

THUCYDIDES ON THE PLAGUE: PHYSIOLOGY OF FLUX AND FIXATION

... πρώτον μὲν τῆς κεφαλῆς θέρμαι ἰσχυραὶ καὶ τῶν ὀφθαλμῶν ἐρυθήματα καὶ φλόγῳσις ἐλάμβανε, καὶ τὰ ἐντός, ἥ τε φάρυγξ καὶ ἡ γλῶσσα, εὐθὺς αἱματώδη ἦν καὶ πνεῦμα ἀτοπον καὶ δυσῶδες ἤφίει.

ἔπειτα ἐξ αὐτῶν παρμὸς καὶ βράγχος ἐπεγίνετο καὶ ἐν οὐ πολλῷ χρόνῳ κατέβαιναν ἐς τὰ στήθη ὁ πόνος μετὰ βηχὸς ἰσχυροῦ.

καὶ ὁπότε ἐς τὴν καρδίαν στηρίζεον, ἀνέστρεφέ τε αὐτὴν καὶ ἀποκαθάρσεις χολῆς πάσαι ὅσαι ὑπὸ ἱατρῶν ὠνομασμέναι εἰσὶν ἐπῆσαν, καὶ αὗται μετὰ ταλαιπωρίας μεγάλης. λύγξ... κενή, σπασμὸν ἐνδιδούσα ἰσχυρόν, τοῖς μὲν μετὰ ταῦτα λωφήσαντα, τοῖς δὲ καὶ πολλῷ ὕστερον. καὶ τὸ μὲν ἐξωθεν ἀπτομένῳ σώμα οὐτ' ἄγαν θερμὸν ἦν οὔτε χλωρόν... τὰ δὲ ἐντός... ἐκάετο... ἡ διεφθειρόντο οἱ πλείστοι ἐναταῖοι καὶ ἐβδομαῖοι ὑπὸ τοῦ ἐντὸς καύματος... ἡ εἰ διαφύγοιεν,

ἐπικατιόντος τοῦ νοσήματος ἐς τὴν κοιλίαν καὶ ἐλκώσεώς τε αὐτῇ ἰσχυρᾶς ἐγγιγνομένης καὶ διαρροίας ἅμα ἀκράτου ἐπιπιπτούσης οἱ πολλοὶ ὕστερον δι' αὐτὴν ἀσθενεῖα ἀπεφθειρόντο.

διεξήει γὰρ διὰ παντὸς τοῦ σώματος ἄνωθεν ἀρξάμενον τὸ ἐν τῇ κεφαλῇ πρώτον ἰδρυθὲν κακόν... (Thucydides 2.49)

Thucydides' description of the great plague at Athens, perhaps the most celebrated 'paramedical' passage in Greek literature, raises questions about the relationship between Thucydides' history and contemporary medical writing.¹ However, despite much discussion of related matters, the physiology implicit in Thucydides' account seems not to have attracted scholarly attention. Physiological aspects of his narrative are here discussed, against the background of medical texts and especially in relation to the prevalent Hippocratic theory that the cause and progress of disease depended on bodily flux. It will be seen that Thucydides' description of the progress of the plague through the body is in accord with classic medical doctrines of flux and fixation, and is based on a relatively sophisticated view of human physiology.

It is beyond the scope of this short paper to explore in full the wider implications of these findings. Does Thucydides tailor his narrative to fit the fabric of known medical theory, or even to prove the theory correct? If so, this may have a bearing on his objectivity and veracity in choice and presentation of evidence; indeed on his entire historiographical method. Or does Thucydides simply use medical knowledge to amplify and confirm data of his own observation and experience, in order to describe the progress of the disease as clearly and accurately as he can? The latter view is more consonant with the probability that Thucydides took the existence and importance of bodily flux for granted, not as an abstraction propounded by doctors, but as a matter of common sense and common knowledge. From a modern perspective, bodily flux

¹ For general treatments of this relationship, see K. Weidauer, *Thukydides und die hippokratischen Schriften* (Heidelberg, 1953/4); C. Lichtenthaeler, *Thucydide et Hippocrate vus par un historien-médecin* (Geneva, 1965); and G. Rechenauer, *Thukydides und die hippokratische Medizin* (Hildesheim, 1991). In the course of useful comments, one of the CQ referees invited speculation on the implications of the findings presented in this paper for this relationship: some tentative suggestions are accordingly incorporated. I am grateful to both referees for their careful reading.

may seem merely a strange or mistaken notion; in the fifth century B.C. it was an accepted fact in diagnosis (see further below). It is most unlikely that Thucydides viewed the occurrence of flux as in any way theoretical (cf. below on contagion and acquired immunity), and certainly not as a theory for which he might present empirical corroboration. His evident familiarity with the details of bodily routes postulated by doctors for the course of flux remains remarkable.

Much has been written on the terminology used by Thucydides to describe the plague: is it technical, semi-technical, or non-technical?² Page argued that Thucydides' language is 'technical'; Parry denied that there is any close similarity with, or debt to, medical writings; Dover, in the course of valuable comments on the limitations of the designation 'technical', has endorsed Parry's scepticism. Commentators judiciously sit on the fence: Rhodes remarks, 'This prose is indeed not the prose of a medical writer, but his medical vocabulary is extensive if not arcane . . . he is indebted to [contemporary medical writings], even if he has not copied them'; Rusten writes 'The vocabulary reveals many coincidences with Hippocratic writings; yet most of the terminology is consistent with everyday speech as well'; and Hornblower finds 'a sense of ἀκριβεία . . . which leaves on the reader a strong impression of clinical precision, irrespective of the closeness or otherwise of the parallels which can be cited from medical writings'.³ The consensus seems to be that Thucydides' cognizance of medical expression does not lead him to replicate techniques of medical writing.

Much has been written too on the pathology of the plague: can it be identified with any known disease or diseases? Poole and Holladay were influential in arguing that it cannot, because over the course of two millennia both the virulence of any infecting organism and the characteristics of the host defence mechanisms would change, and so therefore would the clinical manifestations: these arguments arrested, but did not completely end, speculation on candidate microbes. Poole and Holladay were influential too in suggesting that Thucydides was way ahead of contemporary medical science in that he anticipated (by about 1800 years) awareness of the occurrence of contagion and (by more than 2000 years) recognition of acquired immunity to a specific infection. This view won widespread support; but it ought to be recognized that Thucydides merely records and observes details apparent in the particular case of the plague (the effects of associating with, and especially of caring for, sufferers 2.47, 51, and 58; the fact that the plague did not strike twice, or if it did was not fatal 2.51): he does not go beyond this to formulate theories of general validity. He describes the

² Galen's view was clear: whereas Thucydides wrote as an ἰδιώτης for fellow laymen, Hippocrates wrote as a τεχνίτης for fellow professionals (7.850 K.).

³ D. L. Page, 'Thucydides' description of the great plague at Athens', *CQ* 3 (1953), 97–119; A. M. Parry, 'The language of Thucydides' description of the plague', *BICS* 16 (1969), 106–18; K. J. Dover, *The Evolution of Greek Prose Style* (Oxford, 1997), 115–16; commentaries of Rhodes (Warminster, 1988), Rusten (Cambridge, 1989), and Hornblower (Oxford, 1991). See also W. Nestle, 'Hippocratica', *Hermes* 73 (1938), 1–38; S. L. Radt, 'Zu Thukydides' Pestbeschreibung', *Mnemosyne* 31 (1978), 233–45; C. Lichtenthaeler, 'οὕτε γὰρ ἰατροὶ ἤρκουν τὸ πρῶτον θεραπεύοντες ἀγνοοῖα', *Hermes* 107 (1979), 270–86; J. Jouanna, 'Politique et médecine. La problématique du changement dans le Régime des maladies aiguës et chez Thucydide', in *Hippocratica*, *CIH* III Proceedings (Paris, 1980), 299–319; H. Erbse, 'Thukydides über die Ärzte Athens', *RhMus* 124 (1981), 29–41; P. Demont, 'Notes sur le récit de la peste Athénienne chez Thucydide et sur ses rapports avec la médecine grecque de l'époque classique', in *Formes de pensées dans la Collection Hippocratique*, *CIH* IV Proceedings (Geneva, 1983); J. W. Allison, 'Pericles' policy and the plague', *Historia* 32 (1983), 14–23; also O. Wenskus, reviewing Hornblower comm., *Gnomon* 62 (1990), 577–9.

effects of contiguity, rather than the phenomenon of contagion. This does not differ substantially from the observations of a Hippocratic doctor at Thasos, noting that a particular epidemic claimed few female victims, but many young men who frequented the palaistra and gymnasium (*Epid.* 1.1).⁴ Again, as in the case of flux, we are not dealing with 'theories' but rather with matters familiar to doctors through observation, and so known to at least some of the general populace. Inference from medical observation may be quite correct (contiguity and contagion) or only partially correct (flux and fixation); or indeed totally incorrect.

Thucydides' account is not a mere list of symptoms.⁵ This description of experiences common to many sufferers is structured in a way that is reminiscent of, but does not replicate, Hippocratic case studies of individual patients. Thucydides describes the progress of the plague down through the body, *a capite ad calcem*. In summing up, Thucydides states that the plague (*κακόν*) went through the entire body 'after starting from above, and settling first in the head'. There is a clear ordering of stages, stressing the downwards course: *πρώτον μὲν* 'first' high fever struck the head and the eyes became red and inflamed; *εὐθύς* 'very quickly' the parts inside (inside the throat) were suffused with blood and respiration was affected; *ἔπειτα* 'then' there was hoarseness and sneezing; *ἐν οὐ πολλῷ χρόνῳ* 'in a short time' the trouble (*πόνος*) went down to the chest; *καὶ ὁπότε* 'and when' (not a new stage, but a possible eventuality in the same region) it lodged in the *kardia* bile was discharged; after the disease (*νόσημα*) went on to the *koilia* there was uncontrollable diarrhoea; the extremities of survivors were commonly affected. The adverb *ἐντός* twice used in the narrative shows some interest in the internal workings of the body.

To Hippocratic doctors, health depends on harmony of the humours and of body fluids more generally, and disease is seen primarily in terms of fluid imbalance. As fluids provide visible and palpable evidence of organic constitution and change, observation of their motion in or from the body is of paramount diagnostic and prognostic importance. Theories of bodily structure are conditioned by supposed routes and conduits of fluids in motion and supposed sites of coagulation, fixation, or blockage. The body is viewed as having a range of important *σπάγγχνα* 'innards', linked by solid strings such as *εὔρα* (ligaments, etc.) and hollow tubes such as *φλέβες* (vessels, etc.) of various kinds. These views may seem simplistic, but the body is in fact composed largely of water; pus, vomit, and other abnormal fluids are obviously indications of disease; many kinds of illness do lead to a sensation of swelling, or visible swelling; and internal blockage does lead to trouble. The common experience of flux and fixation in head colds, and the observation that fluids flow downwards or into an available space (*VM* 18, *Loc. Hom.* 10, etc.) doubtless contributed to the development of hypothetical schemes of bodily flux.

Theories of bodily flux and fixation feature explicitly or by implication as causes

⁴ J. C. F. Poole and A. J. Holladay, 'Thucydides and the plague of Athens', *CQ* 29 (1979), 282–301; A. J. Holladay, 'New developments in the problem of the Athenian plague', *CQ* 38 (1988), 247–50. See also J. Longrigg, 'Epidemic, ideas and classical Athenian society', in T. Ranger and P. Slack (edd.), *Epidemics and Ideas: Essays on the Historical Perception of Pestilence* (Cambridge, 1992), 21–44, esp. 36 with n. 15.

⁵ See A. Roselli, 'Some remarks about the account of symptoms in *Diseases II* and *Internal Affections*', in *La maladie et les malades dans la Collection Hippocratique*, CIH VI Proceedings (Quebec, 1990), 159–70, on the important place of symptoms in the description and classification of diseases; also W. D. Smith, 'Analytical and catalogue structure in the corpus Hippocraticum', *ibid.* 277–84, on the prevalence of cataloguing rather than reasoned argument in archaic medical texts.

and concomitants of disease in many Hippocratic treatises.⁶ *Aff.* 11 is typical: [καύσος] γίνεται ὑπὸ χολῆς, ὅταν ἐντὸς τοῦ σώματος κασταστηρίζῃ, '[burning fever] arises from bile, when this gets stuck in the body'. There are many variations, but these features are regular: fluids are attracted to the head; flux from the head follows; the flow makes its way to various points where spontaneous or induced elimination, by bodily orifice or by an opening created by surgical intervention, and/or local impaction occur. The nature of the fluids in flux is not always mentioned (but bile and phlegm are most commonly implicated; blood too may be subject to flux; often the doctor hazards a guess as to which fluid or fluids may be on the move); the apparent route of the fluids is more stressed than their supposed nature. In Thucydides' account of the plague, the verbs καταβαίνειν and ἐπικατιέναι, with the explicit ἀνωθεν ἀρξάμενον show that the plague makes its way down through the body in the classic fashion of flux; and the verbs στηρίζειν and ἰδρυσθαι clearly indicate the classic problem of fixation at trouble spots. Hippocratic fluxes regularly include flux to eyes, chest and belly, all hit by the plague. Flux to the chest (lung) is the cause of the most common Hippocratic illnesses, ranging in severity from uncomplicated respiratory infections to such severe diseases as pneumonia, pleurisy, and phthisis. In Thucydides' narrative, an initial flux of blood is implied in the adjective αἱματώδης: such formations as πυώδης, χολώδης, φλεγματώδης are used in medical literature to describe the appearance of body fluids, not of body parts; for αἱματώδης, cf. *Coac.* 2.437, *Morb.* 2.54, etc., of spittle; *Morb.* 3.16, of urine.

In some medical texts, the route of flux is specified: sometimes the vessels, sometimes particular bodily 'passages' which open up for the purpose, sometimes the trachea (conduit to respiratory system) and the oesophagus (conduit to digestive system). Thucydides is sufficiently aware of this contemporary physiological theory to incorporate a version of it in his narrative. He does so with typical economy. From parallels in medical works, it is evident that Thucydides here uses the expression τὰ ἐντὸς, ἥ τε φάρυγξ καὶ ἡ γλῶσσα 'the inner parts, throat and tongue' to indicate trachea and oesophagus and that these are the implied separate routes of noxious matter to the chest (lung) and to the belly (digestive tract). The use of γλῶσσα and φάρυγξ in conjunction for trachea and oesophagus occurs in Hipp. *Anat.*, where the body is described in terms of these two routes.⁷ The two terms occur together also in *Morb.* 1.29: as a result of καύσος 'burning fever', ἡ δὲ γλῶσσα καὶ ἡ φάρυγξ τρηχύνεται τε καὶ ξηραίνεται.

The terminology in the theoretical accounts of bodily flux, where trachea and oesophagus are specified as routes of flux, is analogous to that of Thucydides: φάρυγξ is regular for trachea, and στόμαχος for Thucydides' γλῶσσα. The author of *Glands* lists seven types of flux: the first three—to ears, eyes, nose—are regarded as 'natural', presumably because the route is directly from the head. The last two, to back and hips, flow through the vessels. The remaining two go, *Gland.* 11, δι' ὑπερώης ἐς φάρυγγα, ἐς στόμαχον 'by the palate to the throat and to the oesophagus'. It soon becomes evident, *Gland.* 14, that these two fluxes, both beginning from the palate, correspond with flux via trachea to chest and flux via oesophagus to belly: the author distinguishes flux ὀπίσω . . . δι' ὑπερώης . . . ἐς τὴν κοιλίην . . ., flux 'behind (sc. by oesophagus, situated behind the trachea) by the palate to the belly' leading to diarrhoea, and flux

⁶ See E. M. Craik, *Hippocrates: Places in Man* (Oxford, 1998), 16 and 131–43, esp. 132.

⁷ On these terms in *Anat.*, see E. M. Craik, 'The Hippocratic treatise *On Anatomy*', *CQ* 48 (1998), 135–67, at 141–2 and 153.

δι' ὑπερώης ἐπὶ φάρυγγα, 'by the palate to the throat', affecting τοὺς πνεύμονας 'the lungs' and leading to consumptive conditions. This use of 'throat' is found not only in *Gland.* 11, 14 but also in *Carn.* 16, where flux from the head goes ἐς τὴν ὑπερώην καὶ τὴν φάρυγγα καὶ τὸν πνεύμονα καὶ ἐς τὴν ἄλλην κοιλίην 'to palate, throat, lung and the rest of the (sc. upper) cavity'.

There are, then, two clearly differentiated routes taken by the plague: firstly, by trachea (to lung) and secondly by oesophagus (to belly, lower digestive tract). There are also two clearly differentiated areas affected: firstly the chest (lung and *kardia*), and secondly the belly. The two routes do not exactly correspond with the two areas, but Thucydides' narrative is so compressed that this is telescoped. Chest and belly correspond with upper and lower (thoracic and abdominal) cavities, separated by the diaphragm. Noxious matter eliminated from the mouth, whether by coughing or by vomiting, both indicated here, comes from the upper cavity. There is no indication in the statement on the *kardia* that the plague has moved on from the chest; indeed the use of ὅποτε with the optative—as LSJ I.2a, '(in the case) when', expressing an event which occurred often—not ἐπειτα with indicative 'then' indicates that it is still in the upper cavity. As is regular, temporal and conditional clauses are used to indicate the different sites of flux. Flux which lodges (note the idea of fixation) in the *kardia* leads to painful evacuations of all kinds of bile; to vain retching and strong convulsions.

What and where is the *kardia*? In literary texts, it is most commonly the heart, including the heart as seat of emotion, as (with medical overtones) *A. Ch.* 184 προσέστη καρδίας κλυδώνιον χολῆς and *E. Med.* 245 ἔπαυσε καρδίαν ἄσσης. Some have supposed Thucydides to refer literally to the heart here. However, although *kardia* can of course denote the heart in anatomical contexts in the *Corpus* (as in *Cor. passim*, *Carn.*, *Oss.*, and elsewhere) regular usage of the term in physiological contexts (as in *Epid.* and elsewhere) is rather vague. (See further below.) Other commentators have taken Thucydides' reference to be to the cardiac orifice at the mouth of the stomach. This anachronistic explanation, endorsed by Σ, and recorded by LSJ s.v. II, is based solely on Galen's statement that 'the ancients' used this name; Galen here imposes his own superior anatomical knowledge on his idealized Hippocrates (*Gal.* 5.274–5 K.). LSJ cite *Prorrh.* 1. 72, but the expression there, καρδίας πόνος, is not specific.

In the Thucydeidean passage, the *kardia* is in the thoracic cavity but, as the source of vomit, is involved with digestion and so is apparently a point *en route* to the lower abdominal cavity; for flux which may stop at a point in its course the flux to back and to hips via the spinal fluid in *Loc. Hom.* and in *Glands* may be compared. The process of digestion was imperfectly understood, and there was little idea of what happened in the trunk: for instance, the totally mistaken view that some of the fluid swallowed went to the lung was common. The connection of the *kardia* with digestion is apparent in its links, especially when symptoms are being recorded, with the *hypochondrion*, the area just below the diaphragm, the abdomen, as *Aff.* 14–15, *Prorrh.* 1. 72; but for the commonly supposed position of the *kardia* itself ἄνω τῶν φρενῶν 'above the diaphragm', see *Morb.* 3.14. The term *kardia* is used by the Hippocratics in much the same range of senses as the term *praecordia* is used by Celsus: it is inconsistently an area in front of the heart, or an area in the upper abdomen. The area is vaguely described in such prepositional phrases as ἐπὶ, κατὰ, παρὰ or περὶ καρδίην, *Aff.* 15, *Epid.* 5.63, 5.80, 6.7.5, 7.3, 7.10, *Morb.* 2.48. And it is implicated in a whole range of general aches and pains, as ἐξ ὁσφύος ἐς καρδίην, *Prorrh.* 1.83 ~ *Coac.* 2.310, and for pains in similar regions cf. *Morb.* 2.5; compare also the plaintive καὶ τὴν καρδίην οἱ γυιούσθαι ἔφη, *Epid.* 7.11.

The most common use of the term *kardia*, both by patients reporting their symptoms and by doctors commenting on them, is to indicate an area in the upper part of the body, where peccant matter might accumulate, often causing pain or nausea, or a burning sensation (like 'heartburn', cf. καρδιαλγία, καρδιωγμός, καρδίας πόνος) and from where it might be evacuated from the mouth. Just as (typically phlegmatic) stuff which settled on the lung was eliminated by coughing, so (typically bilious) stuff on the *kardia* was eliminated by vomiting.⁸ But doctors were frequently non-committal as to which fluid was involved: the *kardia* is said to be associated with a trouble which might be caused by bile or by phlegm, *Aff.* 14, *Morb.* 2.5. Elsewhere too, the *kardia* is associated with phlegm, as when phlegm accumulates in the καρδίη and στόμαχος (oesophagus) compressed by the womb which had wandered from its proper place, *Mul.* 2.200. And perhaps the closest parallel to Thucydides' usage is that of *Morb. Sacr.* 9, where the verb ἐπικαταρρέω is repeated eight times, in 6, 8, 10: descending phlegm is said to go to the καρδίη and στήθεα, also (equivalent expressions) to the πλεύμων and καρδίη.

The rest of the narrative is straightforward. When the disease 'got down to' the κοιλία 'belly' (that is, not stomach but entire lower digestive tract) severe irritation and uncontrollable diarrhoea ensued; cf. *Aff.* 23 τῆς κοιλίης παντάπασιν ἡλκωμένης, ζωῆς οὐδεμία ἐλπίς. The narrative ends with stress on the extraordinary course of the plague to the extremities: survivors frequently had lost genitals, fingers, or toes; or had gone blind. While the course of the plague through the body follows the general pattern of disease-inducing flux, the plague differs from more familiar Hippocratic diseases in that it attacks not one but many parts of the body.

There remain the much-noted coincidences in vocabulary with the case histories of *Epidemics* (κατασκήπτω only *Epid.* 3.8; ἐπικατῆλθε *Epid.* 7.107) and the old question of a possible connection between the constitution of *Epid.* 3.2–16 and the year of the plague described by Thucydides. It is certainly probable that Thucydides, who had strong family and personal connections with Thrace and Thasos, was familiar with the North Greek medical tradition to which the *Epidemics* belong.⁹ However, this examination of the physiological basis of Thucydides' narrative suggests that he may have read quite widely in medical texts. It is clear that he subscribed to the common medical view that flux and disease were inextricably linked; and that he took some interest in the mechanics of the process. There are certain affinities with theoretical schemes of flux (probably widespread, but best known to us from *Loc. Hom.*, *Glands*, and *Carn.*), and there are affinities with particular cases of flux (widespread, and clearly described *Morb. Sacr.*, *Int.*, *Aff.*). Thucydides may have been familiar with at least some of those works, and it is likely that at least some of them were in circulation in fifth-century Athens.

That Thucydides had an extensive medical knowledge is clear. The ways in which he adapted the ideas of contemporary medicine to serve his own literary and historiographical ends are complex. The evidence presented here—and this applies to

⁸ The fact that the *kardia* is a region associated with bile, which is in turn most commonly associated with the liver, may lie behind the puzzling statement of *Morb.* 4.36 that the name *kardia* might be given to ἥπαρ, the liver: ἀλλοεῖ τὸ ἥπαρ ὅπερ οἱ παῖδες καρδίην καλοῦσιν.

⁹ The possibility that Thucydides met Democritus and Hippocrates in the Abdera region is explored by D. Procter, *The Experience of Thucydides* (Warminster, 1980), 40–1. See also the works cited above, n. 1, especially G. Rechenauer, 14, 16–17 and cf. J.-E. Dugand, 'Hippocrate à Thasos et en Grèce du nord' in *Corpus Hippocraticum*, CIH II Proceedings (Mons, 1977), at 233–5.

terminology and structuring of narrative as well as to its pathological and physiological substance—suggests that he had his own ‘take’ on this material, but not that he distorted it; also that he neither made nor intended to make an original contribution to medical debate.

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