character will be discussed in the treatise "On the Use of Parts."

XII

It is not, however, our business to discuss either of these questions here, but to consider duly the natural faculties, which, to the number of four, exist in each organ. Returning then, to this point, let us coat, with its valvulae conniventes, and (2) the muscular coat, of which the chief layer is made up of circular fibres. cf. p. 262, note 1.\(^3\) Or utility.
τῶν ἔμπροσθεν εἰρημένων ἐπιθώμεν τε κεφαλὴν ἤδη τῷ λόγῳ παντὶ τὸ λείπον ἐτὶ προσθέντες. ἐπειδὴ γὰρ ἐκαστὸν τῶν ἐν τῷ ζῷῳ μορίων ἐλλειψὶν εἰς ἕαυτό τὸν οἱκείον χυμὸν ἀποδέδεικται καὶ πρώτῃ σχεδὸν αὐτῇ τῶν φυσικῶν ἐστὶ δυνάμεων,

183 ἐφεξῆς ἢ ἐκείνῳ γνωστέον, ὅσιο πρῶτον ἀποτρίβεται τὴν ἐλκυθείσαιν <τροφὴν> ἦτοι σύμπασαν ἢ καὶ τι περίττωμα αὐτῆς, πρὶν ἄν εἰς ἐναντίαν μεταπέσῃ διάθεσιν ἢ αὐτὸ τὸ ὄργανον ἢ καὶ τῶν περιεχομένων ἐν αὐτῷ τὰ πλείστα. ἡ μὲν οὖν γαστὴρ, ἐπειδὰν μὲν ἰκανῶς ἐμπληθῇ τῶν σιτίων καὶ τὸ χροστότατον αὐτῶν εἰς τοὺς ἐαυτῆς χυτῶν ἐναπόθηται βδάλλουσα, τηνικαύτη ἢ δὴ τὸ λοιπὸν ἀποτρίβεται καθάπερ ἀχθος ἀλλότριον· αἱ κύστεσις δ’, ἐπειδὰν ἐκαστὸν τῶν ἐλκυθεῖτων ἢ τῷ πληθεὶ διατείνον ἡ τῇ ποιότητι δάκνον ἁναράν γένοται.

Τῷ δὲ αὐτῷ τρόπῳ καὶ αἱ μὴ τραί. ἦτοι γάρ, ἐπειδὰν μηκετί φέρωσι διατεϊνόμεναι, τὸ λυπτοῦν ἀποθέσθαι σπεύδουσιν ἢ τῇ ποιότητι δακνόμεναι τῶν ἐκχυθεῖτων εἰς αὐτὰς ύγρῶν. ἐκάτερον δὲ τῶν εἰρημένων γίγνεται μὲν καὶ βιαίως ἐστίν ὅτε καὶ ἀμβλώσκουσι τηνικαύτα, γίγνεται δ’ ὡς τὰ πολλὰ καὶ προσηκόντως, ὅπερ οὐκ ἀμβλώσκειν ἀλλ’ ἀποκύσκειν τε καὶ τίκτειν ὑνομάζεται. τοῖς μὲν οὖν ἀμβλωθριδίοις φαρμάκοις ἢ τοιού ἄλλοις 184 παθήμασι διαφθείρουσι τὸ ἐμβρυών ἢ τῶν ύμενων αὐτοῦ ῥηγνύσσων αἱ ἀμβλώσεις ἐπονται, οὔτω δὲ κατειδάν ἀνιαθῶσι ποθ’ αἱ μὴ τραί κακῶς ἔχουσι τῇ διατάσει, ταῖς δὲ τῶν ἐμβρυών αὐτῶν κινήσεις ταῖς σφοδροτάταις οἱ τόκοι, καθάπερ καὶ τοῦθ’ Ἰπποκράτει καλῶς ἐφηταί. κοινὸν δ’ 284
recall what has already been said, and set a crown to the whole subject by adding what is still wanting. For when every part of the animal has been shewn to draw into itself the juice which is proper to it (this being practically the first of the natural faculties), the next point to realise is that the part does not get rid either of this attracted nutriment as a whole, or even of any superfluous portion of it, until either the organ itself, or the major part of its contents also have their condition reversed. Thus, when the stomach is sufficiently filled with the food and has absorbed and stored away the most useful part of it in its own coats, it then rejects the rest like an alien burden. The same happens to the bladders, when the matter attracted into them begins to give trouble either because it distends them through its quantity or irritates them by its quality.

And this also happens in the case of the uterus; for it is either because it can no longer bear to be stretched that it strives to relieve itself of its annoyance, or else because it is irritated by the quality of the fluids poured out into it. Now both of these conditions sometimes occur with actual violence, and then miscarriage takes place. But for the most part they happen in a normal way, this being then called not miscarriage but delivery or parturition. Now abortifacient drugs or certain other conditions which destroy the embryo or rupture certain of its membranes are followed by abortion, and similarly also when the uterus is in pain from being in a bad state of tension; and, as has been well said by Hippocrates, excessive movement on the part of the embryo itself brings on labour. Now
GREEK TEXT: Galen, on the topic of repose and sleep, discusses the various factors that contribute to restful sleep. He mentions the importance of the environment, the state of mind, and physical conditions. Galen emphasizes the role of the soul in achieving a peaceful state. He argues that the body and soul must be in harmony for true rest to be achieved. The text reflects Galen's comprehensive approach to medicine, integrating physiology, psychology, and philosophy.
pain is common to all these conditions, and of this there are three possible causes—either excessive bulk, or weight, or irritation; bulk when the uterus can no longer support the stretching, weight when the contents surpass its strength, and irritation when the fluids which had previously been pent up in the membranes, flow out, on the rupture of these, into the uterus itself, or else when the whole foetus perishes, putrefies, and is resolved into pernicious ichors, and so irritates and bites the coat of the uterus.

In all organs, then, both their natural effects and their disorders and maladies plainly take place on analogous lines, some so clearly and manifestly as to need no demonstration, and others less plainly, although not entirely unrecognizable to those who are willing to pay attention.

Thus, to take the case of the stomach: the irritation is evident here because this organ possesses most sensibility, and among its other affections those producing nausea and the so-called heartburn clearly demonstrate the eliminative faculty which expels foreign matter. So also in the case of the uterus and the urinary bladder; this latter also may be plainly observed to receive and accumulate fluid until it is so stretched by the amount of this as to be incapable of enduring the pain; or it may be the quality of the urine which irritates it; for every superfluous substance which lingers in the body must obviously putrefy, some in a shorter, and some in a longer time, and thus it becomes pungent, acrid, and burdensome to the organ which contains it. This

1 Relationship between physiology and pathology again emphasized. cf. p. 188, note 2.

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ΕΠΙ ΓΕ ΤΗΣ ΕΠΙ ΤΩ ΉΠΑΤΙ ΚΥΣΤΕΩΣ ὈΜΟΙΩΣ ΕΧΕΙ·
Ω ΔΗΛΟΝ, ΌΤΙ ΝΕΥΡΩΝ ΉΚΙΣΤΑ ΜΕΤΕΧΕΙ. ΧΡΗ ΔΕ
ΚΑΝΤΑΒΑ ΤΟΝ ΓΕ ΦΥΣΙΚΟΝ ἈΝΔΡΑ ΤΟ ΑΝΑΛΟΥΝ
ἘΞΕΥΡΙΣΚΕΙΝ. ΕΙ ΓΑΡ ΕΛΚΕΙΝ ΤΕ ΤΩΝ ΟΙΚΕΙΟΝ ἈΠΕ-
ΔΕΙΧΘΗ ΧΥΜΟΝ, ΌΣ ΦΑΙΝΕΣΘΑΙ ΠΟΛΛΑΚΙΣ ΜΕΣΤΗΝ,
186 ἈΠΟΚΡΙΣΙΕΝ ΤΕ ΤΟΝ ΑΥΤΟΝ ΤΟΥΤΟΝ ΟΥΚ ΕΙΣ ΜΑΚΡΑΝ,
ἈΝΑΓΚΑΙΟΝ ἙΣΤΙΝ ΑΥΤῗΝ Ἡ ΔΙΑ ΤΟ ΠΛΗΘΟΣ ΒΑΡΥΝΟ-
ΜΕΝΗΝ Ἡ ΤΗΣ ΠΟΙΟΤΗΤΟΣ ΜΕΤΑΒΑΛΛΟΥ Stuttgart ἘΠΙ ΤΟ
ΔΑΚΝΩΔΕΣ ΤΕ ΚΑΙ ΔΡΜΥ ΤΗΣ ἈΠΟΚΡΙΣΙΩΝ ΕΦΙΕΣΘΑΙ.
ΟΥ ΓΑΡ ΔΗ ΤΑ ΜΕΝ ΣΙΤΙΑ ΤΗΝ ΑΡΧΑΙΑΝ ὩΠΑΛΛΑΤΕΙ
ΠΟΙΟΤΗΤΑ ΤΑΧΕΩΣ ΟΥΤΩΣ, ὌΣΤΘ, ἘΠΕΙΔΘΑΝ ἘΜΠΕΣΘΗ
ΤΟΙΣ ΛΕΠΤΟΙΣ ΕΝΤΕΡΟΙΣ, ΕΥΘΥΣ ΕΙΝΑΙ ΚΩΠΡΟΝ, Ἡ ΧΟΛΗ
ΔΟΥΝ ΠΟΛΥ ΜΑΛΛΟΝ Η ΤΟ ΟΥΡΟΝ, ἘΠΕΙΔΘΑΝ ἈΠΑΞ
ἙΚΠΕΣΗ ΤΩΝ ΦΛΕΒΩΝ, ἙΞΑΛΛΑΤΕΙ ΤΗΝ ΠΟΙΟΤΗΤΑ,
ΤΑΧΙΣΤΑ ΜΕΤΑΒΑΛΛΟΝΤΑ ΚΑΙ ΣΗΣΤΟΜΕΝΑ. ΚΑΙ ΜΗΝ
ΕΙΠΕΡ ἙΠΙ ΤΕ ΤΩΝ ΚΑΤΑ ΤΑΣ ΥΣΤΕΡΑΣ ΚΑΙ ΤΗΝ
ΚΟΙΛΙΑΝ ΚΑΙ ΤΑ ΕΝΤΕΡΑ ΚΑΙ ΠΡΟΣΕΤΙ ΤΗΝ ΤΟ ΟΥΡΟΝ
ὙΠΟΔΕΧΟΜΕΝΗΝ ΚΥΣΤΙΝ ΕΝΑΡΓΩΣ ΦΑΙΝΕΤΑΙ ΔΙΑΤΑΣΙΣ
ΤΗΣ Ἡ ΔΗΈΣΗς Ἡ ἈΧΘΟΣ ἘΠΕΓΕΙΡΟΝ ἘΚΑΣΤΟΝ ΤΩΝ
ὈΡΓΑΝΩΝ ΕΙΣ ἈΠΟΚΡΙΣΙΝ, ΟΥΔΕΝ ΧΑΛΕΠΤΩΝ ΚΑΤΙ
ΤΗΣ ΧΟΛΗΔΟΧΟΥ ΚΥΣΤΕΩΣ ΤΑΥΤΟ ΤΟΤΕ ἘΝΝΟΕΙΝ ἙΠΙ
ΤΕ ΤΩΝ ἈΛΛΩΝ ἈΠΑΝΤΩΝ ὈΡΓΑΝΩΝ, ἘΞ ὩΝ ΔΗΛΟΝΟΤΙ
ΚΑΙ ΑΙ ἈΡΤΗΡΙΑΙ ΚΑΙ ΑΙ ΦΛΕΒΕΣ ΕΙΣΙΝ.

ΧΙΙΙ

ΟΥ ΜΗΝ ΟΥΔΕ ΤΟ ΔΙΑ ΤΟΥ ΑΥΤΟΥ ΠΟΡΟΥ ΤΗΝ Θ'
ΩΛΚΗΝ ΓΗΓΕΝΕΣΘΑΙ ΚΑΙ ΤΗΝ ἈΠΟΚΡΙΣΙΝ ΕΝ ΔΙΑΦΕ-
187 ΡΟΥΣΙ ΧΡΟΝΟΙΣ ΟΥΔΕΝ ἘΤΙ ΧΑΛΕΠΤΩΝ ἘΞΕΥΡΕΙΝ, ΕΙ ΓΕ
ΚΑΙ ΤΗΣ ΓΑΣΤΡΟΣ Ο ΣΤΟΜΑΧΟΣ ΟΥ ΜΟΝΟΝ ΕDEDΣΜΑΤΑ

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does not apply, however, in the case of the bladder alongside the liver, whence it is clear that it possesses fewer nerves than do the other organs. Here too, however, at least the physiologist¹ must discover an analogy. For since it was shown that the gall-bladder attracts its own special juice, so as to be often found full, and that it discharges it soon after, this desire to discharge must be either due to the fact that it is burdened by the quantity or that the bile has changed in quality to pungent and acrid. For while food does not change its original quality so fast that it is already ordure as soon as it falls into the small intestine, on the other hand the bile even more readily than the urine becomes altered in quality as soon as ever it leaves the veins, and rapidly undergoes change and putrefaction. Now, if there be clear evidence in relation to the uterus, stomach, and intestines, as well as to the urinary bladder, that there is either some distention, irritation, or burden inciting each of these organs to elimination, there is no difficulty in imagining this in the case of the gall-bladder also, as well as in the other organs,—to which obviously the arteries and veins also belong.

XIII

Nor is there any further difficulty in ascertaining that it is through the same channel that both attraction and discharge take place at different times. For obviously the inlet to the stomach does not merely

¹ Or physicist—the investigator of the Physis or Nature. cf. p. 196, note 2. Note here the use of analogical reasoning. cf. p. 113, note 2.
GALEN

καὶ πόματα παράγοντο εἰς αὐτήν, ἀλλὰ κἂν ταῖς ναυτίαις τὴν ἐναντίαν ὑπηρεσίαν ὑπηρετῶν ἐναργῶς φαίνεται, καὶ τῆς ἐπὶ τὸ ἦπατι κύστεως ὁ αὐχήν εἰς δὲν ἀμα μὲν πληροῖ δὲ αὐτοῦ τὴν κύστιν, ἀμα δ' ἐκκενοῖ, καὶ τῶν μητρῶν ὁ στόμαχος οὕσαντος ὁδὸς ἑστιν εἰσὶν μὲν τοῦ σπέρματος, ἐξω δὲ τοῦ κυήματος.

"Αλλὰ κανταῦθα πάλιν ἡ μὲν ἐκκριτικὴ δύναμις ἐναργῆς, οὐ μὴν ὁμοίως γ' αὐτῇ σαφῆς τοὺς πολλοὺς ἢ ἐλκτικὴν ἀλλ' Ἰπποκράτης μὲν ἀρρώστου μήτρας αἰτιώμενος αὐχένα φησί. "Ὅτι γὰρ δύναται αὐτές ὁ στόμαχος εὑρύσας τὴν γοην."  

Ἐρασίστρατος δὲ καὶ Ἀσκληπιάδης εἰς τοσοῦτον ἴκουσι σοφίας, ὥστε οὐ μόνον τὴν κοιλίαν καὶ τὰ μήτρας ἀποστεροῦσι τῆς τοιαύτης δυνάμεως ἀλλ' καὶ τὴν ἐπὶ τῷ ἦπατι κύστιν ἀμα τοὺς νεφρῶις. καὶ τοι τῷ ὧν μηδε εἰπεῖν δυνατὸν ἔτερον αἰτιον ἡ σύρων ἡ χολῆς διακρίσεως, ἐν τῷ πρώτῳ δεδεικτα λόγῳ.

Καὶ μήτραν οὖν καὶ γαστερὰ καὶ τὴν ἐπὶ 188 τῷ ἦπατι κύστιν δι' ἐνὸς καὶ ταύτοῦ στομάχου τὴν θ' ὀλκήν καὶ τὴν ἀπόκρισιν εὐρύσκοιτες ποιομένας μηκέτι θαυμάζωμεν, εἰ καὶ διὰ τῶν φλεβῶν ἡ φύσις ἐκκρίνει πολλάκις εἰς τὴν γαστερὰ περιττόματα. τούτου δ' ἐτε μᾶλλον ὡς χρή θαυμάζωμεν, εἰ, δι' ὧν εἰς ἦπαρ ἀνεσθῶθη φλεβῶν ἐκ γαστρός, αὖθις εἰς αὐτήν εἴς ἦπατος ἐν ταῖς μακροτέραις ἁσιτίαις ἐλκεσθαι τις δύναται τροφή. τὸ γὰρ τοῖς τοιούτοις ἀπιστεῖν

1 cf. p. 95.  
2 I. xiii. ; II. ii.  
3 Galen’s idea is that if reversal of the direction of flow
ON THE NATURAL FACULTIES, III. xiii

cconduct food and drink into this organ, but in the condition of nausea it performs the opposite service. Further, the neck of the bladder which is beside the liver, albeit single, both fills and empties the bladder. Similarly the canal of the uterus affords an entrance to the semen and an exit to the foetus.

But in this latter case, again, whilst the eliminative faculty is evident, the attractive faculty is not so obvious to most people. It is, however, the cervix which Hippocrates blames for inertia of the uterus when he says:—"Its orifice has no power of attracting semen." 1

Erasistratus, however, and Asclepiades reached such heights of wisdom that they deprived not merely the stomach and the womb of this faculty but also the bladder by the liver, and the kidneys as well. I have, however, pointed out in the first book that it is impossible to assign any other cause for the secretion of urine or bile. 2

Now, when we find that the uterus, the stomach and the bladder by the liver carry out attraction and expulsion through one and the same duct, we need no longer feel surprised that Nature should also frequently discharge waste-substances into the stomach through the veins. Still less need we be astonished if a certain amount of the food should, during long fasts, be drawn back from the liver into the stomach through the same veins 3 by which it was yielded up to the liver during absorption of nutriment. 4 To disbelieve such things can occur in the primae viae (in vomiting), it may also be expected to occur in the secundae viae or absorptive channels. 4 For this "delivery," "up-yield," or anadosis, v. p. 13, note 5.
Ομοίων ἐστὶ δήπου τῷ μηκέτι πιστεύειν μηδὲ ὅτι τὰ καθαίροντα φάρμακα διὰ τῶν αὐτῶν στομάτων ἐξ ὅλου τοῦ σώματος εἰς τὴν γαστέρα τοὺς οἰκείους ἑπισπάται χυμούς, δι' ὃν ἐμπροσθεῖν ἡ ἀνάδοσις ἐγένετο, ἀλλ' ἑτερα μὲν ξητείν ἀναδόσεως, ἑτερα δὲ καθάρσεως στόματα. καὶ μὴν εἴπερ ἐν καὶ ταύτῳ στόμα διίταϊς ὑπηρετεῖ δυνάμεσιν, εἰς διαφόρους χρόνους εἰς τάναντία τὴν ὀλκήν ποιομέναις, ἐμπροσθεῖν μὲν τῇ κατὰ τὸ ἡπαρ, ἐν δὲ τῷ τῆς καθάρσεως καιρῷ τῇ τοῦ φαρμάκου, τῷ θαυμαστῶν ἐστὶ διίτην ὑπηρεσίαν τε καὶ χρείαν εἶναι ταῖς φλεψὶ ταῖς ἐν τῷ μέσῳ τεταγμέναις ἦπατος τε καὶ τῶν κατὰ τὴν κοιλίαν, ὡσθ', ὅποτε μὲν ἐν τούτοις ἀφθονοις εἰς περιεχομένη τροφή, διὰ τῶν εἰρήμων εἰς ἡπαρ ἀναφέρεσθαι φλεβῶν, ὅποτε δ' εἰς κενὰ καὶ δεόμενα τρέφεσθαι, διὰ τῶν αὐτῶν αὐθίς εἰς ἦπατος ἐλκεσθαι;

Πάν γὰρ ἐκ παντὸς ἐλκεῖν φαίνεται καὶ παντὶ μεταδίδοναι καὶ μία τις εἶναι σύρροια καὶ σύμπνοια πάντων, καθάπερ καὶ τοῦθ' ὁ θειότατος Ἰπποκράτης εἶπεν. Ἐλκεῖ μὲν οὖν τὸ ἰσχυρὸτερον, ἐκκενοῦται δὲ τὸ ἀσθενέστερον.

Ἰσχυρότερον δὲ καὶ ἀσθενέστερον ἐτερον ἔτερον μόριον ἢ ἁπλῆς καὶ φύσει καὶ κοινῇ πᾶσιν ἐστιν ἢ ἰδίως τῷ δὲ τινι γίγνεται. φύσει μὲν καὶ κοινῇ πᾶσιν ἀνθρώπως θ' ἀμα καὶ ξύοις ἢ μὲν καρδία τοῦ ἦπατος, τὸ δ' ἡπαρ τῶν ἐντέρων τε καὶ τῆς γαστρὸς, αἱ δ' ἀρτηρίαι τῶν φλεβῶν ἐλκύσαι τε τὸ χρῆσιμον ἑαυταῖς ἀποκριναί τε τὸ μὴ τοιοῦτον

1 The mesenteric veins.
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would of course be like refusing to believe that purgative drugs draw their appropriate humours from all over the body by the same stomata through which absorption previously takes place, and to look for separate stomata for absorption and purgation respectively. As a matter of fact one and the same stoma subserves two distinct faculties, and these exercise their pull at different times in opposite directions—first it subserves the pull of the liver and, during catharsis, that of the drug. What is there surprising, then, in the fact that the veins situated between the liver and the region of the stomach fulfil a double service or purpose? Thus, when there is abundance of nutriment contained in the food-canal, it is carried up to the liver by the veins mentioned; and when the canal is empty and in need of nutriment, this is again attracted from the liver by the same veins.

For everything appears to attract from and to go shares with everything else, and, as the most divine Hippocrates has said, there would seem to be a consensus in the movements of fluids and vapours. Thus the stronger draws and the weaker is evacuated.

Now, one part is weaker or stronger than another either absolutely, by nature, and in all cases, or else it becomes so in such and such a particular instance. Thus, by nature and in all men alike, the heart is stronger than the liver at attracting what is serviceable to it and rejecting what is not so; similarly the liver is stronger than the intestines and stomach, and

2 Linacre renders: "Una omnium confluxio ac consipiratione"; and he adds the marginal note "Totum corpus nostrum est conspirabile et confluxile per meatus communes." cf. p. 48.

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ισχυρότεραι. καθ’ έκαστον δ’ ήμιθν ιδίως εν μεν τόδε τῷ καιρῷ τὸ ἦπαρ ἰσχυρότερον ἔλκειν, ἡ γαστὴρ δ’ εν τόδε. πολλὴς μὲν γὰρ εν τῇ κοιλίᾳ περιεχομένης τροφῆς καὶ σφοδρῶς ὄρεγομένου τε καὶ χρῆζοντος τοῦ ἦπατος, πάντως ἰσχυρότερον ἔλκει τὸ σπλάγχνον· ἐμπαλίν δὲ τοῦ μὲν ἦπατος ἐμπεπλησμένον τε καὶ διὰ τεταμένον, τῆς γαστρὸς δ’ ὀρεγομένης καὶ κενῆς ὑπαρχοῦσης ἢ τῆς ὀλκής ἰσχύς εἰς ἐκείνην μεθίσταται.

Ὡς γὰρ, εἰ καὶ ταῖς χερσὶ τίνα συτία κατ’ ἔχοντες ἀλλήλων ἀρταξομεν, εἰ μὲν ὁμοίως εἴημεν δεόμενοι, περιγγυνεσθαί τὸν ἰσχυρότερον εἰκός, εἰ δ’ οὖτος μὲν ἐμπεπλησμένος εἴη καὶ διὰ τούτ’ ἀμελῶς κατέχον τὰ περὶτα ἢ καὶ τίνι μεταδοῦνα ποθῶν, δ’ ἀσθενέστερος ὀρέγοιτο δεινῶς, οὔτεν ἀν εἰ ἱκύρωμα τοῦ μὴ πάντα λαβεῖν αὐτόν, οὔτω καὶ ἡ γαστήρ ἐκ τοῦ ἦπατος ἐπισπάται ράδιος, ὡσ τούτῃ μὲν ἰκανῶς ὀρέγηται τροφῆς, ἐμπεπλησμένον δ’ ἢ τὸ σπλάγχνον. καὶ τοῦ γε μὴ πεινὴν ἐνίστε τὸ ἄφων ἢ περιουσία τῆς ἐν ἦπατο τροφῆς αὐτία. κρείττονα γὰρ ἔχουσα καὶ ἐτοιμοτέραν ἡ γαστὴρ τροφῆν οὐδὲν δεῖται τῆς ἐξωθένει εἰ δὲ γε ποτὲ δέοιτο μὲν, ἀποροή δὲ, πληροῦται περιττώματων. ἰχώρες δὲ τινὲς εἰς ταῦτα χολώδεις τε καὶ φλεγματώδεις καὶ ὀρρώδεις, ὁδὸς μόνους ἔλκουση μεθίσηςν αὐτή τὸ ἦπαρ, ὅταν ποτὲ καὶ αὐτῇ δέηται τροφῆς.

"Ωσπερ οὖν ἐξ ἀλλήλων ἔλκει τὰ μόρια πτ’ ἰσχυρότερον, οὕτω καὶ ἀποτίθεται ποτ’ εἰς ἀλληλα
the arteries than the veins. In each of us personally, however, the liver has stronger drawing power at one time, and the stomach at another. For when there is much nutriment contained in the alimentary canal and the appetite and craving of the liver is violent, then the viscus\(^1\) exerts far the strongest traction. Again, when the liver is full and distended and the stomach empty and in need, then the force of the traction shifts to the latter.

Suppose we had some food in our hands and were snatching it from one another; if we were equally in want, the stronger would be likely to prevail, but if he had satisfied his appetite, and was holding what was over carelessly, or was anxious to share it with somebody, and if the weaker was excessively desirous of it, there would be nothing to prevent the latter from getting it all. In a similar manner the stomach easily attracts nutriment from the liver when it [the stomach] has a sufficiently strong craving for it, and the appetite of the viscus is satisfied. And sometimes the surplusage of nutriment in the liver is a reason why the animal is not hungry; for when the stomach has better and more available food it requires nothing from extraneous sources, but if ever it is in need and is at a loss how to supply the need, it becomes filled with waste-matters; these are certain biliary, phlegmatic [mucous] and serous fluids, and are the only substances that the liver yields in response to the traction of the stomach, on the occasions when the latter too is in want of nutriment.

Now, just as the parts draw food from each other, so also they sometimes deposit their excess substances

\(^1\) The alimentary canal, as not being edible, is not considered a splanchnon or viscus.
GALEN

tὸ περιττὸν καὶ ὦσπερ ἐλκόντων ἐπιλεονέκτει τὸ ἰσχυρότερον, οὕτω καὶ ἀποτιθεμένων καὶ τῶν γε καλομένων ῥεμάτων ήδη ἡ πρόφασις. ἔκαστον γὰρ τῶν μορίων ἐχει τινὰ τόνον σύμφυτον, φι διωθεῖται τὸ περιττὸν. ὅταν οὖν ἐν ἐξ αὐτῶν ἀρρωστότερον γένηται κατὰ δὴ τινὰ διάδεσιν, ἐξ ἀπάντων εἰς ἐκείνον συρρεῖν ἀνάγκη τὰ περιττώματα. τὸ μὲν γὰρ ἰσχυρότατον ἐναποτίθεται τοῖς πλησίον ἀπασίν, ἐκείνων δὲ αὐτῷ πάλιν ἐκαστὸν εἰς ἐτέρ ἀττα τῶν ἀσθενεστέρων, εἰτ' αὐθισ ἐκείνων ἐκαστὸν εἰς ἄλλα καὶ τοῦτ' ἐπὶ πλειστὸν γίγνεται, μέχρι περ ἂν ἐξ ἀπάντων ἐλαυνόμενον τὸ περίττωμα καθ' ἐν τὶ μείνῃ τῶν ἀσθενεστάτων ἐντεῦθεν γὰρ οὐκέτ' εἰς ἄλλο δύναται μεταρρεῖν, ὡς ἂν μήτε δεχομένου τινὸς αὐτὸ τῶν ἰσχυρότερον μήτ' ἀπώσασθαι δυναμένου τού πεπονθότος.

Ἀλλὰ περὶ μὲν τῶν παθῶν τῆς γενέσεως καὶ τῆς ἰάσεως αὖθις ἦμων ἐπιδεικνύντων ἱκανά καὶ ἐκείνων ἐσται λαβεῖν μαρτύρια τῶν ἐν τῶδε τῶν 192 λόγω παντὶ διδειγμένων ὀρθῶς. δ' ἐν τῷ παρόντι δεῖξαι προῤῥειτο, πάλιν ἀναλάβωμεν, ὡς οὐδὲν θαυμαστόν ἐξ ἦπατος ἦκειν τινὰ τροφὴν ἐντέρως τε καὶ γαστρὶ διὰ τῶν αὐτῶν φλεβῶν, δι' ὅν ἐμπροσθεν ἐξ ἐκείνων εἰς ἦπαρ ἀνεδίδοτο. καὶ πολλοῖς ἀθρόως τε καὶ τελέως ἀποστάσιοι εἰς τρίχας υγμασίων ἢ τι κόλων ἀποκοπεῖσιν αἵματος διὰ τῶν ἐντέρων γίγνεται κένωσις ἐκ τινῶν περιδῶν, ὡς που καὶ Ἰπποκράτης ἔλεγεν, οὐδὲν μὲν ἄλλο λυτοῦσα, καθαίροντα δ' ἐξέως τὸ πᾶν σώμα καὶ τὰς πλησμονὰς ἐκκενοῦσα, διὰ τῶν
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in each other, and just as the stronger prevailed when the two were exercising traction, so it is also when they are depositing; this is the cause of the so-called fluxions, for every part has a definite inborn tension, by virtue of which it expels its superfluities, and, therefore, when one of these parts,—owing, of course, to some special condition—becomes weaker, there will necessarily be a confluence into it of the superfluities from all the other parts. The strongest part deposits its surplus matter in all the parts near it; these again in other parts which are weaker; these next into yet others; and this goes on for a long time, until the superfluity, being driven from one part into another, comes to rest in one of the weakest of all; it cannot flow from this into another part, because none of the stronger ones will receive it, while the affected part is unable to drive it away.

When, however, we come to deal again with the origin and cure of disease, it will be possible to find there also abundant proofs of all that we have correctly indicated in this book. For the present, however, let us resume again the task that lay before us, i.e. to show that there is nothing surprising in nutriment coming from the liver to the intestines and stomach by way of the very veins through which it had previously been yielded up from these organs into the liver. And in many people who have suddenly and completely given up active exercise, or who have had a limb cut off, there occurs at certain periods an evacuation of blood by way of the intestines—as Hippocrates has also pointed out somewhere. This causes no further trouble but sharply purges the whole body and evacuates the plethoras;

1 Lit. rheums; hence our term rheumatism.
αὐτῶν δὴ ποιοῦν φλεβῶν τῆς φορᾶς τῶν περιττῶν ἐπιτελουμένης, δι’ ὅν ἐμπροσθεν ἡ ἀνάδοσις ἐγένετο. 
Πολλάκις δ’ ἐν νόσοις ἡ φύσις διὰ μὲν τῶν αὐτῶν δὴ ποιοῦν φλεβῶν τὸ πᾶν ἐκκαθαίρει ἥδιν, οὐ μὴν αἰματώδης γ’ ἡ κένωσις αὐτοῖς, ἀλλὰ κατὰ τὸν λυποῦντα γίγνεται χυμόν. οὕτω δὲ καὶ ταῖς χολέραις ἐκκενοῦται τὸ πᾶν σώμα διὰ τῶν εἰς ἐντερά τε καὶ γαστέρα καθηκοῦσαν φλεβῶν.
Τὸ δ’ οἴεσθαι μίαν εἶναι ταῖς ὑλαις φοράν 193 τελέως ἀγνοοῦντός ἐστι τὰς φυσικὰς || δυνάμεις τάς τ’ ἄλλας καὶ τὴν ἐκκριτικὴν ἐναντίαν οὕσαν τῇ ἐλκτικῇ ταῖς γαρ ἐναντίας δυνάμεσιν ἐναντίας κινήσεις τε καὶ φορᾶς τῶν ὑλῶν ἀναγκαῖον ἀκολουθεῖν. έκαστον γαρ τῶν μορίων, σὺν ἐλκύσῃ τὸν οἰκεῖον χυμόν, ἔπειτα κατάσχη καὶ ἀπολαύσῃ, τὸ περιττὸν ἀπαν ἀποθέσθαι σπεύδει, καθότι μάλιστα δύναται τάχιστα θ’ ἀμα καὶ κάλλιστα, κατὰ τὴν τοῦ περιττοῦ ῥοπήν.
"Ὅθεν ἡ γαστήρ τὰ μὲν ἐπιτοπολάζοντα τῶν περιττωμάτων ἐμέτοις ἐκκαθαίρει, τὰ δ’ ύψιστά-μενα διαρροϊκαίς. καὶ τὸ γε ναυτιώδες γίγνεσθαι τὸ ξύνων τούτ’ ἐστὶν ὀρμήσαι τὴν γαστέρα κενω-θῆμαι δι’ ἐμέτου. οὕτω δὲ δὴ τι βίαιον καὶ σφοδρόν ἡ ἐκκριτικὴ δύναμις ἔχει, ὥστ’ ἐν τοῖς εἰλεόσι, ὅταν ἀποκλεισθῆ τελέως ἡ κάτω διέξοδος, ἐμεῖται κόπρος. καίτοι πρὶν διελθεῖν τὸ τε λεπ-τὸν ἐντεροῦν ἀπαν καὶ τὴν νήστιν καὶ τὸν πυλώρον καὶ τὴν γαστέρα καὶ τὸν οἰσοφάγον οὐχ οἶνον τε διὰ τοῦ στόματος ἐκπεσεῖν οὐδὲνι τοιοῦτῳ περιττώματι. τί δ’ θαυμαστόν, εἰ κάκ τῆς ἐσχάτης

1 Here Galen apparently indicates that vital functions are
the passage of the superfluities is effected, of course, through the same veins by which absorption took place. Frequently also in disease Nature purges the animal through these same veins—although in this case the discharge is not sanguineous, but corresponds to the humour which is at fault. Thus in cholera the entire body is evacuated by way of the veins leading to the intestines and stomach.

To imagine that matter of different kinds is carried in one direction only would characterise a man who was entirely ignorant of all the natural faculties, and particularly of the eliminative faculty, which is the opposite of the attractive. For opposite movements of matter, active and passive, must necessarily follow opposite faculties; that is to say, every part, after it has attracted its special nutrient juice and has retained and taken the benefit of it hastens to get rid of all the surplusage as quickly and effectively as possible, and this it does in accordance with the mechanical tendency of this surplus matter.¹

Hence the stomach clears away by vomiting those superfluities which come to the surface of its contents,² whilst the sediment it clears away by diarrhœa. And when the animal becomes sick, this means that the stomach is striving to be evacuated by vomiting. And the expulsive faculty has in it so violent and forcible an element that in cases of ileus [volvulus], when the lower exit is completely closed, vomiting of faeces occurs; yet such surplus matter could not be emitted from the mouth without having first traversed the whole of the small intestine, the jejunum, the pylorus, the stomach, and the oesophagus. What is there to wonder at, then, if something at least partly explicable in terms of mechanical law. cf. Introduction, p. xxviii. ² cf. pp. 211, 247.
ηπιφανείας τῆς κατὰ τὸ δέρμα μέχρι τῶν ἐντέρων

194 τε καὶ τῆς γαστρὸς ἀφικνοῦτο τι || μεταλαμβανό-

μενον, ὡς καὶ τοῦτο Ιπποκράτης ἦμασ ἐδίδαξεν,

οὐ πνεῦμα μόνον ἡ περίττωμα φάσκων ἄλλα καὶ

τὴν τροφὴν αὐτῆς ἐκ τῆς ἐσχάτης ἐπιφανείας

αὕθες ἐπὶ τὴν ἄρχην, θεον ἀνηνέχθη, καταφέρε-

σθαι. ἐλάχισται γὰρ ῥοπάλ κινήσεων τῆς

ἐκκριτικῆς ταύτης οἰκαίζουσι δύναμιν, ὡς ἀν διὰ

τῶν ἐγκαρσίων μὲν ἵνα γνυμομένη, ὡκύτατα δὲ

διαδιδομένην ἀπὸ τῆς κινησάσης ἄρχης ἐπὶ τὰ

καταντικρύ πέρατα. οὐκοῦν ἀπεκός οὐδ ἀδύ-

νατον ἀνθεὶ ποτὲ ψυξὶ τὸ πρὸς τὸ δέρματι

μόριον ἐξαίφνης πιληθὲν ἀμα μὲν ἀρρωστότερον

αὐτῷ γενόμενον, ἀμα δ ὅπως τι μάλλον ἀ

παρασκευὴν θρέψεως ἔχον τὴν ἐμπροσθεν ἀλώπως

αὐτῷ παρεσπαρμένην ὑγρότητα καὶ διὰ τούτ

ἀπωθεῖσθαι σπεύδουν, ἀμα δὲ τῆς ἐξω φοράς

ἀποκεκλεισμένης τῇ πυκνώσει, πρὸς τὴν λοιπὴν

ἐπιστραφῇ καὶ οὕτῳ βιασόμενον εἰς τὸ

παρακεῖμενον αὐτῷ μόριον ἀθρόως ἀπώσασθαι

τὸ περιττόν, ἐκεῖνο δ αὐτὸ πάλιν εἰς τὸ μετ ἑντό,

1 195 καὶ τούτο μὴ παύσασθαι γιγνόμενον, ἀχρίς ἂν ἡ

μετάληψις ἐπὶ τὰ ἐντὸς πέρατα τῶν φλεβῶν

teleυτήσῃ.

Αἱ μὲν δὴ τοιαύτα κινήσεις θάττων ἀπο-

παύονται, αἱ δ ἀπὸ τῶν ἐνδοθεν διερεθίζωντων,

ὡς ἐν τε τοῖς καθαίρουσι φαρμάκοις καὶ ταῖς

χολέραις ἵσχυρότεραι τε πολύ καὶ μοιμώτεραι

γίγνονται καὶ διαμένουσιν, ἔστ’ ἂν καὶ ἡ περὶ

τοῖς στόμασι τῶν ἀγγείων διάθεσις, ἡ τὸ πλησίον

1 See p. 298, note 1.
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should also be transferred from the extreme skin-surface and so reach the intestines and stomach? This also was pointed out to us by Hippocrates, who maintained that not merely pneuma or excess-matter, but actual nutriment is brought down from the outer surface to the original place from which it was taken up. For the slightest mechanical movements determine this expulsive faculty, which apparently acts through the transverse fibres, and which is very rapidly transmitted from the source of motion to the opposite extremities. It is, therefore, neither unlikely nor impossible that, when the part adjoining the skin becomes suddenly oppressed by an unyonted cold, it should at once be weakened and should find that the liquid previously deposited beside it without discomfort had now become more of a burden than a source of nutrition, and should therefore strive to put it away. Finally, seeing that the passage outwards was shut off by the condensation [of tissue], it would turn to the remaining exit and would thus forcibly expel all the waste-matter at once into the adjacent part; this would do the same to the part following it; and the process would not cease until the transference finally terminated at the inner ends of the veins.  

Now, movements like these come to an end fairly soon, but those resulting from internal irritants (e.g., in the administration of purgative drugs or in cholera) become much stronger and more lasting; they persist as long as the condition of things about the mouths of the veins continues, that is, so long as

2 The ends of the veins in the alimentary canal from which absorption or anadosis had originally taken place.  
3 Diathesis.
μὲν γὰρ τὸ συνεχὲς ἐκκενοὶ μόριον, ἐκεῖνο δ' αὖ τὸ μετ' αὐτὸ καὶ τούτ' οὖ παύεται μέχρι τῆς ἐσχάτης ἐπιφανείας, ὡστε διαδεδομένων τῶν ἐφεξῆς ἂν μορίων ἐτέρων ἐτέροις τὸ πρῶτον πάθος ὁμότιτα δικυκλεῖται μέχρι τῶν ἐσχάτων. οὕτως οὖν ἔχει κατ' τῶν εἰλεῶν. αὐτὸ μὲν γὰρ τὸ φλεγμαίνων ἐντερον οὕτε τοῦ βάρους οὕτε τῆς δριμύτητος ἀνέχεται τῶν περιττώματων καὶ διὰ τούτ', ἐκκρίνειν αὕτα σπεύδει καὶ ἀπωθεῖσθαι πορρωτάτω. κωλυόμενον δὲ κάτω ποιεῖσθαι τὴν δίωσιν, ὃταν ἐνταυθοὶ ποτε τὸ σφοδρότατον ἢ τῆς φλεγμονῆς, εἰς τὰ πλησιάζοντα τῶν ὑπερκειμένων ἐντερῶν ἀπωθεῖται. καὶ οὕτως ἦδη κατὰ τὸ συνεχὲς τὴν ὤσπην τῆς ἐκκριτικῆς δυνάμεως ἂνω ποιησαμένης ἀχρι τοῦ στόματος ἐπανέρχεται τὰ περιττώματα.

Ταύτα μὲν οὖν δὴ κἂν τοῖς τῶν νυσημάτων λογισμοῖς ἐπὶ πλέον εἰρήσεται. τὸ δ' ἐκ πάντως εἰς πᾶν φέρεσθαι τι καὶ μεταλαμβάνεσθαι καὶ μίαν ἀπάντων εἶναι σύμπνοιαν τε καὶ σύρροιαν, ὡς Ἰπποκράτης ἔλεγεν, ἢ ὅτι μοι δοκῶ δεδεῖχθαι σαφῶς καὶ μηκέτ' ἂν τινα, μηδ' εἰ βραδὺς αὐτῷ νοῦς ἐνείη, περὶ τῶν τοιούτων ἀπορῆσαι μηδενὸς, οἷον ὅπως ἡ γαστήρ ἢ τὰ ἐντερα τρέφεται καὶ τίνα τρόπον ἐκ τῆς ἐσχάτης ἐπιφανείας εἴσος τι δικυκλεῖται. πάντων γὰρ τῶν μορίων ἔλκειν μὲν τὸ προσηκόν τε καὶ φίλων, ἀποκρίνειν δὲ τὸ βαρὺν ἢ δάκνου ἐχώντων δύναμιν οὐδὲν θαυμαστὸν ἐναντίας συνεχῶς γύρνεσθαι κινήσεις εἰν 302
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divide continue to attract what is adjacent. For this condition\(^1\) causes evacuation of the contiguous part, and that again of the part next to it, and this never stops until the extreme surface is reached; thus, as each part keeps passing on matter to its neighbour, the original affection\(^2\) very quickly arrives at the extreme termination. Now this is also the case in \textit{ileus}; the inflamed intestine is unable to support either the weight or the acridity of the waste substances and so does its best to excrete them, in fact to drive them as far away as possible. And, being prevented from effecting an expulsion downwards when the severest part of the inflammation is there, it expels the matter into the adjoining part of the intestines situated above. Thus the tendency of the eliminative faculty is step by step upwards, until the superfluities reach the mouth.

Now this will be also spoken of at greater length in my treatise on disease. For the present, however, I think I have shewn clearly that there is a universal conveyance or transference from one thing into another, and that, as Hippocrates used to say, there exists in everything a consensus in the movement of air and fluids. And I do not think that anyone, however slow his intellect, will now be at a loss to understand any of these points,—how, for instance, the stomach or intestines get nourished, or in what manner anything makes its way inwards from the outer surface of the body. Seeing that all parts have the faculty of attracting what is suitable or well-disposed and of eliminating what is troublesome or irritating, it is not surprising that opposite movements should occur in them consecutively—as may

\(^1\) \textit{Diathesis}. \quad \(^2\) \textit{Pathos}.
αὐτοῖς, ὦσπερ ἐπὶ τε τῆς καρδιᾶς ὅραται σαφῶς καὶ τῶν ἀρτηριῶν ἀπασῶν καὶ τοῦ θώρακος καὶ τοῦ πνεύμονος. ἐπὶ μὲν γε τούτων ἀπάντων μονον οὐ καθ' ἐκάστην καιροῦ ῥοπῆν τὰς ἐναντίας κινήσεις θ' ἀμα τῶν ὄργανων καὶ φορὰς τῶν ἔναργῶς ἠθείν οἰνομένας. εἰτ' ἐπὶ μὲν τῆς τραχείας ἀρτηρίας οὐκ ἀπορεῖς ἐναλλαξιν<ref>

1 He means, not only under the stress of special circumstances, but also normally.

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be clearly seen in the case of the heart, in the various arteries, in the thorax, and lungs. In all these the active movements of the organs and therewith the passive movements of [their contained] matters may be seen taking place almost every second in opposite directions. Now, you are not astonished when the trachea-artery \(^2\) alternately draws air into the lungs and gives it out, and when the nostrils and the whole mouth act similarly; nor do you think it strange or paradoxical that the air is dismissed through the very channel by which it was admitted just before. Do you, then, feel a difficulty in the case of the veins which pass down from the liver into the stomach and intestines, and do you think it strange that nutriment should at once be yielded up to the liver and drawn back from it into the stomach by the same veins? You must define what you mean by this expression “at once.” If you mean “at the same time” this is not what we ourselves say; for just as we take in a breath at one moment and give it out again at another, so at one time the liver draws nutriment from the stomach, and at another the stomach from the liver. But if your expression “at once” means that in one and the same animal a single organ subserves the transport of matter in opposite directions, and if it is this which disturbs you, consider inspiration and expiration. For of course these also take place through the same organs, albeit they differ in their manner of movement, and in the way in which the matter is conveyed through them.

\(^2\) Lit. “rough artery.” The air-passages as well as the arteries proper were supposed by the Greeks to carry air (pneuma); diastole of arteries was, like expansion of the chest, a movement for drawing in air. cf. p. 317, note 1.
GALEN

"Ο πνεύμων μὲν οὖν καὶ ο θώραξ καὶ ἀρτηρίας αἱ τραχεῖαι καὶ αἱ λείαι καὶ καρδία καὶ στόμα καὶ ῥίνες ἐν ἑλαχίσταις χρόνον ῥοπαῖς εἰς ἑναντίας κινήσεις αὐτά τε μεταβάλλει καὶ τὰς ὦλας μεθήστησιν. αἱ δὲ ἡπατός εἰς ἑντερα καὶ γαστήρα καθήκουσαι φλέβες οὐκ ἐν ὀὔτω βραχέσι χρόνου μορίοις ἀλλ’ ἐν πολλαῖς ἡμέραις ἀπαξ ἐνίοτε τὴν ἑναντίαν κινοῦνται κίνησιν.

"Εχει γὰρ ὅτε τὸ σύμπαν. ἕκαστον τῶν ὀργάνων εἰς ἑαυτὸ τὴν πλησίαξουσαν ἐπισπάται τροφὴν ἐκβοσκόμενον αὐτῆς ἀπασάν τὴν χρήστην νοτίδα, μέχρις ἄν ἰκανῶς κορεσθῇ, καὶ ταύτην, ὡς καὶ πρόσθεν ἐδείκνυμεν, ἐναποτίθεται ἑαυτῷ καὶ μετὰ ταύτα προσφύει τε καὶ ὠμοίοι, τούτῳ ἐστι τρέφεται. διόρισται γὰρ ἰκανῶς ἐμπροσθεν ἐτερόν τι τῆς θρέψεως ἐξ ἀνάγκης αὐτῆς προηγούμενον ἢ πρόσφυσις ὑπάρχειν, ἐκείνης δὲ 199 ἔτι πρότερον ἢ πρόσθεσις. ὅσπερ οὖν ἱκανῶς αὐτοῖς ὕδρος ἐστὶ τῆς ἐδωδῆς τὸ πληρώσαι τὴν γαστέρα, κατὰ τὸν αὐτὸν τρόπον ἐκάστῳ τῶν μορίων ὕδρος ἐστὶ τῆς προσθέσεως ἢ πληρώσις τῆς οἰκείας ψυχρότητος. έπει τούτων ἂπαν μόριον τῆς γαστρῆς ὠμοίως ὁρέγεται τρέφεσθαι, καὶ περιπτύσσεται τῇ τροφῇ καὶ οὔτω σφίγγει πανταχόθεν αὐτὴν ὡς ἡ γαστήρ. ἐπεται δ’ ἐξ ἀνάγκης τούτῳ, καθάπερ καὶ πρόσθεν ἐρρέθη, τὸ πέττεσθαι τοῖς σιτίοις, τῆς γαστρῆς οὖ διὰ τοῦτο περιστελλομένης αὐτοῖς, ὑ’ ἐπιτήδεια τοῖς ἀλλοις ἐγράφηται μορίοις ὀὕτω γὰρ ἂν οὐκέτι φυσικὸν

1 cf. p. 39, chap. xi.
2 Lit. orexis.
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Now the lungs, the thorax, the arteries rough and smooth, the heart, the mouth, and the nostrils reverse their movements at very short intervals and change the direction of the matters they contain. On the other hand, the veins which pass down from the liver to the intestines and stomach reverse the direction of their movements not at such short intervals, but sometimes once in many days.

The whole matter, in fact, is as follows:—Each of the organs draws into itself the nutriment alongside it, and devours all the useful fluid in it, until it is thoroughly satisfied; this nutriment, as I have already shown, it stores up in itself, afterwards making it adhere and then assimilating it—that is, it becomes nourished by it. For it has been demonstrated with sufficient clearness already 1 that there is something which necessarily precedes actual nutrition, namely adhesion, and that before this again comes presentation. Thus as in the case of the animals themselves the end of eating is that the stomach should be filled, similarly in the case of each of the parts, the end of presentation is the filling of this part with its appropriate liquid. Since, therefore, every part has, like the stomach, a craving 2 to be nourished, it too envelops its nutriment and clasps it all round as the stomach does. And this [action of the stomach], as has been already said, is necessarily followed by the digestion of the food, although it is not to make it suitable for the other parts that the stomach contracts upon it; if it did so, it would no longer be a physiological organ, 3 but an animal possessing reason.

3 Lit. a "physical" organ; that is, a mere instrument or organon of the Physis,—not one of the Psyche or conscious personality. cf. semen, p. 132, note 1.
GALEN

ὅργανον ἄλλα ἥφῶν τι γέγνωσι το λογισμόν τε καὶ
νοῦν ἔχουν, ὡς αἴρεῖσθαι τῷ βέλτιον.

Ἄλλ' αὕτη μὲν περιστέλλεται τῷ τὸ πάν
σώμα δύναμιν ἐλκτικήν τινα καὶ ἀπολαυστικήν
κεκτήσθαι τῶν οἰκείων πουστήτων, ὡς ἐμπροσθὲν
ἐδείκνυτο· συμβαίνει δ' ἐν τούτῳ τοῖς σιτίοις
ἀλλοιοῦσθαι. καὶ μέντοι καὶ πληρωθεῖσα τῆς
ἐξ αὐτῶν ὕγρότητος καὶ κορεσθεῖσα βάρος ἤγείται
tὸ λοιπὸν αὐτά. τὸ περίττον οὖν εὐθὺς ἀπο-
200 τρίβεται τε καὶ ὁθεὶ κάτω πρὸς ἔτερον ἐργον
αὕτη τρεπομένη, τὴν πρόσφυσιν. ἐν δὲ τούτῳ
tῷ χρόνῳ διερχομένη τῷ ἐντεροῦ ἀπαν ἡ τροφή
diā τῶν εἰς αὐτὸ καθηκόντων ἀγγείων ἀναρπα-
ζεται, πλείστη μὲν εἰς τὰς φλέβας, ὀλγὴ δὲ τις
εἰς τὰς ἀρτηρίας, ὡς μικρὸν ύστερον ἀποδείξομεν.
ἐν τούτῳ δ' αὖ τῷ χρόνῳ καὶ τοῖς τῶν ἐντερῶν
χυτῶσι προστίθεται.

Καὶ μοι τεμών ἦδη τῷ λογισμῷ τῆς τῆς τροφῆς
οἰκονομίαν ἅπασαν εἰς τρεῖς μοίρας χρόνων, ἐν
μὲν τῇ πρώτῃ νόει μένονσάν θ' ἄμα κατὰ τὴν
κοιλίαν αὐτήν καὶ πεπτομένην καὶ προστιθεμένην
εἰς κόρον τῇ γαστρί καὶ τῇ καὶ τῷ ἦπατι παρ'
αὐτής ἀναφερόμενον.

'Εν δὲ τῇ δευτέρᾳ διερχομένην τά τ' ἐντερα
καὶ προστιθεμένην εἰς κόρον αὐτοῖς τε τούτοις καὶ
τῷ ἦπατι καὶ τῇ βραχὺ μέρος αὐτῆς πάντῃ τοῦ
σώματος φερόμενον. ἐν δὲ δὴ τούτῳ τῷ καιρῷ
tὸ προστεθὲν ἐν τῷ πρῶτῳ χρόνῳ προσφύεσθαι
νοεῖ τῇ γαστρί.

Κατὰ δὲ τὴν τρίτην μοίραν τοῦ χρόνου τρέ-

1 cf. p. 317, note 2; p. 319, chap. xv.
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and intelligence, with the power of choosing the better [of two alternatives].

But while the stomach contracts for the reason that the whole body possesses a power of attracting and of utilising appropriate qualities, as has already been explained, it also happens that, in this process, the food undergoes alteration; further, when filled and saturated with the fluid pabulum from the food, it thereafter looks on the food as a burden; thus it at once gets rid of the excess—that is to say, drives it downwards—itsel turning to another task, namely that of causing adhesion. And during this time, while the nutriment is passing along the whole length of the intestine, it is caught up by the vessels which pass into the intestine; as we shall shortly demonstrate,¹ most of it is seized by the veins, but a little also by the arteries; at this stage also it becomes presented to the coats of the intestines.

Now imagine the whole economy of nutrition divided into three periods. Suppose that in the first period the nutriment remains in the stomach and is digested and presented to the stomach until satiety is reached, also that some of it is taken up from the stomach to the liver.²

During the second period it passes along the intestines and becomes presented both to them and to the liver—again until the stage of satiety—while a small part of it is carried all over the body.² During this period, also imagine that what was presented to the stomach in the first period becomes now adherent to it.

During the third period the stomach has reached

¹ Note that absorption takes place from the stomach as well as the intestines. cf. p. 118, note 1.
Galen

feštai μὲν ἢδη τὴν κοιλιάν ὀμοιώσασαν έαυτῇ τελέως τὰ προσφύντα, πρόσφυσιν δὲ τοῖς ἐντέρους καὶ τῷ ἦπαρτι γίγνεσθαι τῶν προστεθέντων, 

201 ἀνάδοσιν δὲ πάντη τοῦ σώματος καὶ πρόσθεσιν. εἰ μὲν οὖν ἐπὶ τούτους εὐθέως τὸ ξυόν λαμβάνοι τροφῆν, ἐν γάρ πάλιν ἡ γαστήρ χρόνῳ πέττει τε ταύτην καὶ ἀπολαύει προστιθέετα πᾶν ἐξ αὐτῆς τὸ χρῆστον τοῖς έαυτῆς χείτωσι, τὰ μὲν ἐντερα τελέος ὀμοιώσει τῶν προσφύντα χυμον, ὦςαύτως δὲ καὶ τὸ ἦπαρ. ἐν δὲ δὲ τῷ σώματι πρόσφυσις τῶν προστεθέντων τῆς τροφῆς ἔσται μορίων. 

εἰ δ’ ἄσιτος ἀναγκάζοιτο μὲνειν ἡ γαστήρ ἐν τούτῳ τῷ χρόνῳ, παρὰ τῶν ἐν μεσεντερίῳ τε καὶ ἦπατι φλεβῶν ἐλξεὶ τὴν τροφήν’ οὐ γὰρ ἐξ αὐτοῦ γε τοῦ σώματος τοῦ ἦπατος. λέγῳ δὲ σῶμα τοῦ ἦπατος αὐτήν τε τὴν ἰδίαν αὐτοῦ σάρκα πρῶτην καὶ μάλιστα, μετὰ δὲ τήνυται καὶ τῶν ἀγγείων ἐκαστον τῶν κατ’ αὐτό. τὸν μὲν γὰρ ἐν ἐκάστῳ τῶν μορίων ἢδη περισεχόμενον χυμὸν οὐκέτ’ εὐλογον ἀντιστὰν ἐτέρῳ μορίῳ καὶ μάλισθ’ ὅταν ἢδη πρόσφυσις ἐξομιῶσις αὐτοῦ γίγνεται. τὸν δ’ ἐν ταῖς εὐρυχωρίαις τῶν φλεβῶν τὸ μᾶλλον ἵσχύον θ’ ἀμα καὶ δεόμενον ἀντιστὰ μόριον.

202 Οὕτως οὖν καὶ ἡ γαστήρ ἐν | | ἡ χρόνῳ δεῖται μὲν αὐτῇ τροφῆς, ἐσθείη δ’ οὐδέπω τὸ ξυόν, ἐν τούτῳ τῶν κατὰ τῷ ἦπαρ ἐξαρπάζει φλεβῶν. ἐπεὶ δὲ καὶ τῶν στήληα διά τῶν ἐμπροσθεν ἐδείκνυμεν ὅσον ἐν ἦπατι παχύτερον ἐλκοντα

1 That is, among the ultimate tissues or cells.
the stage of receiving nourishment; it now entirely assimilates everything that had become adherent to it: at the same time in the intestines and liver there takes place adhesion of what had been before presented, while dispersal [anadosis] is taking place to all parts of the body,¹ as also presentation. Now, if the animal takes food immediately after these [three stages] then, during the time that the stomach is again digesting and getting the benefit of this by presenting all the useful part of it to its own coats, the intestines will be engaged in final assimilation of the juices which have adhered to them, and so also will the liver: while in the various parts of the body there will be taking place adhesion of the portions of nutriment presented. And if the stomach is forced to remain without food during this time, it will draw its nutriment from the veins in the mesentery and liver; for it will not do so from the actual body of the liver (by body of the liver I mean first and foremost its flesh proper, and after this all the vessels contained in it), for it is irrational to suppose that one part would draw away from another part the juice already contained in it, especially when adhesion and final assimilation of that juice were already taking place; the juice, however, that is in the cavity of the veins will be abstracted by the part which is stronger and more in need.

It is in this way, therefore, that the stomach, when it is in need of nourishment and the animal has nothing to eat, seizes it from the veins in the liver. Also in the case of the spleen we have shown in a former passage² how it draws all material from

κατεργάζεσθαι τε καὶ μεταβάλλειν ἐπὶ τὸ χρηστότερον, οὔδὲν οὖδ᾽ ἐνταῦθα θαυμαστὸν ἔλκεσθαι τι κἂν τοῦ σπλήνος εἰς ἐκαστὸν τῶν κοινωνοῦντων αὐτῷ κατὰ τὰς φλέβας ὀργάνων, οἷον εἰς ἐπίπλοον καὶ μεσεντέριον καὶ λεπτὸν ἐντερον καὶ κώλον καὶ αὐτὴν τήν γαστέρα· κατὰ δὲ τὸν αὐτὸν τρόπον ἐξερεύνεσθαι μὲν εἰς τὴν γαστέρα τὸ περίττωμα καθ᾽ ἐτερον χρόνον, αὐτὸν δ᾽ αὐθισ᾽ ἐκ τῆς γαστρὸς ἔλκειν τι τῆς οἰκείας τροφῆς ἐν ἐτέρῳ καιρῷ.

Καθόλου δ᾽ εἰπεῖν, δ καὶ πρόσθεν ἡδὴ λέλεκται, πάν ἐκ παντὸς ἔλκειν τε καὶ πέμπειν ἐνχωρεῖ κατὰ διαφέροντας χρόνους, ὁμοιοτάτον γεγυμνόμενον τοῦ συμβαίνοντος, ὡς εἰ καὶ ξύλα νοσήσας πολλὰ τροφὴν ἀφθονον εἰν κοινῷ κατακειμένην, εἰς ὁσον βούλεται, προσφερόμενα. καθ᾽ ὃν γὰρ ἡδὴ πεπανται χρόνον ἑτερα, κατὰ τούτον εἰκός ἐσθίειν 203 ἑτερα, καὶ μέλλειν γε τὰ μὲν παύεσθαι, τὰ δ᾽ ἀρχεσθαι, καὶ τινα μὲν συνεσθίοντα, τὰ δ᾽ ἀνὰ μέρος ἐσθίοντα καὶ ναὶ μὰ Δία γε τὸ ἑτερον ἄρτα-ζειν θατέρου πολλάκις, εἰ τὸ μὲν ἑτερον ἐπιδεοῖτο, τῷ δ᾽ ἀφθόνως παρακέοιτο. καὶ οὕτως οὔδὲν θαυμαστὸν οὔτ᾽ ἐκ τῆς ἐσχάτης ἐπιφανείας εἴσω τι πάλιν ὑποστρέφειν οὕτε διὰ τῶν αὐτῶν ἀγγείων ἐξ ἡπατός τε καὶ σπλήνος εἰς κοιλίαν ἀνευχήθηταί τι, δι᾽ ὅν ἐκ ταύτης εἰς ἑκείνα πρότερον ἀνηνέχθη.

Κατὰ μὲν γὰρ τὰς ἀρτηρίας ἰκανῶς ἐναργεὶς τὸ τουτοῦτον, ὡσπερ καὶ κατὰ τὴν καρδίαν τε καὶ τὸν θώρακα καὶ τὸν πνεύμονα. τούτων γὰρ ἀπάντων διαστελλομένων τε καὶ συστελλομένων ἐναλλάξ ἀναγκαῖον, ἐξ ὦν εἰλκύσθη τι πρότερον, εἰς ταῦθ'.
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the liver that tends to be thick, and by working it up converts it into more useful matter. There is nothing surprising, therefore, if, in the present instance also, some of this should be drawn from the spleen into such organs as communicate with it by veins, e.g. the omentum, mesentery, small intestine, colon, and the stomach itself. Nor is it surprising that the spleen should disgorge its surplus matters into the stomach at one time, while at another time it should draw some of its appropriate nutriment from the stomach.

For, as has already been said, speaking generally, everything has the power at different times of attracting from and of adding to everything else. What happens is just as if you might imagine a number of animals helping themselves at will to a plentiful common stock of food; some will naturally be eating when others have stopped, some will be on the point of stopping when others are beginning, some eating together, and others in succession. Yes, by Zeus! and one will often be plundering another, if he be in need while the other has an abundant supply ready to hand. Thus it is in no way surprising that matter should make its way back from the outer surface of the body to the interior, or should be carried from the liver and spleen into the stomach by the same vessels by which it was carried in the reverse direction.

In the case of the arteries ¹ this is clear enough, as also in the case of heart, thorax, and lungs; for, since all of these dilate and contract alternately, it must needs be that matter is subsequently discharged back into the parts from which it was

¹ By this term, of course, the air-passages are also meant; cf. p. 305.
جالين

υστερον ἐκτείμπεσθαι. καὶ ταύτην ἀρα τὴν ἀνάγκην ἢ φύσις προγνωσκοῦσα τοὺς ἐν τῇ καρδίᾳ στόμασι τῶν ἀγγείων ὑμένας ἐπέφυσε κωλύσοντας εἰς τοῦπίσω φέρεσθαι τὰς υλὰς. ἀλλ' ὃπως μὲν τούτο γίνεται καὶ καθ' ὄντινα τρόπον, ἐν τοῖς περὶ χρείας μορίων εἰρήσεται δεικτῶν ἡμῶν τὰ τ' ἄλλα καὶ ὡς ἄδονατον οὕτως ἀκριβῶς 204 κλείεσθαι τὰ στόματα τῶν ἀγγείων, ὡς || μηδὲν παλινδρομεῖν. εἰς μὲν γὰρ τὴν ἀρτηρίαν τὴν φλεβώδη, καὶ γαρ καὶ τούτ' ἐν ἑκείνως δειχθῆσεται, πολὺ πλέον ἢ διὰ τῶν ἄλλων στομάτων εἰς τοῦπίσω πάλιν ἀναγκαῖον ἐπανέρχεσθαι. τὸ δ' εἰς τὰ παρόντα χρήσιμον, ὡς οὐκ ἐνδέχεται τα τῶν αἰσθητὴν καὶ μεγάλην ἐχόντων εὐρύτητα μὴ οὐκ ἦτοι διαστελλόμενον ἐλκευν ἢ ἀπάντων τῶν πλησίων ἢ ἐκθλιβεῖν αὕθες εἰς ταῦτα συστελλόμενον ἐκ τε τῶν ἡδη προειρημένων ἐν τῷ διὰ τὸ λόγῳ σαφές ἢν εἶναι καὶ ἤ ρας Ἰρασίστρατός τε καὶ ἤμεις ἐτέρωθε περὶ τῆς πρὸς τὸ κανούμενον ἀκολούθιας ἐδείξαμεν.

XIV

'Αλλὰ μὴν καὶ ὡς ἐν ἑκάστῃ τῶν ἀρτηριῶν ἐστὶ τις δύναμις ἢ τῆς καρδίας ἐπιρρέουσα, καθ' ἢν διαστελλόμεναι τε καὶ συστελλόμεναι, δέδεικται δι' ἐτέρων.

Εἰπερ οὖν συνθειχὴς ἄμφω τὸ τε ταύτην εἶναι τῆς κίνησιν αὐταῖς τὸ τε πάν τὸ διαστελλόμενον

1 cf. p. 34, note 1. 2 cf. p. 121, note 4. 3 Pulmonary vein, or rather, left auricle. Galen means a reflux through the mitral orifice; the left auricle was looked

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previously drawn. Now Nature foresaw this necessity, and provided the cardiac openings of the vessels with membranous attachments, to prevent their contents from being carried backwards. How and in what manner this takes place will be stated in my work "On the Use of Parts," where among other things I show that it is impossible for the openings of the vessels to be closed so accurately that nothing at all can run back. Thus it is inevitable that the reflux into the venous artery (as will also be made clear in the work mentioned) should be much greater than through the other openings. But what it is important for our present purpose to recognise is that every thing possessing a large and appreciable cavity must, when it dilates, abstract matter from all its neighbours, and, when it contracts, must squeeze matter back into them. This should all be clear from what has already been said in this treatise and from what Erasistratus and I myself have demonstrated elsewhere respecting the tendency of a vacuum to become refilled.

XIV

And further, it has been shown in other treatises that all the arteries possess a power which derives from the heart, and by virtue of which they dilate and contract.

Put together, therefore, the two facts—that the arteries have this motion, and that everything, when on rather as the termination of the pulmonary veins than as a part of the heart. cf. p. 323, note 4. He speaks here of a kind of "physiological" mitral incompetence.

Horror vacui.
Ελκειν ἐκ τῶν πλησίων εἰς ἑαυτό, θαυμαστοῦ
οὐδέν σοι φανεῖται τὰς ἀρτηρίας, ὅσαι μὲν εἰς τὸ
δέρμα περαίνουσιν αὐτῶν, ἐπιστᾶσθαι τὸν ἐξωθεν
ἀέρα διαστελλόμενας, ὅσαι δὲ κατὰ τι πρὸς τὰς ||
205 φλέβας ἀνεστάμωνται, τὸ λεπτότατον ἐν αὐταῖς
καὶ ἀτμωδέστατον ἐπιστᾶσθαι τοῦ ἁματος, ὅσαι
ὁ ἐγγὺς τῆς καρδίας εἰσίν, ἐξ αὐτῆς ἐκεῖνης ποιεῖ-
σθαι τὴν ὅλην. ἐν γὰρ τῇ πρὸς τὸ κενούμενον
ἀκολουθία τὸ κουφότατον τε καὶ λεπτότατον
ἐπεται πρῶτον τοῦ βαρυτέρου τε καὶ παχυτέρου·
κουφότατον ὁ ἐστὶ καὶ λεπτότατον ἁπάντων τῶν
κατὰ τὸ σῶμα πρῶτον μὲν τὸ πνεῦμα, δεύτερον
ὁ ἁματός, ἐπὶ τούτῳ δὲ τρίτον, ὅσον ἀν ἀκριβῶς
ἡ κατειργασμένον τε καὶ λεπτυσμένον ἁμα.

Ταύτ' οὖν εἰς ἑαυτᾶς ἐλκοῦσιν αἱ ἀρτηρίαι
πανταχόθεν, αἱ μὲν εἰς τὸ δέρμα καθήκουσα τὸν
ἐξωθεν ἀέρα· πλησίον τε γὰρ αὐτάς οὕτως ἐστὶ
καὶ κουφότατος ἐν τοῖς μάλιστα· τῶν ὁ ἄλλων
ἡ μὲν ἐπὶ τὸν τράχηλον ἐκ τῆς καρδίας ἀνισοῦσα
καὶ ἡ κατὰ ράχιν, ἥδη δὲ καὶ ὅσαι τούτων ἐγγὺς
ἐξ αὐτῆς μάλιστα τῆς καρδίας· ὅσαι δὲ καὶ τῆς
καρδίας πορρωτέρῳ καὶ τοῦ δέρματος, ἐλκειν
tαύταις ἀναγκαῖον ἐκ τῶν φλεβῶν τὸ κουφό-
τατον τοῦ ἁματος· ὅστε καὶ τῶν εἰς τὴν γαστήρα
tε καὶ τὰ ἐντερα καθηκουσῶν ἀρτηρίων τὴν
ὅλην ἐν τῷ διαστέλλεσθαι γίγνεσθαι παρά τε
206 τῆς || καρδίας αὐτῆς καὶ τῶν παρακειμένων αὐτῆς
φλεβῶν παμπόλλων οὐσῶν. οὐ γὰρ δὴ ἐκ γε τῶν ἐντέρων καὶ τῆς κοιλίας τροφήν οὕτω παχεῖαν τε
cαὶ βαρείαν ἐν ἑαυτοῖς ἑχόντων δύνανται τι
метαλαμβάνειν, ὅ τι καὶ ἄξιον λόγον, φθάνουσαι
πληροῦσθαι τοῖς κουφοτέροις. οὐδὲ γὰρ εἴ καθεῖς
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it dilates, draws neighbouring matter into itself—and you will find nothing strange in the fact that those arteries which reach the skin draw in the outer air when they dilate, while those which anastomose at any point with the veins attract the thinnest and most vaporous part of the blood which these contain, and as for those arteries which are near the heart, it is on the heart itself that they exert their traction. For, by virtue of the tendency by which a vacuum becomes refilled, the lightest and thinnest part obeys the tendency before that which is heavier and thicker. Now the lightest and thinnest of anything in the body is firstly pneuma, secondly vapour, and in the third place that part of the blood which has been accurately elaborated and refined.

These, then, are what the arteries draw into themselves on every side; those arteries which reach the skin draw in the outer air¹ (this being near them and one of the lightest of things); as to the other arteries, those which pass up from the heart into the neck, and that which lies along the spine, as also such arteries as are near these—draw mostly from the heart itself; and those which are further from the heart and skin necessarily draw the lightest part of the blood out of the veins. So also the traction exercised by the diastole of the arteries which go to the stomach and intestines takes place at the expense of the heart itself and the numerous veins in its neighbourhood; for these arteries cannot get anything worth speaking of from the thick heavy nutriment contained in the intestines and stomach,² since they first become filled with lighter elements. For if you let down a tube into a vessel

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αὐλίσκον εἰς ἀγγεῖον ὑδατός τε καὶ ψάμμου πλήρες ἐπιστάσαι τῷ στόματι τὸν ἐκ τοῦ αὐλίσκου ἀέρα, δύνατ' ἂν ἀκολουθήσαι σοι πρὸ τοῦ ὑδατός ἢ ψάμμος. ἀεὶ γὰρ ἐν τῇ πρὸς τὸ κενούμενον ἀκολουθία τὸ κουφότερον ἐπεται πρότερον.

ΧV

Οὐκ οὖν χρὴ θαυμάζειν, εἰ παντελῶς ὅλιγον ἐκ τῆς κολλίας, ὅσον ἂν ἀκριβῶς ἢ κατειργασμένον, εἰς τὰς ἀρτηρίας παραγίγνεται φθανούσας πληροῦσθαι τῶν κουφότερων, ἀλλ' ἐκεῖνο γυγνώσκειν, ὡς δ' ἔστων ὅλης εἰδὴ, τὸ μὲν τῇ πρὸς τὸ κενούμενον ἀκολουθία, τὸ δ' οἰκείότητι ποιότητος γυγυμένου· ἔτερως μὲν γὰρ εἰς τὰς φύσεις ὁ ἀήρ, ἔτερως δ' ὁ σίδηρος ὑπὸ τῆς ἡρακλείας ἐπιστάσαι λίθον· καὶ ὡς ἢ μὲν πρὸς τὸ κενούμενον ἀκο-207 λουθία || τὸ κουφότερον ἐλκεὶ πρότερον, ἢ δὲ κατὰ τὴν τῆς ποιότητος οἰκείότητα πολλάκις, εἰ οὕτως ἔτυχε, τὸ βαρύτερον, ἀν τῇ φύσει συγγενέστερον ὑπάρχῃ. καὶ τοίνυν καὶ ταῖς ἁρτηρίαις τε καὶ τῇ καρδίᾳ, ὡς μὲν κοίλιος τε καὶ διαστελλόμεθα δυναμένοις ὀργάνους, ἀεὶ τὸ κουφότερον ἀκολουθεῖ πρότερον, ὡς δὲ τρέφεσθαι δεομένους, εἰς αὐτοὺς τοὺς χωτῶν, οὐ δὴ τά σώματα τῶν ὀργάνων εἰσὶν, ἐλκεται τὸ οἰκεῖον. ὅσον ἂν οὖν εἰς τὴν κοιλότητα διαστελλόμενων αὐτῶν αἵματος μεταληφη, τούτω τὸ οἰκείοτατόν

1 The "mechanical" principle of horror vacui contrasted with the "physical" or semi-physiological principle of specific attraction. Appropriateness here might almost be rendered affinity or kinship. cf. note 2, infra.

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full of water and sand, and suck the air out of the tube with your mouth, the sand cannot come up to you before the water, for in accordance with the principle of the refilling of a vacuum the lighter matter is always the first to succeed to the evacuation.

XV

It is not to be wondered at, therefore, that only a very little [nutrient matter] such, namely, as has been accurately elaborated—gets from the stomach into the arteries, since these first become filled with lighter matter. We must understand that there are two kinds of attraction, that by which a vacuum becomes refilled and that caused by appropriateness of quality;¹ air is drawn into bellows in one way, and iron by the lodestone in another. And we must also understand that the traction which results from evacuation acts primarily on what is light, whilst that from appropriateness of quality acts frequently, it may be, on what is heavier (if this should be naturally more nearly related ²). Therefore, in the case of the heart and the arteries, it is in so far as they are hollow organs, capable of diastole, that they always attract the lighter matter first, while, in so far as they require nourishment, it is actually into their coats (which are the real bodies of these organs) that the appropriate matter is drawn.³ Of the blood, then, which is taken into their cavities when they dilate, that part which is most proper to them and

³ The coats exercise the vital traction, the cavities the merely mechanical. cf. p. 165, note 2.
GALEN

te kai μάλιστα τρέφειν δυνάμενοι οἱ χειῶνες αὐτοὶ τῶν ἀγγείων ἐπιστῶνται.

Τοῦ δ' ἐκ τῶν φλεβῶν εἰς τὰς ἀρτηρίας μεταλαμβάνεσθαι τι πρὸς τοὺς εἰρημένους ικανοῦ καὶ τούτῳ γε τεκμήριον, εἰ πολλὰς καὶ μεγάλας ἀρτηρίας διατεμοῦ ἀποκτεῖναι τὸ ξύον βουληθεὶς, εὑρήσεις αὐτοῦ τὰς φλέβας ὁμοίως ταῖς ἀρτηρίαις ἐκκενουμένας, οὐκ ἂν τούτου ποτὲ γενομένου χωρίς τῶν πρὸς ἀλλήλας αὐταῖς ἀναστομώσεως. ὥσαυτὸς δὲ καὶ κατ' αὐτὴν τὴν καρδίαν ἐκ τῆς δεξιᾶς κοιλίας εἰς τὴν ἀριστερὰν 208 ἐλκεται τὸ λεπτῶτατον ἔχοντος τινα τρήματα τοῦ μέσου διαφράγματος αὐτῶν, ἀλλ' ἐξ οὐδέποτε δυνατόν ἐστὶν ἵδειν, οἷον βοθύνους τινὰς ἔξενυτερον στόματος ἀεὶ καὶ μᾶλλον εἰς στενοτερον προϊόντας. οὔ μὴν αὐτά γε τὰ ἔσχατα πέρατα δυνατὸν ἐτι θεάσασθαι διὰ τε σμικρότητα καὶ ὅτι τεθνέως ἡ δι' τοῦ ξύον κατέξυπναί τε καὶ πεπύκνωσαί πάντα. ἀλλ' ὁ λόγος κάνταυθα πρῶτον μὲν ἐκ τοῦ μηδὲν ὑπὸ τῆς φύσεως γίγνεσθαι μάτην ὀρμώμενος ἐξευρίσκει τὰς ἀναστομώσεις ταῦτας τῶν κοιλίων τῆς καρδίας· οὔ γὰρ δὴ εἰκῇ γε καὶ ὡς ἐτυχεῖν οἱ ἐς στενὸν οὕτω τελευτῶτες ἔγενοντο βόθυνοι.

Δεύτερον δὲ καὶ τοῦ δυὸν ὄντων στομάτων ἐν τῇ δεξιᾷ τῆς καρδίας κοιλία τοῦ μὲν εἰσάγοντος τὸ αἷμα, τοῦ δ' ἐξάγοντος πολὺ μεῖζον εἶναι τὸ εἰσάγον. ὡς γὰρ οὐ παντὸς τοῦ αἷματος, ὢςον ἡ κοίλη φλεψ δίδωσι τῇ καρδίᾳ, πάλιν ἔξε ἐκεῖνης

1 Chap. xiv.
2 These fossae were probably the recesses between the columnae carnaeae.
most able to afford nourishment is attracted by their actual coats.

Now, apart from what has been said, the following is sufficient proof that something is taken over from the veins into the arteries. If you will kill an animal by cutting through a number of its large arteries, you will find the veins becoming empty along with the arteries: now, this could never occur if there were not anastomoses between them. Similarly, also, in the heart itself, the thinnest portion of the blood is drawn from the right ventricle into the left, owing to there being perforations in the septum between them: these can be seen for a great part [of their length]; they are like a kind of fossae [pits] with wide mouths, and they get constantly narrower; it is not possible, however, actually to observe their extreme terminations, owing both to the smallness of these and to the fact that when the animal is dead all the parts are chilled and shrunken. Here, too, however, our argument, starting from the principle that nothing is done by Nature in vain, discovers these anastomoses between the ventricles of the heart; for it could not be at random and by chance that there occurred fossae ending thus in narrow terminations.

And secondly [the presence of these anastomoses has been assumed] from the fact that, of the two orifices in the right ventricle, the one conducting blood in and the other out, the former is much the larger. For, the fact that the insertion of the vena cava into the heart is larger than the

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4 He means the tricuspid orifice. cf. p. 121, note 4.
5 The right auricle was looked on less as a part of the heart than as an expansion or "insertion" of the vena cava.
GALEN

έκπεμπομένου τῷ πνεύμονι, μείζων ἐστὶν ἢ ἀπὸ τῆς κούλης εἰς αὐτὴν ἐμφύσεις τῆς ἐμφυομένης εἰς 209 τὸν πνεύμονα φλεβός. οὐδὲ || γὰρ τοὺτ ἐστὶν εἰπεῖν, ὡς ἐδαπανήθη τῷ τοῦ αἷματος εἰς τὴν αὐτοῦ τοῦ σώματος τῆς καρδίας θρέψθην. ἐτέρα γὰρ ἐστὶ φλεβὶ ἢ εἰς ἐκεῖνο κατασχιζομένη μήτε τὴν γένεσιν ἐκ τῆς καρδίας αὐτῆς μήτε τὴν τοῦ αἷματος ἔχουσα μετάληψιν. εἰ δὲ καὶ δαπανάται τι, ἀλλ' οὐ τοσοῦτον γε μείων ἐστὶν ἢ εἰς τὸν πνεύμονα φλεβὶ ἀγοῦσα τῆς εἰς τὴν καρδίαν ἐμφυομένης, ὡς εἰκὸς εἰς τὴν τροφὴν ἀνήλωσθαι τῆς καρδίας, ἀλλὰ πλέον πολλῷ. δῆλον οὖν, ὡς εἰς τὴν ἀριστερὰν τι μεταλαμβάνεται κοιλίαν.

Καὶ γὰρ οὖν καὶ τῶν κατ' ἐκείνην ἀγγειών δυοὶ ὄντων ἐλαττῶν ἐστὶ πολλῷ τὸ ἐκ τοῦ πνεύμονος εἰς αὐτὴν εἰσάγον τὸ πνεῦμα τῆς ἐκφυομένης ἀρτηρίας τῆς μεγάλης, ἀφ' ἡς αἱ κατὰ τὸ σῶμα σύμπασαι πεφύκασιν, ὡς ἀν μὴ μόνον ἐκ τοῦ πνεύμονος πνεῦμα μεταλαμβανούσης αὐτῆς, ἀλλὰ κὰ τῆς δεξιὰς κοιλίας αἱμα διὰ τῶν εἰρημένων ἀναστομώσεων.

"Ὅτι δ' ἀμείων ἦν τοῖς τοῦ σῶματος μορίοις τοῖς μὲν ὑπὸ καθαροῦ καὶ λεπτοῦ καὶ ἀτμωδοὺς αἷματος τρέφεσθαι, τοῖς δ' ὑπὸ παχέος καὶ θόλερού καὶ ὡς οὖν ἐνταῦθα τι παρεωράται τῇ 210 φύσει, τῆς || περὶ χρείας μορίων πραγματείας ἐστίν, ὡστ' οὖ χρῆ νῦν ὑπὲρ τούτων ἔτι λέγειν,

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1 This “vein” (really the pulmonary artery) was supposed to be the channel by which the lungs received nutriment from the right heart. cf. p. 121, note 3.
2 The coronary vein.
3 Galen’s conclusion, of course, is, so far, correct, but he has substituted an imaginary direct communication between the ventricles for the actual and more roundabout pulmonary
vein which is inserted into the lungs suggests that not all the blood which the vena cava gives to the heart is driven away again from the heart to the lungs. Nor can it be said that any of the blood is expended in the nourishment of the actual body of the heart, since there is another vein which breaks up in it and which does not take its origin nor get its share of blood from the heart itself. And even if a certain amount is so expended, still the vein leading to the lungs is not to such a slight extent smaller than that inserted into the heart as to make it likely that the blood is used as nutriment for the heart: the disparity is much too great for such an explanation. It is, therefore, clear that something is taken over into the left ventricle.

Moreover, of the two vessels connected with it, that which brings pneuma into it from the lungs is much smaller than the great outgrowing artery from which the arteries all over the body originate; this would suggest that it not merely gets pneuma from the lungs, but that it also gets blood from the right ventricle through the anastomoses mentioned.

Now it belongs to the treatise "On the Use of Parts" to show that it was best that some parts of the body should be nourished by pure, thin, and vaporous blood, and others by thick, turbid blood, and that in this matter also Nature has overlooked nothing. Thus it is not desirable that these matters should be further discussed. Having mentioned, circulation, of whose existence he apparently had no idea. His views were eventually corrected by the Renascence anatomists. cf. Introduction, pp. xxii.–xxiii.

* He means the left auricle, considered as the termination of the pulmonary "arteries"; cf. p. 314, note 3.

5 The aorta, its orifice being circular, appears bigger than the slit-like mitral orifice.
ἀλλ’ ὑπομνήσαντας, ὡς δύο ἐστὶν ὀλκής εἰδή, τῶν μὲν εὐρείας ὁδοῖς ἐν τῷ διαστάλλεσθαι τῇ πρὸς τὸ κενοῦμενον ἀκολούθῳ τῇ ἐλξίν ποιουμένων, τῶν δὲ οἰκειότητι ποιότητος, ἐφεξῆς λέγειν, ὡς τὰ μὲν πρῶτα καὶ πάρρῳδες ἑλκεῖν τι δύναται, τὰ δὲ δεύτερα ἐκ τῶν ἐγγυτάτων μόνων. αὐλάσκον μὲν γὰρ ὅτι μῆκιστον εἰς ὕδωρ ἔνεστι καθένα τράχιος ἀναστὰν εἰς τὸ στόμα δι’ αὐτοῦ τὸ ὕγρον· οὐ μὴν εἰ γ’ ἐπὶ πλέον ἀπαγόρους τῆς ἡρακλείας λίθου τὸν σιδηρὸν ἢ τοὺς πυροὺς τοῦ κεραμίου—καὶ γὰρ καὶ τοιοῦτον τι πρόσθεν ἑλέγετο παράδειγμα—δύνατ’ ἂν ἐτι γενέσθαι τις ὀλκή.

Σαφέστατα δ’ ἂν αὐτὸ μάθοις ἐπὶ τῶν ἐν τοῖς κήποις ὄχετὼν· ἐκ τούτων γὰρ εἰς μὲν τὰ παρακείμενα καὶ πλησίον ἀπαντά διαδίδοται τις ἰκμάς, εἰς δὲ τὰ πορροτέρα προσελθεῖν οὐκέτι δύναται, καὶ διὰ τούτ’ ἀναγκάζονται πολλοῖς ὄχετοις μικροίς ἀπὸ τοῦ μεγάλου τετμημένου εἰς ἐκαστὸν μέρος τοῦ κήπου τὴν ἐπίρρυσιν τοῦ ὤδατος ἐπι-211 τεχνάσθαι· καὶ τηλικαύτα γε τὰ μεταξ’ διαστήμου τούτων τῶν μικρῶν ὄχετῶν ποιουσιν, ἡλικα μάλιστα νομίζουσιν ἀρκεῖν εἰς τὸ ἴκανόν ἀπολαύειν ἑλκοντα τῆς ἐκατέρωθεν αὐτοῖς ἐπιρρεόσ της ὑγρότητος. οὕτως οὖν ἔχει καὶ τοῖς τῶν ξύρων σώμασιν. ὄχετοι πολλοὶ κατὰ πάντα τὰ μέλη διεσπαρμένοι παράγοντοι αὐτοῖς ἀλμα καθά-περ ἐν κήπους ὑδρεῖαν τινά. καὶ τούτων τῶν ὄχετῶν τὰ μεταξ’ διαστήματα θαυμαστῶς ὑπὸ τῆς φύσεως εὐθὺς εξ ἄρχης διατέτακται πρὸς τὸ μὴ ἐνδεῖ δρΧρησιμοθεί τοῖς μεταξ’ μορίοις ἑλκοντιν εἰς ἑαυτὰ τὸ ἀλμα μῆτε κατακλύζεσθαι.
however, that there are two kinds of attraction, certain bodies exerting attraction along wide channels during diastole (by virtue of the principle by which a vacuum becomes refilled) and others exerting it by virtue of their appropriateness of quality, we must next remark that the former bodies can attract even from a distance, while the latter can only do so from among things which are quite close to them; the very longest tube let down into water can easily draw up the liquid into the mouth, but if you withdraw iron to a distance from the lodestone or corn from the jar (an instance of this kind has in fact been already given¹) no further attraction can take place.

This you can observe most clearly in connection with garden conduits. For a certain amount of moisture is distributed from these into every part lying close at hand but it cannot reach those lying further off: therefore one has to arrange the flow of water into all parts of the garden by cutting a number of small channels leading from the large one. The intervening spaces between these small channels are made of such a size as will, presumably, best allow them [the spaces] to satisfy their needs by drawing from the liquid which flows to them from every side. So also is it in the bodies of animals. Numerous conduits distributed through the various limbs bring them pure blood, much like the garden water-supply, and, further, the intervals between these conduits have been wonderfully arranged by Nature from the outset so that the intervening parts should be plentifully provided for when absorbing blood, and that they should never

¹ p. 87.
ΓΑΛΕΝ

ποτ' αυτὰ πλήθει περιττής ύγρότητος ἀκαίρως ἐπιρρεούσης.

Ὁ γὰρ δὴ τρόπος τῆς θρέψεως αυτῶν τοιόσοδε τίς ἐστι. τοῦ συνεχούς έαυτῷ σώματος, οἷόντερ τὸ ἄπλοῦν ἀγγείον Εφασίστατος ὑποτίθεται, τὰ μὲν ἐπιπολῆς μέρη πρῶτα τῆς ὁμιλούσης ἀπολαύει τροφῆς· ἐκ δὲ τούτων αὐτὸ μεταλαμβάνει κατὰ τὸ συνεχὲς ἔλκοντα τὰ τούτων ἔξης, εἰτ' ἐξ ἐκείνων αὐθεὶς ἑτερα καὶ τούτ' οὖ παύεται γιγνόμενον, ἄχρις ἀν εἰς ἀπαντ' αὐτοῦ διαδοθῇ τὰ μόρια τῆς τρεφούσης οὐσίας ἡ ποιότης. ὡσα δὲ 212 τῶν μορίων ἐπὶ πλέον ἃ ἀλλοιουμένου δεῖται τοῦ μέλλοντος αὐτὰ θρέψειν χυμοῦ, τοῦτοι δὲ πεπερ πιγ ταμείου ἡ φύσις παρεσκεύασεν ἢτοι κοιλίας ἢ σήραγγας ἢ τι ταῖς σήραγγιν ἀνάλογον. αἱ μὲν γὰρ σάρκες αἱ τε τῶν σπλάγχνων ἀπάντων αἱ τε τῶν μυῶν ἐξ αἵματος αὐτοῦ τρέφονται βραχεῖαν ἀλλοίωσιν δεξαμένου. τὰ δ' ὀστὰ παμπόλλης ἐν τῷ μεταξὺ δεῖται τῆς μεταβολῆς, ἵνα τραφῆ, καὶ ἐστὶν οἰόντερ τὸ αἵμα ταῖς σαρξί, τοιοῦτος οἱ μυελὸς τοῖς ὅστοις ἐν μὲν τοῖς μικροῖς τε καὶ ἀκούλιοι κατὰ τὰς σήραγγας αὐτῶν διεσπαρμένος, ἐν δὲ τοῖς μείζοσι τε καὶ κοιλίας ἐχούσιν ἐν ἐκείναις ἥθροισμένοι.

Ὡς γὰρ καὶ διὰ τοῦ πρώτον γράμματος ἐδείκνυτο, τοῖς μὲν ὁμοίαν ἔχοσιν τὴν οὐσίαν εἰς ἀλληλα μεταβάλλειν ἑγχώρει, τοῖς δὲ πάμπολοι διεστῶσιν ἀμήχανον ἀλληλοις ὁμοιωθήναι χωρὶς τῶν ἐν μέσῳ μεταβολῶν. τοιούτοις τι καὶ τοῖς

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1 Or we may render it “corpuscle”; Galen practically means the cell. cf. p. 153, note 2.
be deluged by a quantity of superfluous fluid running in at unsuitable times.

For the way in which they obtain nourishment is somewhat as follows. In the body which is continuous throughout, such as Erasistratus supposes his simple vessel to be, it is the superficial parts which are the first to make use of the nutriment with which they are brought into contact; then the parts coming next draw their share from these by virtue of their contiguity; and again others from these; and this does not stop until the quality of the nutrient substance has been distributed among all parts of the corpuscle in question. And for such parts as need the humour which is destined to nourish them to be altered still further, Nature has provided a kind of storehouse, either in the form of a central cavity or else as separate caverns, or something analogous to caverns. Thus the flesh of the viscera and of the muscles is nourished from the blood directly, this having undergone merely a slight alteration; the bones, however, in order to be nourished, require very great change, and what blood is to flesh marrow is to bone; in the case of the small bones, which do not possess central cavities, this marrow is distributed in their caverns, whereas in the larger bones which do contain central cavities the marrow is all concentrated in these.

For, as was pointed out in the first book, things having a similar substance can easily change into one another, whereas it is impossible for those which are very different to be assimilated to one another without intermediate stages. Such a one in respect to

2 cf. the term “cavernous tissue.”
3 I. x.
χόνδροις ἐστὶ τὸ περικεχυμένον μυξώδες καὶ τοῖς συνδέσμοις καὶ τοῖς ὑμέσι καὶ τοῖς νεύροις τὸ παρεσπαρμένον ἐν αὐτοῖς ὑγρὸν γλύσχρον ἔκαστον γὰρ τὸ τοῦτον ἐξ ἑνὸς σύγκειται πολλῶν, ἀλλὰ ὁμοιομερεῖς τῇ εἰσὶ καὶ ὅντως αἰσθητὰ στοιχεῖα. κατὰ δὲ τὰς μεταξὺ χόρας αὐτῶν ὁ οἰκειοτάτος εἰς θρέψιν παρέσπαρται χυμός, διὸ ἐξελκυσαν μὲν ἐκ τῶν φλεβῶν τοῦ ἀίματος, ὡς ὁ ὀίνον τῇ ἐκλεξάμεναι τὸν ἐπιτηδειότατον, ἐξ- ὁμοιοῦσι δὲ κατὰ βραχὺ καὶ μεταβάλλουσιν εἰς τὴν ἑαυτῶν οὐσίαν.

"Απαντᾷ οὖν ταῦτα καὶ ἀλλήλοις ὁμολογεῖ καὶ τοῖς ἐμπροσθεν ἀποδεδειγμένοις ἰκανῶς μαρτυρεῖ καὶ ὡς χρῆ μηκύνειν ἐτὶ τῶν λόγων ἔκ γὰρ τῶν εἰρημένων ἐνεστὶν ἐκάστῳ τὰ κατὰ μέρος ἀπαντᾷ καθ' ὄντια γίγνεται τρόπον ἐξευρίσκειν ἐτοίμῳ, ὡσπερ καὶ διὰ τὴν πολλοῖς κωδωνιζομένοις πάμπολυ τάχιστα μὲν ἀναδίδοται τὸ ποθὲν, οὐρεῖται δ' ὁλὸν δεῖν ἀπαν ἐντὸς σὺν πολλοῦ χρόνου. καὶ γὰρ κάντισθα τῇ τῇ τῆς ποιότητος οἰκείοτητι καὶ τῇ τῆς ὑγρότητος λεπτότητι καὶ τῇ τῶν ἀγγείων τε καὶ τῶν κατ' αὐτὰ στομάτων εὐρύτητι καὶ τῇ τῆς ἐλεκτικῆς δυνάμεως εὐρωστίᾳ τὸ τάχος συντελεῖται τῇ ἀναδόσεως, τῶν μὲν πλησίον τῆς κοιλίας τεταγμένων μορίων οἰκείοτητι ποιότητ- 214 τος ἐνεκα ἐλκόντων τὸ πόμα, τῶν δ'
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cartilage is the myxoid substance which surrounds it, and in respect to ligaments, membranes, and nerves the viscous liquid dispersed inside them; for each of these consists of numerous fibres, which are homogeneous— in fact, actual sensible elements; and in the intervals between these fibres is dispersed the humour most suited for nutrition; this they have drawn from the blood in the veins, choosing the most appropriate possible, and now they are assimilating it step by step and changing it into their own substance.

All these considerations, then, agree with one another, and bear sufficient witness to the truth of what has been already demonstrated; there is thus no need to prolong the discussion further. For, from what has been said, anyone can readily discover in what way all the particular [vital activities] come about. For instance, we could in this way ascertain why it is that in the case of many people who are partaking freely of wine, the fluid which they have drunk is rapidly absorbed through the body and almost the whole of it is passed by the kidneys within a very short time. For here, too, the rapidity with which the fluid is absorbed depends on appropriateness of quality, on the thinness of the fluid, on the width of the vessels and their mouths, and on the efficiency of the attractive faculty. The parts situated near the alimentary canal, by virtue of their appropriateness of quality, draw in the imbibed food for their own purposes, then the parts next to them

1 Lit. homoeomerous, i.e. "the same all through," of similar structure throughout, the elements of living matter. cf. p. 20, note 3, and cf. also the "cell" of Erasistratus, p. 153.
GALEN

ἐξής τούτως ἐξαρπαζόντων καὶ αὐτῶν εἰς ἑαυτὰ κάπετα τῶν ἐφεξῆς πάλιν ἐκ τούτων μεταλαμβανόντων, ἄχρις ἂν εἰς τὴν κοίλην ἁφίκηται φλέβα, τούντεῦθεν δ' ἦδη τῶν νεφρῶν τὸ οἰκεῖον ἐπισπομένων. ὡστε οὖδὲν θαυμαστὸν οὖν μὲν ὑδατος ἀναλαμβάνεσθαι θάττου οἰκείότητι ποιότητος, αὐτὸν δὲ τὸν οἶνον τὸν μὲν λευκὸν καὶ καθαρὸν ἑτοίμως ἀναδίδοσθαι διὰ λεπτότητα, τὸν δ' ἂν μέλανα καὶ θολερόν ἵσχεσθαι τε κατὰ τὴν ὀδὸν καὶ βραδύνειν υπὸ πάχους.

Εἰς δ' ἂν ταῦτα καὶ τῶν ὑπὲρ τῶν ἀρτηριῶν ἐμπροσθεν εἰρημένων οὐ σμικρὰ μαρτύρια. πανταχόν γὰρ ὅσον οἰκεῖον τε καὶ λεπτὸν αἶμα τοῦ μῆ τοιούτου ῥᾶν ἔπεται τοῖς ἐλκουσιν. ἀτμὸν οὖν ἐλκουσαι καὶ πνεῦμα καὶ λεπτὸν αἶμα κατὰ τὰς διαστάσεις αἱ ἀρτηρίαι τῶν κατὰ τὴν κοιλίαν καὶ τὰ ἐντερα περιεχομένων χυμῶν ἢ οὔδ' ὅλως ἢ παντάπασιν ἐπισποῦνται βραχύ.
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in their turn snatch it away, then those next again take it from these, until it reaches the vena cava, whence finally the kidneys attract that part of it which is proper to them. Thus it is in no way surprising that wine is taken up more rapidly than water, owing to its appropriateness of quality, and, further, that the white clear kind of wine is absorbed more rapidly owing to its thinness, while black turbid wine is checked on the way and retarded because of its thickness.

These facts, also, will afford abundant proof of what has already been said about the arteries; everywhere, in fact, such blood as is both specifically appropriate and at the same time thin in consistency answers more readily to their traction than does blood which is not so; this is why the arteries which, in their diastole, absorb vapour, pneuma, and thin blood attract either none at all or very little of the juices contained in the stomach and intestines.
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