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CAUSING DOUBTS: DIODORUS CRONUS AND HEROPHILUS OF CHALCEDON ON CAUSALITY*

The physician Herophilus of Chalcedon, who lived and worked in Alexandria in the early third century B.C., is best known and justly celebrated for his numerous and ground-breaking anatomical discoveries and advances in such areas as pulse theory. His systematic investigations into the human body led to some of the highest achievements of Hellenistic science, among which the best known is probably his discovery and detailed description of the nervous system and its functions.[1] Yet certain aspects of his thought have seemed difficult to harmonize with the aims and methods of his medical research. One such is his attitude to causality. According to Galen, Herophilus had accepted the existence of causes merely on a hypothetical basis, and indeed had made the striking claim that 'by nature it is not discoverable whether causes do or do not exist'.[2] Galen associates these views directly with a number of arguments designed to prove that there are no such things as causes, but we are otherwise left with little in the way of context, and different interpretations have unsurprisingly suggested themselves.

Discussion has tended to focus on the question of the extent to which Herophilus was a sceptic. Fridolf Kudlien maintained the strong thesis that Herophilus can be regarded purely and simply as a sceptic in his medical approach, citing his declaration of the unknowability of causes as one instance of this.[3] By contrast, Heinrich von Staden has taken Galen's testimony, not as indicative of a broadly sceptical attitude on Herophilus' part, but simply as part and parcel of what he characterizes as a generally

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[1] For Herophilus in general, see the magisterial study of H. von Staden, *Herophilus: The Art of Medicine in Early Alexandria* (Cambridge, 1989). For Herophilus' pulse theory, see ibid., 262–88; for his discovery of the nervous system, ibid., 155–61, 247–59, and F. Solmsen, 'Greek philosophy and the discovery of the nerves', *MH* 18 (1961), 150–97, esp. 184–97. Herophilus' researches into the reproductive system were also ground-breaking, leading for example to his identification and description of the ovaries: see von Staden (this note), 165–9.

[2] Gal. *CP* 162 and 198 respectively (pp. 128 and 146 Hankinson) = T58 and T59a von Staden, to be examined in detail below. It has been of enormous help to have at my disposal the excellent edition, translation, and commentary of Galen's *CP* in R.J. Hankinson, *Galen: On Antecedent Causes* (Cambridge, 1998).

[3] F. Kudlien, 'Herophilus und der Beginn der medizinischen Skepsis', *Gesnerus* 21 (1964), 1–13 (repr. in H. Flashar [ed.], *Antike Medizin* [Darmstadt, 1971], 280–95). Further arguments marshalled by Kudlien in support of Herophilus' scepticism are effectively countered by von Staden (n. 1), 117–24 and 244–7.

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cautious attitude to scientific theorizing, exemplified by the privileging of empirically grounded data and circumspection in the face of overly speculative modes of reasoning.[4] Jim Hankinson has responded in turn by emphasizing the manifestly sceptical cast of Herophilus' argumentation against causes, though his suggestion is that this represents merely a moderate form of scepticism, not directed towards the possibility of knowledge in general but formulated as a foil to an ungrounded confidence in the scientific use of such concepts as causes.[5]

My aim in this paper is to move this discussion on by filling out some of the historical and philosophical background to Herophilus' doubts about the existence of causes, and to re-evaluate the significance of these doubts in the context of his scientific project. I shall try to show that the arguments which Galen records in connection with Herophilus' doubts were in fact propounded by the philosopher Diodorus Cronus, and that Herophilus must have encountered them through personal contact with Diodorus in Alexandria before the latter's death *c.* 284 B.C. Hence Herophilus' sceptical views on the existence of causes are very much tied to these particular arguments and to the personality of Diodorus. This allows us to reassess Herophilus' attitude to causes to an extent, and I shall offer some observations on the nature of his reaction, maintaining that it need not be indicative of a more wide-ranging sceptical attitude. It is hoped that this analysis will help first to locate Herophilus' medicine more firmly within the context of early Alexandrian intellectual currents, and secondly to expand our knowledge of Diodorus' dialectical challenges and their influence in particular upon contemporary science.

DIODORUS AND HEROPHILUS

Before examining the details of Herophilus' doubts about causes, it will be worth considering the one piece of ancient evidence that explicitly connects him to Diodorus. This is an anecdote in which the physician ridicules one of the philosopher's notorious arguments against motion:[6]

φέρεται δὲ καὶ Ἡροφίλου τοῦ ἰατροῦ χαρίεν <τι> ἀπομνημόνευμα· συνεχρόνισε γὰρ οὗτος Διοδώρῳ, ὃς ἐναπειροκαλῶν τῇ διαλεκτικῇ λόγους διεξήει σοφιστικοὺς κατά τε ἄλλων πολλῶν καὶ τῆς κινήσεως. ὡς οὖν ἐκβαλών ποτε ὦμον ὁ Διόδωρος ἦκε θεραπευθησόμενος ὡς τὸν Ἡρόφιλον, ἐχαριεντίσατο ἐκεῖνος πρὸς αὐτὸν λέγων "ἤτοι ἐν ᾧ ἦν τόπῳ ὁ ὦμος ὢν ἐκπέπτωκεν, ἢ ἐν ᾧ οὐκ ἦν· οὔτε δὲ ἐν ᾧ ἦν οὔτε ἐν ᾧ οὐκ ἦν· οὐκ ἄρα ἐκπέπτωκεν", ὡς τὸν σοφιστὴν λιπαρεῖν ἐᾶν μὲν τοὺς τοιούτους λόγους, τὴν δὲ ἐξ ἰατρικῆς ἁρμόζουσαν αὐτῷ προσάγειν θεραπείαν.

[4] See von Staden (n. 1), 115–24, and e.g. 121: 'Herophilus finds in the provisionality which a "suppositional" (*ex hypothesi)* causal explanation can accommodate a key to reconciling his extensive empirical or observational activity with a guarded form of theory formation.'

[5] R.J. Hankinson, 'Saying the phenomena', *Phronesis* 35 (1990), 194–215, at 208–12; Hankinson (n. 2),` 270–9, esp. 279: 'Herophilus means thus to jar us out of our causal complacency, to make us realize that the offering of causal explanations is a difficult and inherently unstable enterprise. To this end he employs arguments which would eliminate, if successful, far more than simple unreflective over-confidence – but his goal is not that we actually *accept* them; merely that we are shaken by them.'

[6] Sext. Emp. *Pyr.* 2.245 = T15 von Staden = fr. 127 Döring = fr. 17 Giannantoni; trans. Annas and Barnes.

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A witty anecdote is told about Herophilus the doctor. He was a contemporary of Diodorus, who vulgarized dialectic and used to run through sophistical arguments on many topics including motion. Now one day Diodorus dislocated his shoulder and went to Herophilus to be treated. Herophilus wittily said to him: 'Your shoulder was dislocated either in a place in which it was or in a place in which it wasn't. But neither in which it was nor in which it wasn't. Therefore it is not dislocated.' So the sophist begged him to leave such arguments alone and to apply medical treatment suitable to his case.

Herophilus' response alludes to Diodorus' most famous argument against motion, which Sextus himself had recorded only a few lines earlier:[7]

εἰ κινεῖταί τι, ἤτοι ἐν ᾧ ἔστι τόπῳ κινεῖται, ἢ ἐν ᾧ οὐκ ἔστιν· οὔτε δὲ ἐν ᾧ ἔστιν (μένει γὰρ), οὔτε ἐν ᾧ μὴ ἔστιν (πῶς γὰρ ἂν ἐνεργοίη τι ἐν ἐκείνῳ, ἐν ᾧ μηδὲ τὴν ἀρχὴν ἔστιν;). οὐκ ἄρα κινεῖταί τι.

If anything moves, it moves either in a place in which it is or in a place in which it is not. But neither in a place in which it is (for there it is at rest) nor in a place in which it is not (for how could it do anything in a place in which it simply is not?). Therefore, it is not the case that anything moves.

Sextus does not explicitly attribute the argument to Diodorus here, but does so on three other occasions in his surviving works.[8] It was evidently an argument that was well known on the Alexandrian intellectual scene. Callimachus, for example, alludes to it in an epigram, alongside a reference to Diodorus' contribution to the debate on the truth conditions of conditional propositions.[9] Likewise Herophilus' medical advances had an impact on Callimachus, who saw fit to work into his *Hymn to Artemis* a reference to Herophilus' pioneering differentiation of the four coats of the eye.[10]

Diodorus and Herophilus were plainly figures of note in the intellectual ferment of early Alexandria, and in Sextus' anecdote we see them directly linked by one biographical tradition, and linked specifically in a way which has Herophilus closely familiar with Diodorus' styles of argumentation.[11] The story itself is generally regarded as a fiction, and it is of course safest to assume that it is, but whether or not this particular

[7] Sext. Emp. *Pyr.* 2.242; trans. Annas and Barnes. On Diodorus' various arguments against motion, see D. Sedley, 'Diodorus Cronus and Hellenistic philosophy', *PCPhS* 23 (1977), 74–120, at 84–9; K. Döring, 'Die sogenannten kleinen Sokratiker und ihre Schulen bei Sextus Empiricus', *Elenchos* 13 (1992), 81–118, at 98–118.

[8] *Pyr.* 3.71 = fr. 124 Döring = fr. 16 Giannantoni; *Math.* 10.87–90 = fr. 123 Döring = fr. 13 Giannantoni; and *Math.* 1.311 = fr. 128 Döring = fr. 18 Giannantoni.

[9] Fr. 393 Pfeiffer. When the crows caw κῶς αὖθι γενησόμεθα ('How shall we get there?'), that the reference is to Diodorus' argument against motion and his underlying theory of spatial and temporal minima is argued convincingly by M.J. White, 'What worried the crows?', *CQ* 36 (1986), 534–7.

[10] See H. Oppermann, 'Herophilus bei Kallimachos', *Hermes* 60 (1925), 14–32. G.W. Most, 'Callimachus and Herophilus', *Hermes* 109 (1981), 188–96, also argues, more speculatively, for an allusion in the *Hymn to Delos* to Herophilus' obstetric innovations.

[11] It may also be observed that at Aëtius, *Placita* 1.23, Herophilus' views on the perceptibility of motion are closely associated with Diodorus' theory of motion. Also worth mentioning is the fact that Galen once describes Herophilus as ἐκεῖνον τὸν διαλεκτικόν (Gal. *MM* 1.3 [10.28K.] = T10 von Staden). Although this must be simply a general characterization of Herophilus' perceived skill in logic or dialectic, the epithet Διαλεκτικός was also that standardly attached to Diodorus and his pupils as a school label: see Sedley (n. 7), 74–7; see also N. Denyer, 'Neglected evidence for Diodorus Cronus', *CQ* 52 (2002), 597–600. Galen apparently never uses the epithet in this latter sense, but his usage here at least points to something distinctive about Herophilus' style of argumentation which may be relevant to our understanding of the anecdote linking him with Diodorus (in his commentary on this passage, von Staden [n. 1], 61–2, also points to Herophilus' use of *diaeresis* in analysing various aspects of medicine).

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altercation actually occurred, it must have been considered at least a plausible association. And we know independently that Diodorus was in Alexandria during the period of Herophilus' activity there.[12] Although nothing is said about causes in the anecdote, and it gives us no reason to think that Herophilus thought very much of Diodorus' arguments, yet it should, at the very least, leave us open to the idea of direct contact between the two men.

GALEN'S TESTIMONY

Although this anecdote provides shaky grounds for constructing a hypothesis of substantial Diodorean influence on Herophilus, a more secure edifice can be built on Galen's testimony regarding the actual basis of Herophilus' doubts about causes. In his short tract *On Antecedent Causes*, Galen defends the existence of antecedent causes against, among others, Erasistratus, who denied their existence, or so at least we are told.[13] In the course of his defence, Galen refers also to the more radical position of Herophilus, who 'accepted [cause] *ex hypothesi* [only]', referring thus to causes in general, not only the antecedent causes with which Erasistratus was allegedly concerned.[14] Galen reserves a detailed account of Herophilus' reasons for holding this view until the very end of his treatise. Though rather long, it is worth quoting the relevant passage in full:[15]

[197] de Erophilo autem et de ea quae circa sermones sapientia magis Erasistrato oportet mirari et increpare eum de timore. dubitans enim de omni causa fortibus et multis rationibus, postea ipsemet invenitur utens eis dicendo multis hominibus sic videri. summe enim timidi est dimittendo rationem, ut hominibus videtur, sic existimare. [198] quid igitur ait? 'causa vero, utrum sit

[12] As noted, Callimachus refers to Diodorus as an apparently well-known public figure (Sext. Emp. *Math.* 1.309 = fr. 393 Pfeiffer). Diodorus is also found at a banquet presided over by Ptolemy I Soter in a further anecdote (Diog. Laert. 2.111–12 = fr. 99 Döring = fr. 1 Giannantoni); see Sedley (n. 7), 80, for persuasive arguments that this must have occurred in Alexandria, and that the context of the story is likely to have been historically accurate, if not the details. Sedley concludes that Diodorus died in Alexandria *c.* 284 B.C., and this has been generally accepted. Herophilus' medical achievements are ubiquitously associated with Alexandria; his dates are extremely difficult to pin down with any precision, but the evidence we have concurs in locating his *floruit* in the early third century B.C.: see von Staden (n. 1), 43–50.

[13] J. Allen, 'Galen as (Mis)informant about the views of his predecessors', *AGPh* 83 (2001), 81–9, argues, I think rightly, that Galen has seriously misunderstood, or at least misrepresented, Erasistratus' position.

[14] Gal. *CP* 162 (p. 128 Hankinson) = T58 von Staden: *quidam enim nil nullius dixerunt existere causam, quidam vero dubitaverunt si est an non, sicut Empirici, quidam autem ex suppositione acceperunt, sicut Erophilus, alii vero quidam, quorum ipse fuit dux (sc. Erasistratus), procatarticas causarum removerunt ut male creditas* ('For some people have said that nothing is the cause of anything else; some have been uncertain as to whether anything is or not, like the Empiricists; others, like Herophilus, have assumed them on the basis of hypothesis; and others, of whom he [sc. Erasistratus] was the leader, have thrown out antecedent causes as falsely believed in'; trans. Hankinson). For clarification that the final authority referred to must be Erasistratus rather than Herophilus, see Hankinson (n. 5), 208 n. 28, and, more fully, Hankinson (n. 2), 253–4.

[15] Gal. *CP* 197–200 (pp. 146–8 Hankinson) = T59a von Staden; trans. Hankinson, with changes. The supplements to the text in § 199 are due to Bardong, and they adequately restore the required sense. It is perhaps doubtful whether, strictly speaking, they should be restored to Niccolò's Latin translation, since the omissions seem more likely to have occurred in the original Greek text than in the Latin: cf. the opportunities for confusion in the parallel formulations at Sext. Emp. *Math.* 10.210 and 227.

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vel non, natura quidem non est invenibile, existimatione autem puto infrigidari, estuari, cibo et potibus repleri.' [199] quae enim argumenta sunt ex significati transpositione posuerunt in dubio Erophilum et cum hiis adhuc ea quae de modo generationis uniuscuiusque eorum quae qualitercumque fiunt, adhuc autem et hoc, scilicet utrum incorporea existens causa incorporei alicuius alterius est factiva <aut corporea existens causa corporis alicuius est factiva> aut corporis factiva alicuius existit incorporea ens aut corpus existens incorporei alicuius est effectiva, et utrum mota moti aut manentis manens <aut mota manentis aut moti manens>, et utrum presens presentis vel presens prefacti vel presens futuri. [200] deinde, postquam ita diviserit, probare singula eorum quae ex divisione nequit et sic consequenter sillogizat non esse aliquod alicuius causam. ait enim: 'aut corporea corporis aut incorporea incorporei est causa et alia quae ex divisione inventa sunt. nullum autem horum apparet existens: manifestum est quoniam omnino non est causa.'

[197] As regards Herophilus, however, and his wisdom in this type of argument, we should find him even more remarkable than Erasistratus, and accuse him indeed of timidity. For although he casts doubt on all types of cause with many powerful arguments, later he himself is to be found making use of them, saying that it seems so to many people. For it is the height of timidity to eschew argument and to believe something to be such as it appears to many people. [198] What then does he say? 'Whether or not causes exist is by nature undiscoverable, but in (my) opinion I think I am being cooled, heated and filled up with food and drink.' [199] Those arguments which are based on the alteration of the meaning of words placed Herophilus in a state of doubt, as additionally did the arguments concerning the manner of generation of each thing that comes to be in any way; so also did this, whether causes are incorporeal and the causes of other incorporeal things <, or whether they are corporeal and the causes of corporeal things>, or whether they are the causes of corporeal things while themselves being incorporeal, or whether a thing which is corporeal is the cause of something incorporeal; and whether something moved causes something moved, or something stationary causes something stationary <, or something moved something stationary, or something stationary something moved>; and whether something present is the cause of something present, something present of something past or something present of something future. [200] Then, having thus divided, he demonstrates that none of the individuals in the division is true, and so concludes that nothing is the cause of anything else. For he says: 'Either a corporeal cause is the cause of something corporeal, or an incorporeal cause of something incorporeal, or one of the other possibilities found by division. But clearly none of these is the case: so it is evident that there are no causes at all.'

Previous interpreters of this passage have tended to assume that Herophilus deployed the arguments that Galen records at §199 to support some position of his own, that he was their author, or at least that he advanced them *in propria persona*. But this need not be the case. In introducing them, Galen states that these arguments 'placed Herophilus in a state of doubt'. He *does* directly attribute to Herophilus the argument in §200 which leads to the conclusion that causes do not exist, but Herophilus is not himself committed to this conclusion, since at §198 Galen quotes him as claiming that 'whether or not causes exist is by nature undiscoverable'. Such attributions may indicate only that Galen found the arguments set out in Herophilus' own writings.[16]

I suggest that it is at least as likely that these arguments were propounded by another party, that Herophilus found their conclusions unwelcome, but was unable to diagnose

[16] It is scarcely to be doubted that Galen drew these arguments directly from Herophilus' writings. It would seem absurd to suppose that he took the arguments from elsewhere, merely speculating that they were the sorts of considerations which could hypothetically have generated Herophilus' doubts. We have very strong reasons for thinking that Galen knew at first hand at least some of Herophilus' *oeuvre*, from which he preserves extensive quotations (see von Staden [n. 1], 70). These passages from Galen's *CP* are also the only ancient witnesses to Herophilus' sceptical attitude towards causes, while the arguments themselves are mentioned nowhere else in the Galenic corpus, and thus appear to be tied to this specific context.

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any fallacy, and that he thus attempted to circumvent them by other means. Hence, as we are told by Galen in the earlier passage at §162, he posited causes on a hypothetical basis, bolstered by an appeal to 'what seems to be the case to many people', namely that there are such things as causes. I shall consider this position in more detail below, but for present purposes it may be noted that Herophilus' medical project fundamentally required the application of some notion of causation (unsurprising given the nature of his physiological and pathological speculations), and there are many reports of his having discussed the causes of various phenomena which show no trace of any doubts about their existence.[17] Hence the postulation *ex hypothesi* of causes could simply be an *ad hoc* measure to get his whole medical system off the ground. This is evidently the origin of Galen's charge of self-contradiction in observing that, despite his doubts about causes, Herophilus 'is afterwards to be found making use of them'. The suggestion that he was subjected to these arguments by another party would make excellent sense of the peculiarities in Galen's account. I aim to show next that these arguments were indeed advanced by Diodorus Cronus in order to establish the non-existence of causes, and that he is thus overwhelmingly likely to be the source of Herophilus' doubts.

DIODORUS AGAINST CAUSES AND GENERATION

The arguments which Galen associates with Herophilus' doubts can be divided into three main groups: (i) those based on alteration of meaning, (ii) those against generation, and (iii) those against causes *per se*. I shall examine each in turn (though not in order).

The first group consists of arguments that, as Galen sees it, rely on an 'alteration of the signified' (in Niccolò's translation, *significati transpositio*, which Bardong back-translates as ἡ τοῦ σημαινομένου μετάθεσις). To judge from his earlier remarks, by this Galen appears to mean arguments which depend on a (re-)definition of cause in such a restricted sense as to make actual candidates for causes impossible to find in the real world.[18] Those who employ such arguments claim that if something is to qualify as a cause, it must invariably bring about its effects. As often, Galen appeals in this context to the conception of 'cause' held by the ordinary Greek-speaker as a criterion, a conception which he finds to be in conflict with that of his opponents, and accordingly convicts them of resorting to an unwarranted and illegitimate alteration of the meaning

[17] Quotations from Herophilus' original works are rare, but a good example derives from his *Midwife*, where he offers a list of causes of dystocia, recorded by Soranus at *Gyn.* 4.1.4–5 = Fr196 von Staden: note in particular Herophilus' statement that καὶ τὸ ἐν ὀσφύι δὲ καὶ ῥάχει γινόμενον κοίλωμα αἴτιον δυστοκίας γίνεται, καὶ διὰ πιμελῶδες ἐν ἐπιγαστρίῳ καὶ ἐν ἰσχίῳ δυστοκία γίνεται ὡς ἂν ἀποπιεζομένης τῆς μήτρας, καὶ διὰ τὸ τεθνηκέναι τὰ ἔμβρυα ('when a concavity arises in the loin and spine, it, too, becomes a cause of difficult labour; on account of fat in the upper abdominal cavity and in the hips, difficult labour also occurs as if the uterus is squeezed, and because the foetuses are dead'). See generally von Staden (n. 1), 302: 'For all Herophilus' emphasis on the provisionality and hypothetical nature of causal explanation, the evidence presented in this chapter (especially T205–T225) leaves no doubt that Vindician is right [sc. to say that Herophilus dissected cadavers to discover why they died], at least to the extent that Herophilus engaged in causal explanation not only for physiological but also for pathological purposes.' I shall consider Herophilus' views about the causes of disease in more detail below.

[18] See esp. Gal. *CP* 46–55 (pp. 84–8 Hankinson); see also *CP* 97 (p. 102 Hankinson), which appears to link the two passages.

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of the term under consideration.[19] Thus the dispute is 'not about the actual facts of the matter itself, but about the words used to describe them'.[20] It is clear that this diagnosis of the arguments' fallacy is Galen's personal view of the matter, however, and that by itself it can tell us little about the nature of the arguments which actually influenced Herophilus. For details on the precise form which some of these original arguments took, we have to wait until Galen's third group.

Group (iii) comprises a series of three arguments which lead to the conclusion that there is no such thing as a cause. All three of them, as a group, subsequently made their way into the Pyrrhonian tradition, as weapons used in the war against Dogmatism. They are recorded, in the same order and in more detail, by Sextus Empiricus at *Adversus Mathematicos* 9.210–17, 227–31, and 232–6 respectively. The first argument, that based on a dichotomy between the corporeal and the incorporeal, is also preserved in Diogenes Laertius' summary of Pyrrhonian Scepticism (Diog. Laert. 9.98–9).

This has suggested to some the possibility that these arguments may have originated with Herophilus himself, and that the Pyrrhonian tradition drew them ultimately from medical sources.[21] I maintain, for the reasons set out above, that the arguments against causes are unlikely to have been of Herophilus' own devising. But of course what is needed for my argument is some way to connect them with Diodorus. Happily, one is provided by Sextus. In the course of his discussion of cause, the arguments against causes are not associated directly with any named authorities, but in introducing them Sextus notes that there is indeed a group which is committed to their conclusion (viz. that causes do not exist). He goes on to make the interesting, and not clearly motivated, observation that this group is also committed, in a logically related way, to the non-existence of motion:[22]

> … τῶν σκεψαμένων περὶ αὐτοῦ οἱ μὲν ἔφασαν εἶναί τί τινος αἴτιον, οἱ δὲ μὴ εἶναι, οἱ δὲ μὴ μᾶλλον εἶναι ἢ μὴ εἶναι. … μὴ εἶναι δὲ οἱ τὴν μεταβλητικὴν καὶ τὴν μεταβατικὴν κίνησιν ἀνελόντες σοφισταί· οὐ χωρὶς γὰρ ταύτης ὑφίσταται τὸ ποιοῦν.
>
> … of those who have examined it, some have asserted that a cause of things exists, others that it does not exist, others that it is no more existent than non-existent. … The sophists who deny change and transient motion assert that (cause) does not exist, as without such motion the agent does not subsist.

When he comes later to his discussion of motion, Sextus duly identifies these sophists who deny motion specifically as Parmenides, Melissus, and Diodorus.[23] Now Diodorus

[19] For a useful discussion of Galen's attitudes to the proper use of language and terminology in a scientific or philosophical context, see B. Morison, 'Language', in R.J. Hankinson (ed.), *The Cambridge Companion to Galen* (Cambridge, 2008), 116–56, esp. 148–52.

[20] Gal. *CP* 53 (pp. 86–8 Hankinson). Note that Galen wrote a whole book on *How one ought to distinguish an inquiry into things from one into word and meaning* (ὅπως χρὴ διακρίνειν τὴν πραγματικὴν ζήτησιν τῆς κατ' ὄνομα καὶ τὸ σημαινόμενον ἕν, Gal. *Libr. Propr.* 14.20 [19.44 K.]), and another work *On the inquiry into word and meaning* (περὶ τῆς κατ' ὄνομα καὶ σημαινόμενον ζητήσεως, *Libr. Propr.* 14.23 [19.45 K.]).

[21] See J. Barnes, 'Ancient skepticism and causation', in M.F. Burnyeat (ed.), *The Skeptical Tradition* (Berkeley, CA, Los Angeles, CA, and London, 1983), 149–203, at 150–3; Hankinson (n. 2), 272–3; G. Cambiano, 'Philosophy, science and medicine', in K. Algra et al.. (edd.), *The Cambridge History of Hellenistic Philosophy* (Cambridge, 1999), 585–613, at 610; and Allen (n. 13), 83.

[22] Sext. Emp. *Math.* 9.195; trans. Bury, with minor changes.

[23] Sext. Emp. *Math.* 10.46–48 = fr. 122 Döring = fr. 12 Giannantoni; these are the only authorities named.

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certainly drew inspiration from the Eleatics for the subjects of some of his arguments,[24] but Parmenides and Melissus themselves did not propound any of the arguments against motion or against causes that Sextus lists.[25] Diodorus, on the other hand, is by far the most prominent authority discussed in Sextus' section on motion, and he is unquestionably the principal member of Sextus' group who deny motion.[26]

It may also be significant that those who deny the existence of causes are described as 'sophists'. Sextus does not deploy this term in many contexts, and it is striking that he associates it with Diodorus on three occasions in his discussion of motion.[27] In fact, as Carl Joachim Classen has observed, Diodorus is the only named figure to be given the epithet σοφιστής in all of Sextus' surviving works.[28] In Sextus' eyes, 'sophistry' was apparently a distinctive feature of the methods of argumentation of Diodorus in particular. Indeed, such a characterization appears to date back to Diodorus' own lifetime, for it is probably Diodorus, or at least a member of his circle, to whom Epicurus refers when he describes the 'sophist' employing the riddle of the Covered Father in *On Nature* 28.[29]

Since Diodorus is the only relevant representative of the group that denies motion, and since this group is explicitly said to be behind the arguments against causes which are also recorded by Galen, Sextus thus provides an indirect but concrete link between Diodorus and the arguments that influenced Herophilus. Consistent with this is the fact that the structure of the arguments themselves is typically Diodorean: their dilemmatic form is a recurrent and characteristic motif of Diodorus' arguments, well exemplified by the argument against motion anecdotally ridiculed by Herophilus. Accordingly, rather than positing an otherwise unattested Herophilean influence on Pyrrhonian scepticism, we can infer, with far more plausibility, that these arguments reached the Pyrrhonists from Diodorus via the Sceptical Academy, whose founder, Arcesilaus, was, as we know, strongly and directly influenced by Diodorus' argumentative strategies.[30]

What, then, of Galen's second group of arguments, 'which concern the manner of generation of each thing that comes to be in any way'? Just as the arguments against causes mount a comprehensive attack on the very notion of them, this set is clearly likewise directed against generation *per se*. Arguments intended to demonstrate the non-

[24] See Sedley (n. 7), 77–8.

[25] This despite Sextus' misattribution to them at *Math.* 10.47 of Zeno of Elea's Dichotomy argument against motion: see Sedley (n. 7), 84. For Parmenides' arguments against motion, see DK 28 B 8.26–31; for Melissus', DK 30 B 7.7–10.

[26] In the whole section on motion at *Math.* 10.37–168, Diodorus' arguments and the responses to them are addressed explicitly at §§48, 85–118, 143; §§119–20 can also be added, though Diodorus is not mentioned (see N. Denyer, 'The atomism of Diodorus Cronus', *Prudentia* 13 [1981], 33–45, at 34–7).

[27] See Sext. Emp. *Math.* 10.99, 112, 118; see also the anecdote told of 'one of the ancient Cynics' and an anonymous sophist at *Math.* 10.68, where the context suggests Diodorus: cf. Sext. Emp. *Pyr.* 2.244, and Diog. Laert. 6.38–39, where the same anecdote is told of Diogenes, and where Diodorus' Horned argument is additionally refuted in a parallel manner.

[28] C.J. Classen, 'L'esposizione dei sofisti e della sofistica in Sesto Empirico', *Elenchos* 13 (1992), 57–79, at 59–61, referring to Sext. Emp. *Pyr.* 2.245, which is, perhaps not incidentally, the anecdote about Herophilus and Diodorus.

[29] Epicurus, *Nat.* 28 fr. 13 col. IX 11–IX 20; see comm. ad loc. in D. Sedley, 'Epicurus, *On Nature* Book XXVIII', *CErc* 3 (1973), 5–83, at 71–3. See also Plut. *Stoic. Rep.* 1036F, where Chrysippus criticizes Diodorus' associate and rival, the Megarian philosopher Stilpo, for having descended into sophistry; and Cic. *Acad.* 2.75, where both Stilpo and Diodorus are accused of using *sophismata*.

[30] Sext. Emp. *Pyr.* 1.234 reports that Arcesilaus' contemporary Ariston of Chios described him as 'Plato in the front, Pyrrho at the back, and Diodorus in the middle', because he made use of Diodorus' dialectic; see Sedley (n. 7), 83.

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existence of generation would also presumably be required to generate doubts about the existence of causes, as Galen tells us they did in Herophilus' case. Given the Eleatic inspiration of much of Diodorus' argumentation, as we have seen, there is a strong *prima facie* likelihood that he would have formulated arguments against generation or coming-to-be specifically. It is made practically certain that he did so by the fact that an argument against perishing is explicitly attested for him. Do we then have any plausible candidates for a corresponding Diodorean argument against generation? Indeed we do, as has been suggested by David Sedley, from precisely the passage in which Sextus records the anecdote about Diodorus and Herophilus, and in which he gives Diodorus' argument against motion without attributing it directly to him.[31] It is worth juxtaposing it here with Diodorus' explicitly attributed argument against perishing:[32]

ἤτοι τὸ ὂν γίνεται ἢ τὸ μὴ ὄν. τὸ μὲν οὖν ὂν οὐ γίνεται (ἔστι γάρ)· ἀλλ᾽ οὐδὲ τὸ μὴ ὄν· (τὸ μὲν γὰρ γινόμενον πάσχει τι, τὸ δὲ μὴ ὂν οὐ πάσχει)· οὐδὲν ἄρα γίνεται.

Either what is comes into being or what is not comes into being. Now what is does not come into being (for it already is). But neither does what is not (for what comes into being is acted on and what is not is not acted on). Therefore, nothing comes into being.

λόγον συνηρώτηκε καὶ ὁ Κρόνος τοιοῦτον· εἰ φθείρεται τὸ τειχίον, ἤτοι ὅτε ἅπτονται ἀλλήλων οἱ λίθοι καί εἰσιν ἡρμοσμένοι, φθείρεται τὸ τειχίον, ἢ ὅτε διεστᾶσιν. οὔτε δὲ ὅτε ἅπτονται ἀλλήλων καί εἰσιν ἡρμοσμένοι, φθείρεται τὸ τειχίον, οὔτε ὅτε διεστᾶσιν ἀπ᾽ ἀλλήλων· οὐκ ἄρα φθείρεται τὸ τειχίον.

[Diodorus] Cronus propounded an argument of this kind: if the wall perishes, the wall perishes either while the stones are touching one another and are fitted together or when they have come apart. But neither when they touch one another and are fitted together nor when they have come apart does the wall perish; therefore the wall does not perish.

Furthermore, we should also take seriously the fact that Galen refers to more than one argument concerning generation. I suggest that a second plausible candidate is recorded by Sextus immediately after the Diodorean argument against perishing just quoted. In this case it is directed against both generation and perishing, but it is exactly parallel to Diodorus' argument against motion, though in this case focusses on time instead of place:[33]

εἰ γίνεταί τι καὶ φθείρεται, ἤτοι ἐν ᾧ ἔστι χρόνῳ γίνεται καὶ φθείρεται, ἢ ἐν ᾧ μὴ ἔστιν. καὶ ἐν ᾧ μὲν ἔστιν, οὔτε γίνεται οὔτε φθείρεται· ἐφ᾽ ὅσον γὰρ ἔστι τοῦτο, οὔτε γίνεται οὔτε φθείρεται. καὶ μὴν οὐδὲ ἐν ᾧ μὴ ἔστι πάθοι ἄν τι τούτων· ἐν ᾧ γάρ τι μὴ ἔστιν, οὔτε παθεῖν τι οὔτε ποιεῖν δύναται. εἰ δὲ τοῦτο, οὐδὲν οὔτε γίνεται οὔτε φθείρεται.

If anything comes into being and perishes, it comes into being and perishes either in a time in which it is or in a time in which it is not. But it neither comes into being nor perishes in a time in which it is; for insofar as it *is* this thing it neither comes into being nor perishes. And it could not

[31] See Sedley (n. 7), 110 n. 56: 'Diodorus is also likely to be the author of an argument against becoming, quoted by Sext. Emp. (*Pyr.* 2.243, in a catalogue of sophisms where the two preceding arguments, though also unattributed, are of Diodorean origin): "What becomes is either τὸ ὄν or τὸ μὴ ὄν; but neither ..... etc." (of course, nothing beyond the formal presentation of this argument is original; in other respects it is that attributed to the "ancients" by Aristotle, *Ph.* A, 191a 23–33)'.

[32] Respectively Sext. Emp. *Pyr.* 2.243, trans. Annas and Barnes; and Sext. Emp. *Math.* 10.347 = fr. 126 Döring, trans. Bury, with minor changes.

[33] Sext. Emp. *Math.* 10.350.

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suffer any of these things in a time in which it is not; for it cannot suffer or effect anything in a time in which it is not anything. If this is so, then nothing either comes into being or perishes.

This argument's obvious imitation of Diodorus' argument against motion, its direct juxtaposition with an argument against perishing that is attributed to Diodorus by name, and the strong general likelihood that Diodorus formulated arguments against generation, combine to make its ascription to him very appealing.

Finally, Sextus completes the picture for us by stating explicitly that both the arguments against generation and perishing and those against motion also entail the non-existence of cause:[34]

ἀλλὰ μὴν οὐκ ἔχει τὸ αἴτιον οὗ ἔστιν αἴτιον, διὰ τὸ μήτε γένεσιν μήτε φθορὰν μήτε πεῖσιν μήτε κοινῶς κίνησιν ὑπάρχειν, ὡς ἐπὶ τῶν οἰκείων γινόμενοι τόπων διδάξομεν. οὐκ ἄρα ἔστιν αἴτιον.

But the cause does not have anything to be a cause of, since neither generation nor perishing nor being affected nor motion exists, as we shall point out when we come to the appropriate places. Therefore cause does not exist.

These remarks are made immediately before Sextus' discussion of the argument against causes based on the corporeal/incorporeal dichotomy, which, as I have argued above, was used by Diodorus. There is good reason, then, for thinking that Diodorus himself explicitly redeployed this whole set of Eleatic-inspired arguments to establish the non-existence of causes as well. We could hardly expect a better explanation of why, as Galen tells us, Herophilus' doubts about causes were connected with arguments against generation.[35]

The three arguments, then, which are said by Galen to have placed Herophilus in doubt about the existence of causes can be linked with Diodorus. In view of the Eleatic inclinations of much of his argumentation, Diodorus is also very likely to have propounded arguments against generation of the sort that Galen mentions. Not only this, but we have two specific arguments against generation which can be connected with Diodorus, and which, moreover, Sextus tells us can be used to demonstrate the non-existence of causes. Given that, as I have suggested, Herophilus is likely to have been subjected to these arguments by another party, and that he lived in Alexandria at the same time as Diodorus, the conclusion seems inescapable that it was Diodorus himself who generated Herophilus' doubts about causes. Direct, historical contact of this sort between the two men would additionally offer an ideal explanation of how the anecdote in which Herophilus teased Diodorus over his argument against motion could have arisen.

As a further general point, it should not be underestimated just how seriously Diodorus' arguments were taken by his philosophical contemporaries and immediate successors. He was able to have a profound effect on the development in particular

[34] Sext. Emp. *Math.* 9.209. The same argument is found at Diog. Laert. 9.98, recorded likewise immediately before the argument against causes based on the corporeal/incorporeal dichotomy (οὔτε γὰρ γένεσις οὔτε φθορὰ οὔτ' ἄλλο τι· οὐκ ἄρ' ἐστὶν αἴτιον).

[35] Generation/coming-to-be and causes are, of course, conceptually related (Hankinson [n. 2], 273, in his note on this testimony of Galen, points to Arist. *Gen. corr.* 1.3.318a1 ff. and *Ph.* 1.8.191a23 ff. for discussion of their general links), but something more than this seems to be suggested by Galen's comments. Some *concrete* reason why Herophilus should have been particularly worried about generation in the context of his doubts about causes is called for, one which is amply provided by the thesis that Diodorus actually directed his arguments against generation against causes as well.

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of Stoic logic, Academic Scepticism, and various aspects of Epicurus' thought.[36] Chrysippus' response to Diodorus' Master Argument, for example, was at the core of his modal logic, and differed from the refutation offered by Cleanthes, who himself devoted a whole book to it.[37]

I have avoided in the above any suggestion that Diodorus himself must have been the author of these arguments against causes and generation, or that he was the first to formulate them. In some cases he presumably was, but we need not assume so in any particular instance. It is Diodorus' role in disseminating such arguments that is critical in this context.[38] In a related manner, I would emphasize that Herophilus is likely to have been influenced by these arguments not in their own right but *as propounded by* Diodorus in person: I assume that they were transmitted to Herophilus primarily orally (Diodorus is not known to have produced any written works), and that his response to them was very much tied up with his reaction to Diodorus' personality and dialectical performances.[39] The figure of Diodorus himself is central here, in relation both to the transmission of these arguments and to their impact on Herophilus.

HEROPHILUS' RESPONSE

Diodorus' arguments were designed to show that causes *per se* do not exist. As we have seen, Herophilus did not accept this conclusion, but concluded instead that 'whether or not causes exist is by nature undiscoverable'.[40] It seems that it was at least partly because of the almost universal intuition that there are such things as causes that he was unwilling to accept the conclusion of Diodorus' arguments, since Galen tells us that he appealed to this intuition in justifying his subsequent recourse to causes: 'he himself is to be found making use of them, saying that it seems so to many people'. It is clear, however, that Herophilus did not, as Galen asserts, proclaim the existence of causes undemonstrable at one moment but nevertheless proceed to talk as if causes did exist at another, without consciousness of any inconsistency in doing so. Rather, Galen's assertion that Herophilus used causes must refer to his earlier comment that Herophilus accepted causes, but only on a hypothetical basis.[41] The kind of cause which Herophilus relied upon must have been this hypothetically posited kind, and thus the belief of the majority of people that they exist may also have been presented

[36] Sedley (n. 7).

[37] Epict. *Diss.* 2.19.9.

[38] As noted by Sedley (n. 7), 78, in regard to certain arguments, such as the Sorites, which were employed by Diodorus but reliably attributed to his predecessor Eubulides: 'Some of these came to be as closely associated with Diodorus as with Eubulides, and for this reason I shall assume, wherever one of Eubulides' riddles has passed to the Hellenistic philosophers, that Diodorus is the main vehicle of transmission …. In instances like this Diodorus' importance lies not in originality … but in his ability to impress ideas upon his contemporaries.'

[39] Diodorus' arguments certainly had an impact on written works of the period: we have seen above (n. 9), for example, a response by Callimachus; his Master Argument was treated in detail in books by Cleanthes, Chrysippus, and Archedemus (Epict. *Diss.* 2.19.9); and Sedley (n. 7), 80–1, speculates that various arguments may have been recorded by his pupil Philo.

[40] Gal. *CP* 198 (p. 146 Hankinson) = T59a von Staden: *causa vero, utrum sit vel non, natura quidem non est invenibile*.

[41] Gal. *CP* 162 (p. 128 Hankinson) = T58 von Staden: *quidam autem [sc. causam] ex suppositione acceperunt, sicut Erophilus* ('some people, such as Herophilus, have accepted [cause] *ex hypothesi* [only]').

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as to some extent justifying his hypothesis of their existence. In a dialectical context, a hypothesis needs to be accepted by the interlocutor,[42] and this appeal to a majority opinion may have been intended to elicit a general acceptance of the hypothesis for the purposes of his arguments.

But there is more to Galen's report on Herophilus' assertion of the undiscoverability of causes. The whole statement, presented as a quotation, runs as follows:[43]

quid igitur ait? 'causa vero, utrum sit vel non, natura quidem non est invenibile, existimatione autem puto infrigidari, estuari, cibo et potibus repleri.'

What then does he say? 'On the one hand, by nature it is not discoverable whether causes do or do not exist; on the other hand, in my opinion I think I am being cooled, heated, and filled with food and drink.'

Characteristically, Galen shows little interest in filling out for us the context of this enigmatic statement. I take it first that the mention here of being chilled, heated, and filled with food and drink would be relevant only if these represent examples of (hypothetical) causes. Given the focus of Galen's wider discussion in *On Antecedent Causes*, Herophilus' interests as a doctor, and the nature of the examples themselves, it is overwhelmingly likely that they represent causes specifically of *disease*.[44] Elsewhere in his treatise, Galen refers repeatedly to heating, cooling, and repletion (and exhaustion) as the paradigmatic antecedent causes of disease,[45] and it would be very strange if he did not expect us to take them as such here. This interpretation is corroborated by the fact that, as we know from Soranus, Herophilus considered an excess (πλῆθος) of matter in the body a basic cause of disease, common to male and female parts, and that he believed the genesis of disease to reside ultimately in the bodily fluids (χυμοί, *umida*).[46] It is also strikingly confirmed by a less well-known but crucially important fragment of Herophilus on the causes of disease deriving from the *Placita* tradition. It is less well known because its attribution to Herophilus rests solely on the Arabic translation of ps.-Plutarch's *Placita* by Qustā ibn Lūqā, and it does not feature in

[42] See e.g. Arist. *An. post.* 1.10.76b23–32, and *Top.* 1.18.108b12–19, where an *endoxon* can be used as the basis for arguments ἐξ ὑποθέσεως.

[43] Gal. *CP* 198 (p. 146 Hankinson) = T59a von Staden.

[44] Hankinson takes the heating, cooling, and repletion to be *effects*, rather than causes, the point being that Herophilus thinks it impossible to be certain about what is causing the cooling, heating, and being filled: see Hankinson (n. 2), 273, in particular where he suggests that 'We should perhaps then supply "by something or other" after "infrigidari, estuari", which would put them on all fours with the case of repletion. The sense then would be that Herophilus can know subjectively that he is being warmed; but it is only on the basis of a fallible causal conjecture that he can ascribe that warming to the sun's heat'; see also Hankinson (n. 5), 209–10. But there is no sign in the formulation that there is any doubt that the repletion is due to the food and drink.

[45] Cf. esp. *CP* 36–7 (pp. 80–2 Hankinson), 96 (p. 102), 102–04 (pp. 104–6), 187 (p. 142), 192 (p. 144), 195 (p. 144); also 8 (p. 72), 11 (p. 72), 16 (p. 74), 22 (p. 76), 39 (p. 82), 42–4 (p. 84), 54 (p. 88), 74 (pp. 94–6), 100–1 (p. 104), 122 (p. 112), 124 (pp. 112–14), 126 (p. 114), 143 (p. 120), 153 (p. 124), 155 (p. 126), 168 (pp. 130–2), 173–6 (pp. 134–6).

[46] On excess, see Sor. *Gyn.* 3.3.4 = T193 von Staden: καὶ Ἡρόφιλος ἐν τῷ Μαιωτικῷ φησι τὴν ὑστέραν … ὑπὸ τῶν αὐτῶν αἰτίων νοσοποιεῖσθαι, καθάπερ πλήθους, πάχους, διαφορᾶς τῶν ὁμοίων. On bodily liquids, see ps.-Gal. *Int.* 9 [14.698–9 K.] = T130 von Staden, and Celsus, *Med.* 1.pref.14–15 = T133 von Staden. We are not well informed on Herophilus' views on disease causation, but the importance of indigestion and corruption of food as a direct cause of disease is noted by Cael. Aur. *Cel. Pass.* 2.39.225 = T214 von Staden. Similarly, the Herophilean Aristoxenus points to corruption and excess of liquid in hydrophobia at Cael. Aur. *Cel. Pass.* 3.16.134 = *Ar.* 6 von Staden.

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Heinrich von Staden's collection of the Herophilean fragments.[47] The Greek text of ps.-Plutarch 5.30.1 is transmitted as follows:

Ἀλκμαίων τῆς μὲν ὑγείας εἶναι συνεκτικὴν τὴν ἰσονομίαν τῶν δυνάμεων, ὑγροῦ θερμοῦ ξηροῦ ψυχροῦ πικροῦ γλυκέος καὶ τῶν λοιπῶν· τὴν δ' ἐν αὐτοῖς μοναρχίαν νόσου ποιητικήν· φθοροποιὸν γὰρ ἑκατέρου μοναρχία.

καὶ νόσων αἰτία ὡς μὲν ὑφ' οὗ ὑπερβολὴ θερμότητος ἢ ψυχρότητος· ὡς δ' ἐξ οὗ διὰ πλῆθος τροφῆς ἢ ἔνδειαν· ὡς δ' ἐν οἷς ἢ αἷμα ἢ μυελὸν ἢ ἐγκέφαλος· γίνεσθαι δέ ποτε καὶ ὑπὸ τῶν ἔξωθεν αἰτιῶν, ὑδατῶν ποιῶν ἢ χώρας ἢ κόπων ἢ ἀνάγκης ἢ τῶν τούτοις παραπλησίων· τὴν δὲ ὑγείαν τὴν σύμμετρον τῶν ποιῶν κρᾶσιν.

Alcmaeon says that the 'equal rights' of the powers maintains health, moist, hot, dry, cold, bitter, sweet, and the rest, while monarchy among them is productive of disease; for the monarchy of either produces destruction.

And the efficient cause of disease is excess of heat or cold; the material cause is through surfeit or deficiency of nourishment; the location is either the blood or the marrow or the brain. It is sometimes also produced by external causes, the quality of waters or place or fatigue or necessity or the like. Health is the balanced mixture of the qualities.

The second part of this entry (καὶ νόσων to κρᾶσιν) offers a view on the cause of disease quite distinct from that assigned directly to Alcmaeon, and it is precisely this second part that is attributed to Herophilus in the Arabic translation.[48] Although there is no mention of Herophilus in the Greek versions found in ps.-Plutarch or Stobaeus,[49] there are powerful reasons for thinking that the Arabic translator's attribution is correct, and that Herophilus' name simply fell out of the extant Greek tradition. First, the references in Galen's quotation of Herophilus to heating, cooling, and being filled with food and drink in the context of disease causation correspond precisely to the causes of disease listed in Aëtius. The exact parallelism in these independent sources mutually supports their authenticity as Herophilean doctrine.[50]

[47] Von Staden (n. 1). Edition and German translation of Qustā ibn Lūqā's work in H. Daiber, *Aetius Arabus: die Vorsokratiker in arabischer Überlieferung* (Wiesbaden, 1980), with the text and translation of the relevant passage (ps.-Plut. 5.30.1) at pp. 246–7. For the role of the Arabic version in the reconstruction of the Aëtian *Placita*, see J. Mansfeld and D. Runia, *Aetiana: The Method and Intellectual Context of a Doxographer, Vol. I: The Sources* (Leiden, 1997), 152–61.

[48] In Daiber's translation (n. 47), 247: 'Herophilus glaubte: die Krankheiten werden entweder infolge der Ursache, welche "dadurch" genannt wird, durch das übermaß an Wärme oder Kälte', etc.

[49] The case of Stobaeus is not straightforward, however, since he actually separates the second part of the *doxa* from the first, and attributes both independently to Alcmaeon: in fact, the part which comes first in ps.-Plut. is found in Stobaeus at *Ecl.* 4.37.2, while the part I regard as Herophilean comes a little way *before* this, at *Ecl.* 4.36.29. This separation obviously underscores the distinct nature of the two views reported. A further source for ps.-Plut., Michael Psellus, likewise fails to mention Herophilus at his corresponding passage at *Solut. Div. Quaest.* (J.F. Boissonade [ed.], *Michael Psellus: De operatione daemonum* [Nuremberg, 1938; repr. Amsterdam, 1964], p. 66), but this can tell us nothing about which authorities were referred to in his source text, since he does not mention Alcmaeon either and generally removes name labels in taking over material from the *Placita*: see Mansfeld and Runia (n. 47), 170.

[50] Moreover, there are suggestive similarities with the general theory of disease aetiology proposed by Erasistratus, Herophilus' younger contemporary in Alexandria, who likewise thought that a major cause of disease was excess of food. Indeed, Erasistratus' views on this subject are reported in the Aëtian *Placita* shortly after the Herophilean *doxa*, at ps.-Plut. *Plac.* 5.30.3 = Erasistratus fr. 168 Garofalo: Ἐρασίστρατος τὰς νόσους διὰ πλῆθος τροφῆς καὶ ἀπεψίας καὶ φθοράν ('Erasistratus thought that diseases are caused by excess of food, indigestions, and corruption'). The role of excess (πληθώρα) in his disease aetiology is confirmed by Sor. *Gyn.* 3.4 = Erasistratus fr. 60 Garofalo and Gal. *Ven. Sect. Er. Rom.* 8 [11.236–240 K.] = fr. 162 Garofalo. I do not understand why D. Runia, 'The *Placita a*scribed to doctors in Aëtius' doxography on physics', in P. J. van der Eijk (ed.), *Ancient Histories of Medicine* (Leiden, Boston, MA, and Cologne, 1999), 189–250, at 250, claims

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Secondly, the first view on disease causation, attributed to Alcmaeon, is in many ways quite different from the second, suggesting that a name has indeed dropped out, but it seems highly improbable that an Arabic translator in the ninth century should have selected such an obscure name as Herophilus' to import into the text if it were not in his Greek source.[51] Finally, the strongly Peripatetic content of this testimonium is also particularly appropriate to Herophilus, and certainly not to Alcmaeon. The Lyceum represented the dominant philosophical influence on early Alexandria, and Herophilus was clearly directly inspired by its teachings on a number of levels, most clearly in regard to his scientific method and anatomical research.[52] The most obviously Aristotelian feature of the *doxa* is the distinction between the efficient (ὑφ' οὗ) and material (ἐξ οὗ) causes of disease. This is also of some significance in the context of the Aëtian testimonium, since the Aristotelian schema which it applies to disease causation is quite different from that which would become standard under the Roman Empire. The later schema was apparently introduced in the first century B.C. by the Pneumatist physician Athenaeus of Attaleia, a pupil of Posidonius, and was based on a Stoic-inspired distinction between 'cohesive' (συνεκτικαί), 'preceding' (προηγούμεναι), and 'antecedent' (προκαταρκτικαί) causes.[53] Much medical doxography was then rewritten in terms of Athenaeus' aetiological distinctions, and it is striking to find the Peripatetic analysis persisting in the Herophilean testimonium. But notably it is the later schema that appears to surface, highly anachronistically, in the report of Alcmaeon's view on the cause of disease (Ἀλκμαίων τῆς μὲν ὑγείας εἶναι συνεκτικὴν τὴν ἰσονομίαν τῶν δυνάμεων), and this offers a further reason for distancing the second, Herophilean, part of the entry from the first. A second, no less

that the 'contents of the second part of the *doxa* [i.e. the Herophilean part] … clearly represent an earlier stage of medical knowledge than we find in the Alexandrians'. See also Allen (n. 13), who argues persuasively that Erasistratus did in fact acknowledge a causal role for such factors as excess of food, or heat and cold, despite Galen's statements in *On Antecedent Causes* to the contrary.

[51] I am grateful to Oliver Overwien for this observation. See also Mansfeld and Runia (n. 47), 157: 'Daiber suggests *ad loc.* that a *Randnotiz* has crept into the text and suggests no drastic conclusions should be drawn. This is surely somewhat precipitate, since the text gives a double account of both disease and health. The texts in Diels and Mau are a mess. If we accept the text in P [i.e. ps.-Plutarch], as given by Mau, then this would weigh against Q [i.e. Qustā ibn Lūqā], since Herophilus is known to have rejected the notion of causes. But at T59a Von Staden … and 59b … he does admit provisional causes, and the examples given in the former text amount to the first two causes in P.'

[52] See von Staden (n. 1), 115–24; T. Tieleman, 'Dialectic and science: Galen, Herophilus and Aristotle on phenomena', in P.J. van der Eijk, H.F.J. Horstmanshoff, and P.H. Schrijvers (edd.), *Ancient Medicine in its Socio-cultural Context*, vol. 2 (Amsterdam and Atlanta, GA, 1995), 487–95; T. Tieleman, *Galen and Chrysippus on the Soul* (Leiden, New York and Cologne, 1996), 22–3 and n. 63. M. Frede, 'An anti-Aristotelian point of method in three rationalist doctors', in B. Morison and K. Ierodiakonou (edd.), *Episteme, etc.: Essays in Honour of Jonathan Barnes* (Oxford, 2011), 115–37, shows that Herophilus' well-known dictum 'Let the *phaenomena* be called first things, even if they are not first things' (T50a–b von Staden) constrains the doctor, *qua* doctor, to inquire into the human body at the level of perception, and not to analyse it at a subsensible or elemental level. Frede further argues that this represents an anti-Aristotelian point of method. There is not space to go into the issue here, but I would argue that Herophilus' position is fully consistent with, and probably inspired by, Aristotle's views on the kinds of principles appropriate to the practical art of medicine and their relation to the principles of natural philosophy. On Aristotle's views, see P.J. van der Eijk, 'Aristotle on "distinguished physicians" and on the medical significance of dreams', in van der Eijk et al. (this note), 447–59.

[53] This later schema is, of course, the one that Galen is working with in *CP*; on it, see e.g. R.J. Hankinson, 'Evidence, externality and antecedence: inquiries into later Greek causal concepts', *Phronesis* 32 (1987), 80–100.

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significant, correspondence with Aristotelianism is provided by the candidates for causes themselves, since the excess of the (primary) elementary qualities of hot and cold, connected with the intake and digestion of food, are also leading factors in disease causation in the Peripatetic tradition.[54]

Hence we have every reason to accept the explicit attribution of this Aëtian *doxa* on the causes of disease to Herophilus. It offers further confirmation, alongside the testimonia of Soranus and others, that Herophilus had no qualms about using the terminology of causation in describing his medical system more generally, as he surely must have done given the sorts of physiological and pathological phenomena he was interested in explaining. But it also provides some – though certainly not all – of the background necessary for understanding the statement quoted by Galen which we are considering. Thus Herophilus concedes, under Diodorus' influence, that 'by nature it is not discoverable whether causes do or do not exist' (as such). In opposition to this concession, however, he counters that in his opinion he thinks that he is 'being cooled, heated, and filled with food and drink', where being excessively heated, cooled, or filled are precisely affections that are taken by him to be causes of disease.

What, then, was Herophilus' point in making this assertion? I suggest, very tentatively, that he wished to affirm that denying the existence of a genuinely causal relation between the excessive heating, cooling, and repletion which seem to be connected with disease on the one hand, and the diseases themselves on the other, certainly does not entail the idea that such affections are not sensed by the subject. In the last analysis, we may be unable to know definitively the actual status of these affections, whether they are causal or not, but we can still tell that they happen. We ought then to be able also to tell that we typically get sick shortly after we are excessively heated, cooled, or filled, in a way that suggests a connection. If, therefore, it is evident to us that we are sometimes excessively heated, cooled, or filled with food and drink, and that we often fall ill afterwards, this may be enough to justify the provisional acceptance of the existence of causes *ex hypothesi*, even if it is accepted that we will never know for sure whether these affections are a cause in reality.

Herophilus might thus have appealed to some sort of principle of regular conjunction between candidates for causes and their effects; his doubts may have been focussed specifically on whether causes are ever actually efficacious. This is, of course, a highly speculative reconstruction of Herophilus' thought, but it might offer him some sort of way of evading the unwelcome conclusions that he felt constrained to accept under the sway of Diodorus' arguments against causes. His appeal to the 'opinion of the majority of people' that there *are* causes would then have represented a distinct but parallel attempt to provide a basis for his medical system that did not turn on a final decision as to the existence of causes as such.

A further point is that Herophilus' position, however the details are to be worked out, is not one that can be helpfully linked with Scepticism as we find it in the ancient Pyrrhonian or Academic traditions. It is merely an assertion of human ignorance as to whether or not causes exist. There is no suggestion that Herophilus felt these doubts to be more widely applicable, let alone to reflect a radical uncertainty on his part about the possibility of knowledge itself. And there is nothing else in the ancient testimonia to suggest that Herophilus' doubts were actually more wide-ranging. Nor, as we

[54] See e.g. Arist. [*Pr.*] 1.1–3, 859a1–24. See also D. Manetti, '"Aristotle" and the role of doxography in the Anonymus Londiniensis (PBrLibr inv. 137)', in P.J. van der Eijk (n. 50), 95–141, at 125–8.

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have seen, is this a position that Herophilus wished to find himself in: his suspension of judgement on the existence of causes is not one that leads to *ataraxia*, as it would for a Pyrrhonian Sceptic. Instead, to be able to get anywhere with his own medical project, he was forced to look for a way around his enforced doubts, and to resort to what looks like a potentially hazardous hypothetical acceptance of causes. Herophilus' step of accepting *ex hypothesi* the existence of what appears to exist to the majority of people is very distant from the Sceptics' inclinations in the face of appearances.[55] Lastly, his assertion that it is undiscoverable *by nature* whether or not causes exist is a dogmatic one, not a Sceptical one.

CONCLUSION

It is hoped that the findings of this paper may offer a slight rehabilitation of the impact of early Alexandrian philosophy, and in particular Diodorus' contribution to it, from the somewhat dim view taken of it in some quarters.[56] Diodorus' importance for the development of Hellenistic philosophy is not in doubt, but his influence on Hellenistic science and medicine has not to my knowledge yet been explored. My principal contention is that a series of arguments against causes and generation preserved by Sextus Empiricus and referred to by Galen should be assigned to Diodorus Cronus, and that Herophilus heard them directly from him in Alexandria before Diodorus' death there around 284 B.C. They had a significant impact on Herophilus, compelling him to question the very existence of causes as such, and he had the intellectual integrity to face them head on, to the extent that he wrote Diodorus' arguments down and addressed them directly in his own writings. Herophilus naturally found them to be an obstacle to his scientific project, but in response he had recourse to the acceptance *ex hypothesi* of the existence of causes, which he clearly regarded as a problematic solution, but attempted to justify further in a number of ways.

Since this problem was ultimately a hindrance to his medical research, we might assume that it did not take up a great deal of his *oeuvre*, and was perhaps dealt with in a single work, which was fortunately read and commented upon much later by Galen in *On Antecedent Causes*. At any rate, there are no further traces of these doubts about causes in the surviving testimonia. But we should not be suspicious of testimonia that have Herophilus using the language of causation without qualification or restriction, or detect inconsistencies when we meet them. It is not true, for example, to say that Herophilus rejected the notion of causes.[57] The purpose of his discussion of Diodorus' arguments, we may assume, was precisely to enable him consistently to employ causal concepts throughout the rest of his work, as his project certainly demanded. Herophilus' engagement with Diodorus Cronus as outlined here offers further evidence for his sensitivity to contemporary philosophical currents, his

[55] Cf. Diog. Laert. 9.91 for the Sceptics' direct attack on what they characterize as the Dogmatic procedure of accepting premises ἐξ ὑποθέσεως; Agrippa's fourth mode (Sext. Emp. *Pyr.* 1.168; Diog. Laert. 9.89); and Sext. Emp. *Math.* 3.1–17, attacking the use of ὑποθέσεις in the hands of mathematicians in particular.

[56] See e.g. P.M. Fraser, *Ptolemaic Alexandria, Vol. 1: Text* (Oxford, 1972), 481, 'The hedonistic doctrines of [Theodorus and Hegesias of Cyrene] are recorded in detail by Diogenes Laertius, but it does not seem likely that they were of any great significance in the intellectual history of Alexandria itself. Nor can greater importance be attached to Diodorus "Cronus".'

[57] See above, n. 51.

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sophistication in meeting the challenges that they might pose to medical science, and his flexibility and honesty in incorporating such ideas into his medical system.

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