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EPICUREAN THEORIES OF KNOWLEDGE
FROM HERMARCHUS TO LUCRETIUS
AND PHILODEMUS

ABSTRACT: The aim of this paper is to trace the development of Epicurean epistemology from the death of Epicurus in 270 BCE to the latter part of the first century BCE. The story gains interest from the fact that these Epicureans were, as would be expected, scrupulously loyal to the doctrines of their founder as they interpreted these, but at the same time found themselves obliged to elaborate and strengthen the inferential methodology he had bequeathed, initially in order to resist the sceptical critiques of the New Academy, and later in order to justify their school's empiricism in opposition to the rationalistic Stoic theory of inferential validity. The protagonists are Colotes, Polystratus, Timasagoras, Zeno of Sidon, Philodemus and Lucretius, with Cicero an important witness.

SOMMARIO: Lo scopo di questo articolo è quello di tratteggiare lo sviluppo dell'epistemologia epicurea dalla morte di Epicuro nel 270 a.C. fino alla seconda metà del I sec. a.C. Questa vicenda desta particolare interesse per il fatto che gli Epicurei di quest'epoca erano scrupolosamente fedeli alle dottrine del fondatore secondo le interpretazioni che fornivano di queste (il che non stupisce), ma allo stesso tempo erano costretti a elaborare e a rafforzare la metodologia inferenziale che Epicuro aveva lasciato loro in eredità, in un primo momento per opporsi alle critiche scettiche della Nuova Accademia e successivamente per legittimare l'empirismo della loro scuola in opposizione alla teoria stoica della validità inferenziale. I protagonisti sono Colote, Polistrato, Timasagora, Zenone di Sidone, Filodemo e Lucrezio, con Cicerone come importante testimone.

KEYWORDS: Epicureanism; Signs; Criterion of Truth; Scepticism; Philodemus

1. *The founder's authority*

To draw a firm line between the epistemology of Epicurus (see Verde's article above) and that of his Epicurean successors is a hazardous task. The school founder died in 270 BCE, to be succeeded as school-head by Hermarchus, who thereby became the leader among an early group of leading Epicureans whose work on the system continued after the founder's death.¹

The significance of that fact lies in the changed attitude to the founder that typically occurred at this juncture in a school's history. The Epicurean school in time became famous for the reverence with which it treated the authority of its four founders, above all Epicurus himself. But it is, as in the Academy and Stoa, hard to discern that kind of unquestioning allegiance during its founder's lifetime. There is in fact evidence of at least limited disagreements between Epicurus and some leading members of his circle, quite apart from the likelihood that at this date some philosophical issues will have remained as yet unsettled, or even unaddressed, in the school's inner circle. But following the founder's death the very nature of school loyalty dictated that his written doctrines would henceforth be canonical – as were, in the absence of Epicurus' own explicit pronouncements on this or that issue, those of his three co-founders – Metrodorus, Hermarchus and Polyaeus, on the somewhat idealistic assumption that unanimity had reigned from the start.

In reality, subsequent generations of Epicureans made many innovations, sometimes merely extending Epicurean theory into new areas,

¹ From Hermarchus himself we possess the longest preserved continuous passage from any early Epicurean apart from Epicurus himself, transcribed by Porphyry, *Abst.*, I, 7-12 = *Hermarch.* Fr. 34 in F. Longo Auricchio, *Ermarco, frammenti*, Naples, Bibliopolis, 1988. Although its topic is anthropological, it may afford us our first opportunity to see Epicurean epistemological concepts at work among Epicurus' immediate successors. Notably, the much-debated Epicurean term ἐπιλογισμός appears to be given a more precise technical function than in Epicurus' own writings, as the third level in a scale of learning: (1) irrational perception unsupported by memory, (2) irrational perception supported by memory, (3) rational observation. The work from which the passage is thought to come, Hermarchus' *Against Empedocles*, has been assigned a very early date (see Longo Auricchio, *Ermarco, frammenti*, p. 126-127), but the evidence for this has now receded owing to Obbink's improved text of Philodemus, *Piet.*, XIX, 23-30 (Fr. 29 Longo Auricchio = lines 541-548 in D. Obbink, *Philodemus On Piety, Part 1*, Oxford, Oxford University Press, 1996), and there is no reason in principle why it might not be dated late enough to belong to Hermarchus' own scholarchate.

but sometimes risking the charge of being in conflict with Epicurus' own explicit views. In the latter kind of case, no Epicurean would ever have considered *expressing* this or that innovation as a disagreement with the now-divinized founder, any more than a Platonist would have done in respect of Plato. Rather, the terms of debate among Epicureans were primarily exegetical: the school's founders must be shown, *when properly interpreted*, to have in fact endorsed the apparently innovative view, or at any rate not to have contradicted it. This authorization procedure by appeal to the school's scriptures could involve rejecting as inauthentic some of the early writings attributed to one or other of the founders, or checking and collating manuscripts in order to find, if necessary by emendation, a reading that would restore the founders' consistency or credibility.²

In these and similar ways, disputes among the Epicureans came to rest in part on close study of the foundational texts, with the aim of refining the literary canon and being able to invoke its authority in doctrinal disputes. Thus during the period covered by the present article, members and followers of the Athenian Garden found themselves more than once in conflict with the very independent Epicurean community at Rhodes, each group invoking Epicurean scripture in its own support and each ready to condemn the other as unfaithful to the canonical teachings.³ For this reason I avoid as potentially misleading the common practice of referring to one or the other party in such a dispute as 'dissident' Epicureans. All Epicureans considered themselves loyalists.⁴

One of the Athens-Rhodes disputes involved the Rhodian Epicurean Timasagoras, *ca.* 200 BCE. The specifically epistemological topics on which he is reported to have taken a distinctive stance included his innovative thesis on the nature of the *simulacra* that enable vision and imagination.⁵ Rather

² See especially the text-critical work of Demetrius of Laconia in *PHerc.* 1012: E. Puglia, *Demetrio Lacone, Aporie testuali ed esegetiche in Epicuro*, Naples, Bibliopolis, 1988.

³ See further, D. N. Sedley, "Philosophical Allegiance in the Greco-Roman World", in M. Griffin-J. Barnes (eds.), *Philosophia Togata I: Essays on Philosophy and Roman Society*, Oxford, Clarendon Press, 1989, p. 97-119.

⁴ All that 'dissidence' could mean is disagreement with the current head of the Athenian school, but it does not seem that the scholarch's pronouncements on doctrinal matters were treated as having any sort of quasi-papal authority, cf. Sedley, "Philosophical Allegiance in the Greco-Roman World", p. 112-113.

⁵ For the evidence, and helpful discussion of it, including the correction of 'Timagoras' to 'Timasagoras', see F. Verde, "Ancora su Timasagora epicureo", *Elenchos*, 31, 2010, p. 285-317.

than a series of discrete films travelling from the surface of the object to the eye, he held them to be continuous atomic streams or ‘effluences’ (*ἀπόρροιαί*) which, we must nevertheless infer, were such as to preserve and transmit the external structure of the object seen. Although Aetius (*Plac.*, IV, 13, 6), our single source, reports this as a significant ‘re-branding’ of the school’s position, there is no reason to doubt that, following the normal school principles, Timasagoras cited textual authority from the founder. For Epicurus does indeed, even in his surviving epitome the *Letter to Herodotus* (46), allow ‘effluences’ as one of three alternative forms that *simulacra* might take. Why contrary to the mainstream school doctrine Timasagoras opted for this alternative is unknown, but one can easily imagine at least two motives: (1) to answer challenges as to how the *simulacra* of large objects can shrink drastically enough to enter the eye or the mind, yet retain their original shape; (2) to enable the Epicurean doctrine of vision to become a credible competitor to the mathematical science of optics, with which it was difficult for the *simulacra* theory, as traditionally understood, to compete.⁶ Another of Timasagoras’ interventions will be considered below.

2. *Resistance to scepticism*

The most obvious driver of new developments in the school was the need to fend off external critics and competitors. An epistemological rivalry with the Stoics is an example to which we will turn in due course, but the major concern in the generation or two immediately following Epicurus’ death in 270 seems to have been the challenge posed by the revival of scepticism.

During the 260s BC Arcesilaus succeeded to the headship of the Academy, and under his influence the formerly doctrinal Platonist school veered away from dogma, instead adopting towards rival schools an essentially critical, dialectical stance. It seems to have been during that early phase of the sceptical New Academy that Colotes, who had been an intimate of Epicurus, wrote his treatise entitled *The impossibility of life itself according to other philosophers* (meaning, of course, other than Epicurus), about whose content we learn from Plutarch’s polemical counterblast in his

⁶ There has been a long-running debate about the Epicureans’ critical stance towards conventional mathematics. See most recently R. Netz, “Were there Epicurean Mathematicians?”, *Oxford Studies in Ancient Philosophy*, 49, 2015, p. 283-319; and F. Verde, “Ancora sulla matematica epicurea”, *Cronache Ercolanesi*, 46, 2016, p. 21-37.

own *Against Colotes*. None of Colotes' chosen targets – Democritus, Parmenides, Empedocles, Socrates, Melissus, Plato, Stilpo, the Cyrenaics and Arcesilaus – were criticised for their ethical positions, as one might have predicted, but entirely for the support that their epistemology and metaphysics allegedly lent to scepticism, and specifically, to scepticism about human cognitive access to physical reality.⁷ The last target attacked by Colotes, though anonymous, is unerringly recognized by Plutarch as the New Academy of Arcesilaus, presented as advocating universal suspension of judgement (ἐποχή). Yet, intriguingly, there is reason to think that the treatise was composed, not in the vicinity of the Athenian Academy, but in Alexandria. This much is suggested by its opening dedication to Ptolemy II (Plutarch., *Adv. Col.*, 1107E), and by a flattering peroration in which the Alexandrian king was warned against the dangers to law and order posed by the ruinous non-Epicurean philosophies listed (1124C). We should infer that the felt need for Epicureans to counterattack Academic scepticism was not just an Athenian preoccupation but was spreading to the courts of major Hellenized cultural centres, where the patronage of the local dynasty might well be hotly competed for.

A philosophically more sophisticated case involves the third Epicurean scholar, Polystratus, presumably writing in the middle part of the third century BCE. There is every reason to identify his opponents too as the sceptically inclined philosophers who had in the last generation or so, under the leadership of Arcesilaus, taken over the Academy. Here is a substantially preserved passage from the papyrus of his treatise *On irrational contempt*, more fully entitled *Against those who irrationally despise popular beliefs*:⁸

Or do you think, on the basis of the foregoing argument, that someone would not suffer the troubles which I mention but rather would make it convincing that fair,

⁷ The meagre papyrus fragments of Colotes' *Against Plato's Lysis* (*PHerc.* 208) likewise contain several occurrences of epistemological terminology, notably *δοξαζόμενον* and forms of *ἐναργ-*, despite the targeted dialogue itself scarcely being epistemological in content; and the even scantier fragments of his *Against Plato's Euthydemus* (*PHerc.* 1032) seem *inter alia* to target Socrates' equation of wisdom with luck at *Euthyd.*, 279d. For a judicious survey of these fragments, see E. Kechagia, *Plutarch against Colotes: A Lesson in History of Philosophy*, Oxford, Oxford University Press, 2011, Ch. 3. For the Alexandrian context of Colotes' treatise, discussed below, see also K. Fleischer, *Dionysios von Alexandria, De natura (περὶ φύσεως): Übersetzung, Kommentar und Würdigung. Mit einer Einleitung zur Geschichte des Epikureismus in Alexandria*, Turnhout, Brepols, 2016, Ch. 1.

⁸ Ed. G. Indelli, *Polistrato, Sul disprezzo irrazionale delle opinioni popolari*, Naples, Bibliopolis, 1978.

foul and all other matters of belief are falsely believed in, just because unlike gold and similar things they are not the same everywhere? After all, it must stare everybody in the face that bigger and smaller are also not perceived the same everywhere and in relation to all magnitudes [...] So too with heavier and lighter. And the same applies also to other powers, without exception. For neither are the same things healthy for everybody, nor nourishing or fatal, nor the opposites of these, but the very same things are healthy and nourishing for some yet have the opposite effect on others. Therefore either they must say that these too are false – things whose effects are plain for everyone to see – or else they must refuse to brazen it out and to battle against what is evident, and not abolish fair and foul as falsely believed in either, just because unlike stone and gold they are not the same for everybody [...] Relative predicates do not have the same status as things said not relatively but in accordance with something's own nature. Nor does the one kind truly exist but the other not. So to expect them to have the same attributes, or the one kind to exist but the other not, is naive. And there is no difference between starting from these and eliminating those and starting from those and eliminating these: it would be similarly naive to think that since the bigger and heavier and whiter and sweeter are bigger than one thing but smaller than another, and heavier, and likewise with the other attributes, and since nothing has the same one of these attributes *per se* as it has in relation to something else, in the same way stone, gold and the like ought also, if they truly existed, likewise to be gold in relation to one person while having the opposite nature in relation to another; and to say that, since that is not the case, *these* things are falsely believed in and do not really exist (*On irrational contempt*, XXIII, 26-XXVI, 23).⁹

The opponents can be seen to draw heavily on Platonic dialectical materials in order to launch their attack on the reality of values, in particular in their contrast between the universally agreed determinate nature exhibited by minerals and the cultural relativity of values. As one might expect of the New Academy, this sceptical argument borrows its materials freely from the text of Plato (*Phaedrus*, 263a, cf. also *Euthyphro*, 7b-d, *Theaetetus*, 172b). More remarkable is how Polystratus, in his reply, appears himself to draw inspiration from Plato – a strategy with all the more *ad hominem* force when directed against Plato's own self-declared successors. Plato had indeed never intended by this contrast between minerals and values to impugn the reality of the latter, any more than he had meant to infer from the relativity of large(r) and small(er) to *their* unreality. On the contrary, at *Sophist* 255c he had presented an exhaustive division of *beings* (ὄντα) into absolute and relative, a bicategorical scheme which became formal Academic doctrine under his second successor Xenocrates (F15 Isnardi Parente²). Much the same stance as Plato's own is developed by Polystratus as a

⁹ All translations are my own.

rebuttal of the contemporary Academy. He resourcefully points out that the mere existence of an ontological difference between the two categories does not entail that one or other of them will fall short of reality. Anyone who thinks otherwise, he ingeniously adds, could as easily argue that, since such relative predicates as beneficial and harmful manifestly *are* part of the structure of reality, it must be the non-relative items such as minerals that are unreal!

A further attempted innovation likely to have been motivated by the challenge of Academic scepticism is attributable to the Rhodian Epicurean Timasagoras. We have already encountered one of his two recorded innovations to the school's doctrine of vision. The other, noted by Cicero (*Lucullus*, 80) in his defence of the New Academy's scepticism, concerns the case of seeing double. To judge from the Ciceronian context, the debate ran more or less as follows.

- 1) Epicurus insists on the truth of *all* sense-perceptions. If a single case of a false sense-perception were found, trust in the senses would collapse. But in fact the eye simply registers with unfailing accuracy the visual data reaching it. In all alleged cases of optical illusion the error lies in the mind's misinterpretation or over-interpretation of those visual data.
- 2) Critics from the New Academy respond with the counterexample of an eye squeezed out of shape and as a result falsely seeing the single flame in a lamp as two flames. Here what appear to the eye are the visual data, but not in the form in which they first reached it. How can the Epicureans say that the appearance is 'true', when it is not even true to those visual data?
- 3) Timasagoras replies on behalf of the Epicureans that never, when he has squeezed his eye while looking at a lamp, have there appeared to him to be two flames. This supports the Epicurean thesis that falsehood is always located in the added opinion, not in the eyes themselves.

In stage (3), does Timasagoras mean (a) that in the situation described the bare visual appearance has never even momentarily *looked* to him like two flames? Or (b) that he has never been misled into *thinking* that there actually were two flames? Cicero seems to understand the latter. But on either understanding Timasagoras' reply would be meant to disqualify the

Academic example from counting as a genuine optical illusion at all, and thereby to block it from being used as the single counterexample that Epicurus in stage (1) conceded would suffice to destroy his most fundamental epistemological doctrine.

3. *The first century BCE*

It is appropriate now to move our focus to the end of the period covered by this article, partly because it is an age when new polemical confrontations were dominating the epistemological agenda, and partly because the greater part of the evidence for developments within the Epicurean epistemological tradition is supplied by what one might call 'Italian' sources datable to the middle decades of the first century BC. This was an era in which Epicureanism was establishing a strong foothold in Italy, both in the primarily Greek-speaking south and, to a surprising extent, at Rome itself. Prominent Roman Epicureans of the period included Cicero's close friend Atticus, and Cassius the co-assassin of Julius Caesar. Cassius, not unlike Timasagoras, seems to have taken a special interest in the interpretation of the Epicurean theory of *simulacra*, notably with regard to its role in the mechanism of imagination.¹⁰

In the mid 50s Lucretius set out, in his great poem *De rerum natura*, to showcase Epicurus' physics in Latin verse. Around a decade later, in 45-44 BCE, Cicero wrote a series of philosophical dialogues, which included extended Latin presentations of Epicurean theology (*De natura deorum*, I) and ethics (*De finibus*, I-II). Understandably, these works are much concerned with finding the most appropriate ways to capture Epicurean terminology in Latin. And that particular preoccupation is one important symptom of an era in which the school's philosophy was adapting itself to its new home in the Roman world.

This consideration finally brings us to Philodemus. Born at Gadara in Syria, and originally trained in the Epicurean school's Athenian headquarters, during the central decades of the first century BCE Philodemus taught in the Campania region of southern Italy, where like many Greek philosophers he enjoyed the patronage of a wealthy Roman. In his case this was Lucius Calpurnius Piso Caesoninus, consul of 58 BCE and also, as it happened, the father-in-law of Julius Caesar. Although Philodemus' own teaching was undoubtedly done in Greek, he had the ear of some leading Roman

¹⁰ See the discussion of this issue between Cicero and Cassius in Cic., *Fam.*, XV, 16 and 19, and Plutarch., *Brut.*, 37.

intellectuals, including Cicero (see *Fin.*, II, 119) as well as the young Virgil and Horace. The discovery at Herculaneum, by 18th-century excavators, of Philodemus' personal philosophical library, sadly damaged though the scrolls are, has massively enriched the historical study of Epicureanism. In the final section of this chapter we will turn in particular to Philodemus' epistemological treatise *On sign-inferences*.

A note of caution has first to be added about Lucretius. Much of what we know – or think we know – about Epicurus' own physics and epistemology is in fact drawn from Lucretius' poem, which is far fuller and more detailed (if less technical) than anything that now survives from Epicurus' own pen. A natural working hypothesis is that Lucretius is to the best of his ability following Epicurus' text faithfully, as indeed he declares himself to be doing (*DRN*, III, 1-13), and not relying on intermediate sources in the way that Cicero, for one, certainly does. But if this hypothesis were wrong, and some Lucretian passages in fact represented developments postdating Epicurus, it would in most cases be hard to identify which passages those were. I myself in fact favour the view that Lucretius was working directly from Epicurus' major treatise *On nature*, without taking account of more recent developments in the school,¹¹ but that remains controversial. The only parts of his *On the nature of things* which are uncontroversially Lucretius' own original contributions are the proems to each of the six books, and so far as possible I shall limit my use of his evidence to those passages.¹²

4. *A fourth criterion of truth?*

Epicurus, in the *Kanon* ('Yardstick'), says that sense-perceptions (*aistheseis*), preconceptions (*prolepseis*) and feelings (*pathe*) are the criteria of truth. The Epicureans add 'representational projections of thought' (*phantastikai epibolai tes dianoias*) (Diog. Laert., *VP*, X, 31).

Here we have something of a rarity in the Epicurean record: explicit evidence of a doctrinal innovation on the part of Epicurus' followers. It presumably postdates his death in 270 BCE, and thus falls into the phase covered by the present article.

¹¹ D. N. Sedley, *Lucretius and the Transformation of Greek Wisdom*, Cambridge, Cambridge University Press, 1998, Ch. 3.

¹² Anyone wishing to consider Lucretius' epistemology in its own right should start by reading *De rerum natura*, IV, 26-1036.

The first three criteria listed in this passage – sense-perceptions (*aistheseis*), preconceptions (*prolepseis*) and feelings (*pathe*) – are commonplace both in Epicurus' own writings and in those of subsequent Epicurean generations. Curiously, however, the fourth item listed, *phantastikai epibolai tes dianoias*, is likewise at least twice appealed to by Epicurus (*Hrdt.*, 38, *RS*, XXIV) *as if* it were another of his criteria of truth. We may therefore take the school's reported innovation to consist in nothing more than making its criterial status explicit. It is unknown why Epicurus did not himself formally do so in the *Kanon*, his now lost work on the criteria of truth. It was a work of (in at least two senses!) canonical status, upon which the school reverentially bestowed the extravagant-sounding epithet 'heaven-sent' (Cic., *ND*, I, 43, Plutarch., *Adv. Col.*, 1118A). Hence, it seems, even a small departure from it had to be acknowledged and, no doubt, justified.

Be that as it may, it seems that one credible motive for the elevation of *phantastikai epibolai tes dianoias* to official criterial status by Epicurus' followers was that the expression was felt by them to capture, better than any other, the nature of Epicurus' own greatest cognitive gift to mankind. As Cicero's Epicurean spokesman Velleius explains, Epicurus' godlike superiority lay above all in his powers of intellectual *vision*:

For the same man who taught us everything else taught us also that the world was made by nature without the need for craftsmanship, and that this thing which you call impossible without divine creativity is in fact so easy that nature will make, is making and has made infinitely many worlds. Just because you [the Stoic Balbus] do not see how nature can do this without a mind, unable to develop your plot's *dénouement* you copy the tragic poets and resort to a god. You would not be demanding this god's handiwork if you saw the measureless magnitude of space, endless in all directions, into which the mind, projecting and concentrating itself (*in quam se iniciens animus et intendens*), travels far and wide, seeing as a result no boundary of its extremities at which it could call a halt. In this measureless stretch of widths, lengths and heights there flies an infinite mass of countless atoms, which despite the presence of void between them stick together and by taking hold of each other form a continuous whole. And from these are made those shapes and formations of things which you think are impossible without bellows and anvil. With this thought you have placed as a yoke upon our necks a permanent overlord, for us to fear day and night [...] Freed from these terrors by Epicurus, and delivered into freedom, we do not fear those whom we understand neither to bring trouble upon themselves nor to try and make trouble for others, and with holy reverence we worship their supremely fine nature (*ND*, I, 53-54, 56).

Velleius thus brings out what Epicureans can achieve for themselves if they follow Epicurus on his odyssey of the mind, and thus come to appreciate the inevitability that mere atomic accident, operating as it must do on an infinite

scale, will produce worlds like our own, without the need for divine craftsmanship. That in its turn requires them to see, by mental projection, what the universe's infinity really means.

A decade or so before Cicero wrote this, Lucretius had eulogised Epicurus in similar terms (I, 62-79) as the pioneering Greek thinker who burst through the visual barrier presented by the outermost heaven – the 'flaming walls of the world' – to travel in thought through boundless space and discover the scope and limits of physical possibility. Lucretius goes on (III, 14-30) to describe how he has himself been enabled by Epicurus' lesson to make the same mental breakthrough, and to enjoy the intense pleasure of seeing the world as entirely unthreatening. The Epicurean thought experiments, arguments and mental exercises by which this vision can be achieved are set out at length by Lucretius towards the end of his first book (I, 951-1051). For example, we are invited to imagine going to some hypothetical boundary of the universe and throwing a spear past it (I, 968-983).¹³

Velleius, in speaking of the mind 'projecting itself, *se iniciens*, into infinite space, is capturing in Latin Epicurus' technical term, *epibole tes dianoiias*. A possible subtext underlying Velleius' words is that the method of discovery which Epicurus pioneered was one which he thereby earned the privilege of naming. At any rate, elsewhere Velleius makes a similar claim about the term *prolepsis* (*ND*, I, 43-44): Epicurus was uniquely able to explain the universal human 'preconception' of god, having himself discovered and named this basic criterion of truth.¹⁴

5. *Sign-inferences*

Arguably the most important contribution to the history of philosophy to emerge from the wreckage of Philodemus' library is to be found in his own

¹³ Similarly at II, 1044-1047, in introducing his argument that beyond our own world there are countless others, Lucretius writes "For given the infinite amount of space beyond these walls of our world, the mind demands an account of what further things lie there for the intellect to aim to reach with its gaze, and to which the mind's projection [*animi iactus*, cf. II, 740, 1080] can free itself and fly." There seems to be a close conceptual correspondence between the mind's self-projection and its imagined throwing of the spear.

¹⁴ For the wide-ranging use of *prolepsis* in Philodemus, see V. Tsouna, "Philodemus and the Epicurean Tradition", in A. M. Ioppolo-D. N. Sedley (eds.), *Pyrrhonists, Patricians, Platonizers: Hellenistic Philosophy in the Period 155-86 BC, Tenth Symposium Hellenisticum*, Naples, Bibliopolis, 2007, p. 339-397.

treatise *On sign-inferences*.¹⁵ Seemingly intended for school use rather than for publication, it is his record of an otherwise quite unknown debate about scientific method that is likely to have taken place around the beginning of the 1st century BC, in Athens. In it Philodemus summarizes (down to XXVII, 28), both from his own lecture notes and from those of his fellow-student Bromius, how their teacher Zeno of Sidon, and likewise the eminent contemporary Epicurean Demetrius of Laconia (XXVIII, 13-XXIX, 16), had defended their own shared theory of scientific inference against opponents who denied its validity. This favoured Epicurean method is the ‘similarity method’ (ὁ καθ’ ὁμοιότητα τρόπος), while the opponents advocate instead the deductive ‘elimination method’ (ὁ κατ’ ἀνασκευὴν τρόπος, or just ἀνασκευή, ‘elimination’, for short). These opponents are almost certainly Stoics. If in the early years of the first century BCE it is the epistemological challenge posed by another doctrinal school, rather than the rapidly weakening scepticism of the New Academy,¹⁶ that now occupies the Epicureans’ main attention, that is very much a sign of the times.

The similarity method is itself subdivided into two species. The first is based on direct similarity, as is well exemplified (though not exhausted) by inductive inference, the standard example being inference from the exceptionless mortality of human beings in our experience to the universal mortality of all human beings, including those outside our experience. The second species is based on analogical rather than direct similarity, the analogy normally taking the form of an inference from the macroscopic to

¹⁵ The title seems to have been Περὶ < > καὶ σημειώσεων, it being uncertain what the missing word was. At all events the surviving final part is focused on σημειώσεις, ‘sign-inferences’.

¹⁶ However, for an attempt to identify the opponents as New Academics see E. Asmis, “Epicurean Semiotics”, in G. Manetti (ed.), *Knowledge through Signs*, Brussels, Brepols, 1996, p. 155-185. For general studies of the treatise see, in addition to Asmis, above all P. and E. De Lacy, *Philodemus, On Methods of Inference*, Naples, Bibliopolis, 1978; also J. Allen, *Inference from Signs: Ancient Debates about the Nature of Evidence*, Oxford, Oxford University Press, 2001; J. Barnes, “Epicurean Signs”, in J. Annas-R. H. Grimm (eds.), *Oxford Studies in Ancient Philosophy*, Supplementary Volume, Oxford, Oxford University Press, 1988, p. 91-134; A. A. Long, “Reply to Jonathan Barnes, ‘Epicurean Signs’”, in Annas-Grimm, *Oxford Studies in Ancient Philosophy*, p. 135-144; and G. Manetti, “La semiotica salvata(si) dal Vesuvio: Il dibattito tra Epicurei e Stoici (?) sull’inferenza da segni nel *de signis* di Filodemo”, *Blityri*, 1, 2012, p. 135-178. Currently the most accurate translation available is in D. Delattre-J. Pigeaud (eds.), *Les Épicuriens*, Paris, Gallimard, 2010, p. 535-562.

the microscopic. For instance, since macroscopic motion depends on empty space, motion at the microscopic level of atoms also does so. Both species of the method constitute Epicurean procedures for the use of ‘signs’ – that is, for the scientific discovery of unobserved truths by inference from the directly observable evidence.

It should be clear that the analogical use of the method formally encodes what had always been, at least in outline, a primary Epicurean procedure for investigating the unobservable realm of atoms and void. The stock example noted above, the inference from motion to void, corresponds to the very first inference of the physics we meet in Epicurus’ epitome the *Letter to Herodotus* (40). It is less immediately obvious why the inductive use of the method should be equally important to Epicureans, but the following is a likely motive. In Cicero’s *De natura deorum* the account of Epicurean theology, probably itself derived from a work by Zeno of Sidon, includes a *consensus omnium* argument for the existence of gods (I, 43), starting from the premise that all human races have the *prolepsis* of gods. Whether this argument was already used by Epicurus himself can be disputed, but its use in the school by the time Philodemus studied there should not be in doubt. To defend the soundness of its main premise, that all human races have a *prolepsis* of gods, would have required arguing, by appeal to the similarity method, from the attested religious conceptions of known races to the unattested religious conceptions attributable to unknown races. This may well be among the contexts in which the inductive version of the ‘similarity method’ was first fully formulated and defended.

It seems likely, in addition, that its formulation and defence were a response to the Stoic critics. This is because the critics, as reported by Philodemus, deny the formal validity of such ‘similarity’ inferences – thus incidentally anticipating the Humean problem of induction – and insist instead that the only valid inferences from observed sign to unobserved significata are those that respect the ‘elimination’ criterion: that if the significata is ‘eliminated’, i.e. taken to be false (in the case of a proposition) or non-existent (in the case of a state of affairs), then the sign is, simply thereby, ‘co-eliminated’. And this seems to be an adaptation to sign-inferences of the favoured Stoic criterion of conditional entailment known as *synartesis*: that the negation of the consequent in a conditional should ‘conflict’ with the antecedent. In the terminology of this debate, signs differ from conditionals only to the extent that their standard formulation, instead of the conditional

'If p, q', is 'Since p, q', the latter being what Stoics would call a 'paraconditional' (*παρασυνημμένον*), equivalent to 'If p, q; and p'.

Remarkably, the Epicurean side in the debate seems fully prepared to accept this fundamentally *a priori* 'elimination' criterion as correct, and to retain it alongside the 'similarity' criterion rejected by the Stoics. The Epicurean strategy is not to reject the Stoic inferential criterion but to minimize its role in sign-inference. The Stoic quest for a purely deductive scientific method is doomed to failure, they allege, since even the *a priori* elimination method cannot avoid relying on premises established by the empirical similarity method.

True, the Epicureans say, the sign-inference "Since there is motion there is void" goes through trivially by the elimination method, because according to them if void is eliminated, motion is thereby co-eliminated. But that natural and universal generalization about motion is one that we have learnt in the first place by empirical generalization over a vast range of experiences, where without exception motion is observed to take place only where there is room for it to do so.

This Epicurean strategy exhibits the empiricism that had always been the school's epistemological hallmark, and which is here taken to underwrite all necessary truths: even apparently *a priori* truths are in reality generalizations from experience. Thus the same inductive methodology is pushed even into the realm of mathematics: from the fact that every 4x4 square in our world has an area numerically equal to its perimeter, we may correctly infer that the same is true of 4x4 squares in all other worlds too (Philodemus, *On sign-inferences*, XV, 28-XVI, 1).

If induction sounds like a bizarre way to establish the facts of mathematics, it should seem less so when we note that its key criterion is that of inconceivability. The basic format of a similarity inference is "Since x is F, y is F", the justification being that y is so similar to x in nature as to make it *inconceivable* that y should lack an essential predicate of x. Thus it is 'inconceivable' (XV, 37-38) that, while all 4x4 squares in our world have a certain property, 4x4 squares in other worlds should lack that property. To generalize, if two or more things are sufficiently similar in their nature, it is inconceivable that they should differ in some essential property. And this applies without distinction to mathematical and to (for instance) biological generalizations:

[...] for instance, "If Plato is a man, Socrates is a man too." For given that this is true, "If Socrates is not a man, Plato is not a man either" comes out true as well, not

because by the elimination of Socrates Plato is co-eliminated, but because it is impossible to conceive of Socrates not being a man but Plato being a man. And that belongs to the similarity method (*On sign-inferences*, XII, 19-31).

The ultimate justification for this approach seems to lie in an Epicurean brand of essentialism, expressed by what we may call the ‘*qua* operator’, which is captured in Philodemus’ Greek by a range of subtly different terms translatable as ‘in so far as’, ‘in that’, etc.:

Those who attack sign-inference by similarity do not notice the difference between the aforementioned [senses of ‘in so far as’ etc.], and how we establish the ‘in so far as’ premise, such as, for instance, that man in so far as he is man is mortal. [...] For we establish the necessary connection of one thing with another thing from the very fact that it has been an observed concomitant of all the instances which we have encountered, especially as we have met a variety of animals belonging to the same type which while differing from each other in all other respects all share such-and-such common characteristics. Thus we say that man, in so far as and in that he is man, is mortal, because we have encountered a wide variety of men without ever finding any variation in this respect, or anything that draws us towards the opposite view. So this is the method on which the establishment of the premise rests, both for this issue and for the others in which we apply the ‘in so far as’ and ‘in that’ construction – the peculiar connection being indicated by the fact that the one thing is the inseparable and necessary concomitant of the other.

The same is not true in the case of what is established merely by the elimination of a sign. But even in these cases, it is the fact that all the instances which we have encountered have this as their concomitant that does the job of confirmation. For it is from the fact that all familiar moving objects, while having other differences, have it in common that their motion is through empty spaces, that we conclude the same to be without exception true also at the microscopic level. And our reason for contending that if there is not, or has not been, fire, smoke should be eliminated, is that smoke has been seen in all cases without exception to be a secretion from fire (*On sign-inferences*, XXXIV, 29-XXXVI, 7).

In case it should be suspected that Epicurus’ own favoured inferential principle, appeal to the ‘lack of counterevidence’ (οὐκ ἀντιμαρτύρησις), has simply been replaced by this newly evolved methodology, we should note that it retains a significant role, not only in the above passage, but also in its immediate sequel:

Another error which they make is in not noticing our procedure of establishing that no obstacle arises through things evident. For the existence of chance and of that which depends on us is not sufficient ground for accepting the minimal swerves of

atoms: it is necessary to show in addition that nothing else self-evident conflicts with the thesis¹⁷ (*On sign-inferences*, XXXVI, 7-17).

Here, two centuries after his formulation of it, Epicurus' own scientific methodology is visibly being honoured and maintained by his successors in the school he founded. True, the pressure to compete in current far more sophisticated debates about the justification of scientific inference has unmistakably relegated that original methodology to a subordinate role. But it is important to recognize that the ultimate aim of the updated competitive strategy is nevertheless that of committed loyalists. It is the goal of vindicating – and by no means of modifying – Epicurus' proprietary doctrinal positions. The most striking case of this, well attested in *On sign-inferences* and elsewhere, is Epicurus' much-derided thesis that the sun, far from being larger than the earth as the astronomers maintain, is actually just as small as it appears.¹⁸ As we learn from Philodemus (*On sign-inferences*, IX, 18-XI, 9), Zeno of Sidon faithfully defended this thesis against Stoic attacks.¹⁹ And in doing so he brought to bear the full Epicurean armory developed in the debate we have been witnessing.

¹⁷ In the example cited here, the Epicurean 'swerve' of atoms, the additional appeal to οὐκ ἀντιμαρτύρησις is attested at Lucretius, *DRN*, II, 249-250.

¹⁸ Epicurus, *Letter to Pythocles*, 91, with many secondary attestations: for these, further bibliography, and the broader scientific context, see J. Barnes, "The Size of the Sun in Antiquity", in Id., *Mantissa: Essays in Ancient Philosophy IV*, ed. by M. Bonelli, Oxford, Oxford University Press, 2015 (first ed. in *Acta Classica Universitatis Scientiarum Debreceniensis*, 25, 1989, p. 29-41), p. 1-20.

¹⁹ Zeno's immediate Stoic critic here is Dionysius of Cyrene (*On sign-inferences*, XI, 14-15), but there is plentiful evidence (see Barnes, "The Size of the Sun in Antiquity") that Posidonius, the most mathematical as well as the most eminent Stoic of the time, was the prime mover of this particular critique.

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