

## Notes

The text of the book is intended to be self-sufficient; and the reader who ignores these notes should not find the main narrative broken or its arguments enthymematic. The notes are designed to serve four subsidiary functions.

First, they supply additional references to the ancient texts. (For the abbreviations used see the Note on Citations, and Appendix A.)

Second, the notes broach issues too technical or too narrow to justify inclusion in the body of the book.

Third, they explain (and sometimes attempt to justify) disputed readings, translations, or interpretations which the main narrative adopts without comment.

Fourth, there are some selected references to the secondary literature. (References consist of the author's name; a numeral, in square brackets, keying the work to the Bibliography; and, usually, a page or chapter number.) It is customary in scholarly works to compile references, pious and polemical, to authors who agree and disagree with a given interpretation. That practice is a pedantic pleasantry, of little value to the reader; and, apart from acknowledgments of direct quotations, I only provide references where they are likely to yield a useful supplement to my own remarks. The reader who seeks bibliographical assistance will find it, I hope, in the Bibliography.

### I *The Springs of Reason*

- 1 On Hippias as a source for Aristotle see esp. Snell [13]; also Stokes [56], 50–60. Democritus also wrote about Thales: Diogenes Laertius, I.11=**68 B 115a**.
- 2 Cf. e. g., Epicharmus, **23 B 4.5**; Anonymous Iamblich, **89 A 4.3**.
- 3 See Alexander, *quaest nat* II. 23, a text which includes Empedocles, **31 A 89**; Anaxagoras, **59 A 98a**; Diogenes, **64 A 33**; Democritus, **68 A 165**.
- 4 Propositions (4) and (5) are also found in Diogenes Laertius, I.27=**A 1**; Scholiast to Plato, **A 3**; Simplicius, Servius, **A 13**; etc. (see Classen [88], 939). The two theses may conceivably have formed parts of a full cosmogony and cosmology (thesis (5) was used in the explanation of earthquakes: Seneca, **A 15**) see West [87], 172–6; [59], 208–13.
- 5 Stokes [56], 283, n. 113, suggests that the analogy with wood was intended to show only the *possibility* of the earth's floating on water; Kirk-Raven [33], 88, think that the analogy may have been supplied by Aristotle and doubt that Thales ever considered the problem of the earth's stability. Neither view is plausible.
- 6 Some scholars are content with the explanation that Thales was adopting an Egyptian myth: see especially Hölscher [91], 40–8 (the explanation is already in Plutarch, **A 11**, and Simplicius, **A 14**). Thales' tour of Egypt (Proclus, **A 11**, etc.) is of dubious historicity.
- 7 On Alcman see West [87] and [108]; on poetico-mythological cosmogony see Stokes [109]; Kirk-Raven [33], 24–72; Hölscher [91], 49–82; Schwabl [107], 1437–74.
- 8 West [59], 75. On Pherecydes see especially West [59], chh. 1–2; Kirk-Raven [33], 48–72. Some scholars have thought that Pherecydes' aim was to interpret the old mythological cosmogonies in the new Milesian spirit (see Jaeger [48], 67–72; *contra*: Vlastos [161], 106–10).

- 9 So, e.g., Guthrie [25], I.46–9; the scepticism of Dicks [42], 298, etc., is excessive.
- 10 References in Classen [88], 941–3 (mathematics), 943–5 (astronomy). Extreme scepticism in Dicks [86]; extreme credulity in van der Waerden [58], 86–90; a balanced view in Burkert [173], 415–17. (Note that Herodotus did not credit the stories of Thales’ engineering feats: they are ‘the common tale of the Greeks’. For late Thalean romance see Classen [88], 931–5.) Thales is the archetypical geometer for Aristophanes: *Birds*, 995, 1009; *Clouds*, 215. Three of the books ascribed to Thales concern astronomy (**B 1**, **B 2**, **B 4**); but all the ascriptions are almost certainly wrong.
- 11 On this report see especially Gladigow [89].
- 12 According to Proclus, Thales ‘is said to have called equal angles “similar” in the archaic fashion’ (**A 20**); this may come from Eudemus, and Eudemus’ source may have been Hippias (cf. **86 B 12**=Eudemus, fr. 133 W). But we cannot infer that either Eudemus or Hippias possessed, or claimed to possess, a written work by Thales.
- 13 But (a) the central portion of Parmenides’ poem has survived entire (see above, p. 155); (b) Gorgias’ *Helen* is complete, and I shall treat it as a piece of philosophy (see above, pp. 523–30); and (c) some of the fifth-century works in the Hippocratic canon have a strong philosophical bias (see above, p. 139).
- 14 Fragments in Diels [4], 473–527. The long fragment on perception is edited by Stratton [14] who gives (51–64) a useful appreciation of Theophrastus’ faults and merits. Most scholars, following Diels, hold that the *Phusikôn Doxai* was a comprehensive history of early Greek thought; and they infer that the Presocratic material extracted from that work has a better evidential standing than the stuff we quarry from Aristotle’s treatises. Steinmetz [5] argues that the title ‘*Phusikôn Doxai*’ was given to the collection of studies on individual Presocratics listed in Diogenes Laertius, V.42–7; that those studies were used by Theophrastus in his *Physics*; and that it is that latter work which formed Simplicius’ main source. If Steinmetz is right, then the Theophrastan material is exactly comparable to the doxographical notices which we read in the Aristotelian treatises.
- 15 For the case against Aristotle see Cherniss [6]; McDiarmid [7] completes his companion study of Theophrastus by asserting that he ‘is a thoroughly biased witness and is even less trustworthy than Aristotle’ (133). The best defence of Aristotle is still that in Guthrie [8] (but see Stevenson [9]); the best defence of Theophrastus is in Mondolfo-Tarán [131], CXCIII–CXCVIII.
- 16 The classic study is Diels’ magisterial *Doxographi Graeci*. There is a useful summary of Diels in Burnet [31], and a detailed illustration in Stokes [56], ch. 3.

## II Anaximander on Nature

- 1 An epitome (or perhaps the work itself) survived to the time of Apollodorus; Anaximander may have gone to press at the age of 64 (see Diogenes Laertius, II.2=**12 A 1**; cf. West [59], 76, n. 1). On Theopompus’ report (Diogenes Laertius, I.116=*FGrH* 115F71=**7 A 1**) that Pherecydes ‘was the first to write about nature and the birth of the gods’, see Kahn [90], 6, n. 2; 240.
- 2 For a fine sketch of Anaximander’s intellectual range see Kahn [90], 82–4; a main thesis of Kahn’s book is the domination of later Presocratic speculation by Anaximander’s conception of science.
- 3 See especially Kahn [90], 58–63; cf. Tannery [29]; Rescher [97] (‘an intellect... audacity’: Rescher, 731).
- 4 On *metabiônai* see Kahn [90], 67; Kahn shows (70–1) that Plutarch’s story in **A 30** is mere romance.
- 5 See, e.g., Anaxagoras, **59 A 42**; Democritus, **68 A 139**; Diodorus Siculus, I.7.

- 6 On Xenophanes' theory see Guthrie [25], I.387–90. The observations were repeated in the fifth century by Xanthus of Lydia, *FGrH* 765 F 12.
- 7 First quotation from Kahn [90], 97; second from Popper [35], 140. There is a splenetic attack on Kahn's 'monstrous edifice of exaggeration' in Dicks [65], which Kahn [66] answers. Both authors are unconvincingly extreme: see Burkert [173], 308–10.
- 8 Cf. Diogenes Laertius, II.1=A 1; Suda, A 2; Simplicius, *in Cael* 532.14.
- 9 A version of the Principle may have been used by Parmenides (see below, p. 187); it is employed at *Phys* 203b25–8, a passage which may have Milesian origins (cf. Hussey [34], 18).
- 10 Kahn [90], 77.
- 11 Aristotle, *Cael* 295a16-b9=31 A 67; see Bollack [349], III.242–4.
- 12 See *Phaedo* 108E; *Timaeus* 62D. The ascription to Empedocles is probably a loose reference to 31 A 67; that to Parmenides, an inference from the spherical symmetry of his world (28 B 8.42–4); that to Democritus a plain error (cf. *Cael* 294b13). Pace Robinson [98], there is nothing in the argument which exceeds Anaximander's capacities or conflicts with the rest of his astronomy.
- 13 Some scholars think that Xenophanes' earth was not literally of infinite depth and that he was not seriously tackling Anaximander's problem (e.g., Kirk-Raven [33], 175–6); but see Stokes [56], 75; 286, nn. 18–19. Empedocles 31 B 39 is generally taken as a criticism of Xenophanes (see *Cael* 294a25); *contra*: Bollack [349] III.242.
- 14 Anaximenes, Anaxagoras, Democritus (*Cael* 294b13=13 A 20); Xenophanes (Simplicius, 21 A 47); Empedocles (*Cael* 295a15=31 A 67). Eudemus, fr. 145 W=12 A 26, has Anaximander's earth move: either Theon has garbled Eudemus (Kahn [90], 54), or the text is corrupt (Burkert [173], 345, n. 38). 15 Sweeney [57], ch. 1, gives a full account of the voluminous publications on this topic from 1947 to 1970. The most distinguished contribution is Kahn [90].
- 16 Cf. Simplicius, *in Phys* 465.5–10, who probably alludes to Anaximander, though he names no name, (*in Cael* 615.15 names Anaximander; but that is in connexion with quite another argument.)
- 17 Kahn [101].
- 18 See Hölscher [91], 10–12; and especially Schwabl [99], 60–4; *contra*: Kahn [90], 37–8.
- 19 The precise extent of the fragment is uncertain: see especially Kahn [90], 168–78; and, more sceptically, Dirlmeier [100].
- 20 For controversy see McDiarmid [7], 138–40, n. 46; Kahn [90], 30–2; Kirk [92], 324–7. I follow Stokes [56], 28–9; 274–6.
- 21 The role of the 'opposites' in Anaximander's thought is obscure: see especially Lloyd [64], 260–70; Kahn [90], 40–1; Hölscher [91], 31–2. For a detailed account of the 'opposites' in early Greek thought see Lloyd [50], ch. 1.
- 22 Conflationists have been worried by the plurals in [iv] (*ex hôn ...tauta...*), covertly making them singular or else asserting that 'the unlimited' is a mixture and hence a plurality. The grammatical difficulty vanishes once it is seen that [iii] and [iv] need not belong together. Kahn [90], 181–3, argues that 'the things that exist' in [iv] cannot be the ordinary furniture of the world but must be the elements 'from which' and 'into which' those things come and go. That makes for a tortuous construe.
- 23 This interpretation is strongly advocated by Schwabl [99]. He sets out from [vi], where he alleges that 'them (*auta*)' must refer to 'generation' and 'destruction' in [iv]. That gives a good sense to '*legôn auta*' ('calling them thus by...'), but it is otherwise implausible. Most interpreters take '*auta*' in [vi] to have the same reference as '*auta*' in [v], i.e. the elements. That gives a good sense to [vi], but it puts a great strain on the Greek. I suspect that '*auta*' in [vi] should be changed to '*autos*' ('himself speaking thus...') or else excised.

- 24 Kirk-Raven [33], 116–17, suggest that Anaximander actually used the Homeric formula ‘immortal and ageless (*athanatos kai agêrôs*)’, and that Aristotle and Hippolytus have each preserved a half of it.
- 25 A lucid account in Kirk-Raven [33], 110–12; cf. Gottschalk [104], 40–7. On the *metaxu* passages see Kahn [90], 44–6; Hölscher [91], 34–7. On *migma* see Vlastos [111], 76–80; Seligman [102], 40–9; Hölscher [91], 16–17.
- 26 See **59 B 12**; cf. Dicks [42], 57; Guthrie [25], II.296.
- 27 **B 3** is generally rejected as spurious, and the language shows that it cannot be a *verbatim* report; but it may well be a fair paraphrase of Anaximenes (see West [59], 100, n. 3). The first ‘and’ in the quotation may belong to Olympiodorus, so that he preserves two fragments rather than one; certainly, the two parts of **B 3** hang only loosely together.
- 28 If argument (*B*) does not belong to Anaximander, I guess that in **A 14** Aëtius has written ‘Anaximander’ by mistake for ‘Anaximenes’.
- 29 The etymology is entertained and rejected by Kahn [90], 231–3; see further Solmsen [103], 123–4; Classen [94], 44–5 (cf. Aristotle, *Phys* 204a2, 13). On ‘*apeiros*’ in general see Guthrie [25], I.85–7.
- 30 ‘Like a fog-bank’: Rescher [97], 719.

### III Science and Speculation

- 1 See Hippolytus, **A 7**; Aristotle, *Meteor* 354a28=**A 14**; Aëtius, **A 12**, **A 14**, **A 15**; Pliny, **A 14A**. The report of Eudemus, fr. 145 W=**A 16**, that Anaximenes first saw that the moon shines with borrowed light, is unreliable (see Guthrie [25], 1.94, n. 2). On Anaximenes’ meteorology see Aristotle, *Meteor* 365b6=**A 21**; Aëtius, **A 17**, **A 18**; Galen, **A 19**.
- 2 See Simplicius, **59 A 41**; Diogenes Laertius, IX.57–**64 A 1**. ‘In the eyes of his contemporaries, and for long after, Anaximenes was a much more important figure than Anaximander’ (Burnet [31], 78).
- 3 See especially Stokes [56], 30–65. McDiarmid [7], 92, asserts that ‘it is an obvious historical impossibility that any Presocratic should have held this concept [sc. of *hulê*], for the concept implies a grasp of the notion of identity and of the distinction between subject and attribute’. That argument barely deserves refutation.
- 4 Jaeger [48], 24.
- 5 A passage from Simplicius has puzzled commentators:

Anaximenes says that when thinned the air becomes fire, when condensed, wind.... For in his case alone Theophrastus in his *History* [i.e. in the *Phusikôn Doxai*] speaks of rarefaction and condensation. But it is clear that the others too used rareness and denseness (*in Phys* 149.30–150.1; cf. **A 5**).

Elsewhere, in passages presumably derived from Theophrastus, Simplicius and the other doxographers use ‘*manôsis*’ and ‘*puknôsis*’ of many Presocratic cosmogonies. (See, e.g., *in Phys* 202.32–203.5; 1266.33–8; 1319.17–27; cf., e.g., Aristotle, *Phys* 187a15; *GC* 330b10.) Simplicius does not report (*pace* Cherniss [6], 13, n. 55) that according to Theophrastus only Anaximenes used rarefaction and condensation; nor (*pace* Stokes [56], 273, n. 22) can he mean

that Theophrastus used the words ‘*manôsis*’ and ‘*puknôsis*’ only in connexion with Anaximenes. Perhaps he means that in his *History*, as opposed to his *Physics*, Theophrastus speaks of rarefaction and condensation only in the case of Anaximenes. If so, then we shall infer that Simplicius’ principal Theophrastean source was not the *History* (see above, p. 313, n. 14); and we may wonder how Theophrastus described non-Anaximenean cosmogonies in the *History*. Klowski [106] argues that the operation of condensation and rarefaction was an invention of Theophrastus, falsely fathered by him on the Presocratics; Stokes [56], 43–8, argues that condensation and rarefaction do not imply an Aristotelian interpretation of Anaximenes’ air. Neither argument appeals.

- 6 Sambursky [53], 10–11; cf. Guthrie [25], I.126–7. It should in fairness be added that, in Sambursky’s opinion, ‘it is a far cry from the speculative teaching of Anaximenes to the extremely abstract calculations of the physicist and mathematician of today’ (11).
- 7 The term ‘felting’ for condensation (‘*pilêsis*’, ‘*pilousthai*’: Hippolytus, A 7; pseudo-Plutarch, A 6) has been thought Anaximenean; but it is common in the doxographers (see Diels-Kranz [1], III.352b).
- 8 But the point is controversial: Guthrie [25], I.131, n. 1.
- 9 Burnet [31], v; cf. 24–8. Popper [35] gives a strong statement of Burnet’s thesis, on grounds diametrically opposed to those of Burnet.
- 10 See especially Cornford [114]. According to Raven [178], 175, Presocratic thought tends to rely ‘on dogmatic reasoning alone’ and shows ‘a cheerful ignorance of the conditions of scientific knowledge’.
- 11 Vlastos [115], 53.
- 12 See Sambursky [53], 283–41. On the vagueness endemic in Presocratic science see especially Vlastos [115], 51–3; Dicks [42], 60–1.
- 13 Lloyd [113] gives an excellent account of the place of experiment in early Greek thought; the best examples are in Hippocrates, *morb* IV.39; *nat puer* 17.
- 14 Jones [49], 44.
- 15 Sambursky [53], 89, is mistaken when he says that experiment is ‘now the final arbiter of every theory’ and contrasts this modern notion with that of the Greeks. At 231–8 he argues in detail that lack of experimentation gravely impeded the advance of Greek science; but at 235 he observes that ‘the heavenly phenomena display all the ideal qualities of a laboratory experiment’.
- 16 Kahn [66], 112. ‘The apparently bizarre speculations of the early thinkers are rarely entirely divorced from observation, but sometimes depend on rather extravagant extrapolation from it’ (Guthrie [25], II.188). But note first, that the word ‘extrapolation’ implies an hypothesis about Milesian procedure which we cannot test; and second, that the ‘extravagance’ is not shown by reliance on a paucity of data, but rather by a carefree connexion between data and theory. Dicks [65], 36, affirms that the Presocratics ‘were not scientists—and actual observation seems to have played a very minor part in their astronomical theories’. Of course, it does not matter a hang whether the Presocratics made their own observations (like Kepler), or simply worked from reports of others (like Newton).

- 17 Examples collected in Kranz [121]; Lloyd [50], part II. See also Baldry [122], and the celebrated paper by Diller [120], who judges that Anaximenes marks 'the birth of the analogical method' (35).
- 18 , Text and interpretation are disputed: see Guthrie [123], Longrigg [124], and especially 'Schwab1[125J.
- 19 A full examination of **26** in Alt [127], who concludes (unconvincingly) that it is a fragment of Diogenes of Apollonia. Although **26** contains anachronistic vocabulary (Alt [127], 129–30) and has been judged a fabrication (especially Reinhardt [30], 175), I side with those who find it Anaximenean in content (see Guthrie [25], I.131–2). Most scholars take 'hoion...kai...' for an inferential construction: 'just as...so...'. (For different ways of construing the inference see Kirk–Raven [33], 158.) It is better to read 'hoion' as 'e.g.', the doxographer's introduction to the quotation which follows; and I guess that the 'kai' is doxographical, conjoining two quotations. See especially Longrigg [126].

#### IV The Natural Philosophy of Heraclitus

- 1 Popper [137], I.17; Hegel [27], 279. On Heraclitus' early followers see Diogenes Laertius, IX.6=A **1**; for early exegetes, *id.*, IX. 15=A **1**; Antiphanes, fr. 113 K. An exhaustive discussion of the traditions and controversies surrounding Heraclitus' life in Marcovich [140], 246–56.
- 2 On Hippolytus see Reinhardt [30], 158–63; Hershbell [17]; on Clement see Reinhardt [135]; on the Stoics see Hölscher [79], 150–3; Marcovich [140], 315–17.
- 3 Note that Pythagoras was incarnated as a Delian diver: above, p. 108.
- 4 Numerals succeeded by 'M' refer to the fragments in the edition of Marcovich [129]; whether or not that arrangement is correct, it is vastly superior to that of Diels–Kranz.
- 5 On Heraclitus' 'Orakelstil' see especially Hölscher [79], 136–41.
- 6 Some scholars deny that Heraclitus wrote a book and suppose instead a disjointed set of aphorisms (e.g., Kirk [136], 7). That view explains the ordering of the fragments in Diels–Kranz: the nature of Heraclitus' effusions prohibits systematic arrangement, and Diels took the alphabetical order of the quoting authorities as a suitably arbitrary schema within which to print the fragments. There are ancient references to Heraclitus' book (Aristotle, *Rhet* 1407b16=A **4**; Diogenes Laertius, IX. 1, 5, 6, 7, 12=A **1**); but that book might have been an anthology of saws. But fragment **33=B 1=1 M** both by its form and by its content promises a continuous and systematic treatise (see, e.g., Guthrie [25], I.406–8; Kahn [139], 189–91).
- 7 See, e.g., Guthrie [25], I. 420–4; Hölscher [79], 130–43; Marcovich [129], 2–11; and, for a clear exposition of the right view, West [59], 124–9.
- 8 See, e.g., Snell [144], 139; West [59], 113–14. That will explain the initial 'and (*de*)' in **33**, if explanation is needed.
- 9 See the useful table in Kirk [136], 47.
- 10 Cf. **B 64=79 M**:

The thunderbolt steers all things (cf. **B 41=85 M**). But the connexion between the *logos* and the thunderbolt is uncertain: see Kirk [136], 356–7; West [59], 142–4. On **B 114** see p. 132.

- 11 For the text of **34** see Marcovich [129], 125. I take 'conjunctions' to mean 'composite things', i.e. to denote the ordinary furniture of the world; and I suppose that the first three clauses of the fragment say that 'all composite things are both unities and diversities' (see, e.g., Snell [146]; Kirk [136], 173–7).

- 12 For the text see Ramnoux [142], 461–3. Kirk [136], 70, thinks that **35** presents an inference from the *logos*; Stokes [56], 102, says that ‘it is apparent from **B 50** that the unity of all things is the principal content of the *Logos*’. Neither view is in the text.
- 13 ‘*Palintonos harmoniê*’ or ‘*palintropos harmoniê*’? ‘Back-stretched connexion’ or ‘back-turning connexion’? For the controversy see Marcovich [129], 215–16. On *harmoniê* see also Stokes [56], 94–7; on *-tonos* and *-tropos*, Hussey [34], 43–5. I doubt if anything turns on the textual dispute: even if we could decide between *-tonos* and *-tropos*, it is not clear that they need bear significantly different senses; even if they do, it is not clear how far we may press the analogy with bow and lyre; even if we squeeze the analogy dry, we have no reason to take **36** as the key statement of the *logos* and to force the other fragments into its mould.
- 14 On text and interpretation of **40** see Jones [149]. I agree that the fragment must be read in two parts (Clement does not quote it as a continuous piece), and that the final ‘*ê genesthai gên*’ should be excised.
- 15 Against *ekpurôsis* see especially Reinhardt [135] and [30], 163–201. For *ekpurôsis* see especially Mondolfo-Tarân [131], CLXXVII–CXCI, 109–18. Mondolfo convinces me that at *Phys* 205a1–4 and *Cael* 279b12–17=A **10** Aristotle ascribes *ekpurôsis* to Heraclitus; he fails to show that the ascription is correct.
- 16 **B 76=66(e) M** carries the implication more clearly; but that fragment is probably a Stoic perversion of **B 36**. See Marcovich [140], 264.
- 17 I quote Guthrie [25], I.438–9; Kahn [139], 190. See also Hölscher [79], 139–40, 148–9 (but Hölscher’s view is unclear to me: at 139–40 he says that in Heraclitus analogies take the place of proofs; at 145 he implies that analogies are a form of proof); von Fritz [62], 230–4, who says that in Heraclitus *notus* is pure insight; Cleve [37], 108 (‘he is no proving and arguing philosopher.... Presenting no proof whatsoever, he appeals to faith and hope, pronouncing his *Logos* dogma like a prophet’).
- 18 See especially Fränkel [145]; cf. Reinhardt [134], 72–5.
- 19 See especially Reinhardt [30], 206–7; Snell [144], 130–1; Kirk [136], 244, 366. Reinhardt denies that Heraclitus held a ‘*Flusslehre*’; but he says that ‘Heraclitus’ fundamental idea...is the most perfect conceivable opposite of the Theory of Flux: stability in change; constancy in alteration;...unity in duality; eternity in ephemerality’ (207). But that describes, in high-flown language, something very like the Theory of Flux.
- 20 References in Marcovich [129], 194–205.
- 21 On the *de victu* see especially Joly [153] (date, *c.*400:203–9; influence from Heraclitus: 19–91); see also Wasserstein [152]; Mondolfo-Tarân [131], 231–4. Epicharmus **23 B 2** (above, p. 106) has been held to show acquaintance with the Theory of Flux: see especially Bernays [133]; Mondolfo-Tarân [131], XLII–LXIV; *contra*: Reinhardt [30], 120–1. Melissus **30 B 8** may hint at the Theory.
- 22 On Plato’s doxographical talents see especially Mondolfo-Tarân [131], LXXXIV–CXVIII; on Plato and Heraclitus, *ibid.*, CXVIII–CLVIII.
- 23 See Marcovich [129], 206–14, with references. Bollack-Wismann [143] accept all three quotations as genuine and independent fragments (87–8, 173–4, 268–9); most scholars pick upon one as the original.
- 24 Plutarch quotes **45**; his text continues as follows:

It is not possible to step into the same river twice, according to Heraclitus, nor to touch twice a mortal substance the same in its character; but with a sharpness and celerity of change *it disperses and gathers together* again (or rather, not again or later, but at the same time it comes together and disintegrates), and *it approaches and departs*.

Some scholars claim the italicized words for Heraclitus (but see Marcovich [129], 207–14); if they are right, the Flux interpretation of the river fragment is assured.

- 25 Popper [137], I.11; [151], 159 (italics Popper's); Hegel [27], 287. For a different comparison between Heraclitus and Wittgenstein's *Tractatus* see Hussey [34], 59.  
 26 Reinhardt [30], 220; cf. Popper [35].  
 27 Another possibility is:

(3\*) ( $\forall \phi$ ) ( $\forall x$ ) ( $\phi_x$  if and only if  $\phi_x$ ): 'opposites' are one in that they are mutually implicative. That, I suspect, is as suitable an interpretation as (2); but it raises all and only the problems raised by (2).

- 28 Kirk [136], 70.  
 29 See Stokes [56], 90–100, who distinguishes five relations involved in the Unity Thesis: opposites may be (i) logically indistinguishable, (ii) ascribed to the same object, (iii) mutually successive, (iv) mutually validating, and (v) 'the kind exemplified by **B 61**'. Now (iv), exemplified in **B 23=45 M** and **B 111=44 M**, has nothing to do with the Unity Thesis; and the cases Stokes lists under (i), (iii) and (v) can all be accommodated under (ii).  
 30 See Kirk [136], 139–48; Reinhardt [134], 91, n. 31 (whose reading, *taútode ge zôn...*, I accept); cf. Plato, *Cratylus* 440A.  
 31 See Stokes [56], 93, who concludes with the romantic hypothesis that Heraclitus 'was only a step from knowing that there was something wrong somewhere in the argument; only he could not lay his finger on the flaw and continued to proclaim the paradoxes with his unique vigour'.  
 32 Plato, *Euthydemus* 293B 'may be the first extant text in which it is implicitly recognized that the factors of *respect* and *time* must be taken into account in deciding whether two assertions in which contrary attributes are predicated of a single subject contradict one another' (Lloyd [50], 138).  
 33 **B 48=39 M**:

A name of the bow is life (*bios*), its function death.

(*Bios* means both 'bow' and 'life'.) See, e.g., Snell [144], 141–5. But there is no call to take that quip as philosophy. On **B 23=45 M**, sometimes taken to illustrate the Unity Thesis, see especially Mouraviev [130], 114–17.

- 34 Sextus, *Pyrr Hyp* I.210–1, II.63, explicitly ascribes this type of argument to Heraclitus.  
 35 See Stokes [56], 97–8; completely different interpretations in, e.g., Hölscher [79], 153–6, and Mouraviev [130], 122–5.  
 36 I side with those scholars who see no cosmological significance in **55** (see, e.g., Kirk-Raven [33], 190–1; *contra*: e.g., West [59], 121–3). On the sense of *anô katô* see Reinhardt [135], 62. The puzzle still troubled Aristotle: *Phys* 202b12–6.  
 37 According to Philo, A 6a, Heraclitus offered 'immensa atque laboriosa argumenta' for his *logos*: the surviving *argumenta* are usefully catalogued in Marcovich [140], 286–91.  
 38 Guthrie [25], I.461; contrast *ibid.* II.246: 'we can only study these philosophers in the light of our own conceptions, nor would the study be of much value if we did not'. Stannard [119], 198, n. 19, suggests that it is silly to accuse Heraclitus of violating the Law of

Contradiction since ‘there was no “Law of Contradiction” prior to Aristotle’s formulation of logical rules’. Perhaps that is a joke.

- 39 *Ta enantia* and *ta antia* do not appear in the fragments (Kranz’ change of *tauta* into *tdntia* in **B 23=45 M** is implausible; *antion* appears as a preposition in **B 120=62 M**). Text **35** and **B 67=77 M**, taken in conjunction with Hippolytus’ glosses, suggest that Heraclitus never spoke of ‘the opposites’.

### V The Divine Philosophy of Xenophanes

- 1 There are two exceptions to this generalization: Democritus (Diogenes Laertius, IX.41=**68 B 5**; see p. 307); and Gorgias (Olympiodorus, **82 A 10**). On Aristotle, *Met* 984all=**31 A 6**, seep. 306.
- 2 For the Milesian aspect of Xenophanes’ work see especially Heidel [160], 268–72 (*contra*: Fränkel [215], 339–40). According to Theophrastus, Xenophanes had ‘heard’ Anaximander: Diogenes Laertius IX.21=**A 2**.
- 3 Sextus, Galen, and Simplicius could not find copies of Xenophanes’ works (**A 35**, **A 36**, **A 47**): Aristotle’s cutting appraisal (*Met* 986b21–5=**A 30**) may have dulled interest in Xenophanes’ thought.
- 4 A poem *Concerning Nature*: Crates of Mallos, *ad B 30*; Pollux, *ad B 39*; Stobaeus, **A 36**. For the majority view see especially Burnet [31], 121–6 (I quote 116); Steinmetz [159], 54–68; *contra*: see especially Untersteiner [156], CCXLII–CCL.
- 5 Cherniss [32], 18; similar judgments are legion.
- 6 On the sentence from the *Sophist* see especially Stokes [56], 50–2; for the issue in general, *ibid.*, ch. 3. Mondolfo-Taran [131], C-CXIV, offer a spirited defence of the doxography. According to Simplicius:

Theophrastus says that Xenophanes...supposes that the principle is one, or that what exists is one..., but he [i.e. Theophrastus] agrees that the account of his [i.e. Xenophanes’] opinion belongs to an inquiry other than that into nature (**A 31**).

Theophrastus did not say (*pace* Jaeger [48], 40) that Xenophanes was not a *phustologos*; rather, he said that Xenophanes’ alleged monism was not a ‘physical’ opinion (he probably gave Xenophanes a physical theory of elements: Diogenes Laertius, IX. 19=**A 1**). The inquiry to which Xenophanes’ monism belongs is theology (see Diels [4], 480 n, recanting the view he expressed at 101–10): Xenophanes’ theological monotheism was lightheartedly construed by Plato as an ontological monism; Theophrastus solemnly indicates that Plato is romancing. It is another question whether Parmenides was in any sense a ‘pupil’ of Xenophanes (Aristotle, *Met* 986b22=**A 30**; Simplicius, **A 31**; etc.).

- 7 Vlastos [161], 92; contrast Burnet [31], 13–15, on ‘the secular character of the earliest Ionian philosophy’. Where religiosity is concerned I am tone-deaf: it is certain that many

- of the Presocratics had something to say about the gods; whether or not they were religious men I cannot tell.
- 8 Nietzsche [28], 385; Jaeger [48], 49, 92. Cf. Kirk-Raven [33], 171; Cleve [37], 27–8; *contra*: Reinhardt [30], 100: ‘the tradition compels us to replace Xenophanes the mystic by Xenophanes the dialectician’.
- 9 That the major gods were ungenerated was clear to Pherecydes, **7 B 1**; and note the apophthegm ascribed to Thales: ‘What is divine?—That which has neither beginning nor end’ (Diogenes Laertius, I.36=**11 A 1**).
- 10 Note the strange phrase ‘*theoi aeigenetai*’ (e.g., *Iliad* II.400; III. 296); Callimachus, *Hymn to Zeus* 1–10, says that Zeus was born, ‘but you have not died; for you exist forever’.
- 11 The section of the *MXG* on Xenophanes is usually dismissed as worthless (e.g., Jaeger [48], 51–4; Guthrie [25], I.367–8); but the old arguments in Reinhardt [30], 89–96, still convince me that the *MXG* relies on Theophrastus and hence has some historical value (cf. Steinmetz [159], 49–51; von Fritz [158], 1548–52). (On the other hand, the attempt in Untersteiner [156], XVII–CXVIII, to date the *MXG* to c.300 BC is feeble and confused.)
- 12 On Epicharmus see especially Berk [172]. For his philosophical interests see Diogenes Laertius, VIII.78=**23 A 3** (cf. Berk [172], 80–5). Some make him a Pythagorean (Diogenes Laertius, VIII.78=**A 3**; lamblichus, **A 4**); but see Burkert [173], 289, n. 58; Thesleff [175], 84. That he criticized Xenophanes is attested by Aristotle (*Met* 1010a5=**21 A 15**; cf. Alexander, *in Met* 308.12; and see especially Reinhardt [30], 122–5). Of the many fragments collected in Diels-Kranz, most are forgeries (see Athenaeus, **A 10**; Diels-Kranz I.193–4). **B 1–B 6** are quoted by Alcimus, a fourth-century historian of Sicily: he argued against Plato’s pupil Amyntas that Platonism was in all essentials anticipated by Epicharmus. **B 1** and **B 2** seem to be genuine (Berk [172], 88–93); and **B 5** probably is too (*ibid.*, 98–9).
- 13 See e.g. Kirk-Raven [33], 170. On ‘polar expressions’ see Wilamowitz [18], III.230–1; Lloyd [50], 90–4. Aristophanes, *Clouds* 573–4, may be a reminiscence of **B 23.1**; but his expression is not ‘polar’.
- 14 See especially Stokes [56], 76–9, who thinks that this view gives the ‘plain, ordinary meaning’ of the Greek (83). A survey of interpretations in Untersteiner [156], XLIII–XLLX.
- 15 Euripides imitates Xenophanes in fr. 282=**C 2** (cf. **B 2**, and see Athenaeus, *ad C 2*); see Nestle [459], 560–3; Dodds [43], 197, n. 20.
- 16 *orthôs*: for the logical sense of the word see Wilamowitz [18], III.18–19 (the MSS. read *ontôs*—an accurate gloss). Cf. *MXG* 977a31–3=**A 28**: ‘the divine is by its nature (*pephukenai*) not mastered’.
- 17 Diogenes Laertius, IX.19=**A 1**, adds ‘and does not breathe’; and the addition may be genuine (see Kahn [90], 98, n. 2).
- 18 Cf. Anaxagoras, **59 B 12**; Diogenes, **64 C 3** (pseudo-Hippocrates) and **C 4** (Philemon); and Critias, **88 B 25**. 17.
- 19 Cf. *MXG* 977b27=**A 28**: ‘Again, he assumes that god is most masterful (*kratistos*), meaning by this most powerful and best’. For the essential goodness of gods see especially Aristotle, *Cael* 279a30–5, and Euripides, fr. 292.7 (‘if gods do anything evil, they are not gods’).
- 20 See Antiphon, **87 B 10**:

For this reason it lacks nothing and takes nothing from anything, but is unlimited and un lacking.

(Antiphon is almost certainly talking about god.) Socrates thought that ‘to lack nothing is a divine characteristic...and what is divine is most powerful’ (Xenophon, *Memorabilia*, I.vi.10). So too Diogenes the Cynic: ‘It is proper to gods to lack nothing’ (Diogenes Laertius, VI.105). *MXG* 977b27–30=A **28** objects that Xenophanes’ almighty god is not conventional (*kata nomon*) (cf. Adkins [207], 26, n. 4). But Xenophanes ‘everywhere starts from the definitions of the nature of the gods given by popular religion’ (Drachmann [164], 19); rather, he forms his concept of the divine from the core of characteristics essential to the gods of popular thought.

- 21 ‘He remains in the same state’ translates *en tautōi mimnei* (cf. Epicharmus, **23 B 2.9**; Euripides, *Ion* 969); thus line 1 of **62** asserts immutability, and line 2 adds immobility. But *en tautōi mimnei* may rather mean ‘he stays in the same place’; in which case *oude* in line 2 may have the force of ‘for...not...’, so that **62** asserts immobility in line 1 and justifies the assertion in line 2.
- 22 Cf. 886D; 889A-890A; [Hippocrates], *morb sacr* 1–5; Plutarch, *Nicias* 23; see Guthrie [25], III.227–8. There is a long-standing controversy over the identity of the atheist philosophers attacked in *Laws* X: see especially Tate [167]; Guthrie [25], III.115–16; de Mahieu [168].
- 23 For the ascription, see especially Jaeger [48], 31–2, 203–6, n. 44 (comparing Diogenes, **64 B 5**); *contra*: e.g., Vlastos [161], 114, n. 75.
- 24 See especially Guthrie [25], I.376–80; Untersteiner [156], LXX-LXXVI, CXC-CCIV.

### *VI Pythagoras and the Soul*

- I On Pythagoras’ life see especially Guthrie [25], I.173–81; Burkert [173], ch II.2 (‘There is not a single detail in the life of Pythagoras that stands uncontradicted’: *ibid.*, 109). On the extreme difficulty of getting to grips with Pythagoreanism see the wise words of Guthrie [25], I.146–56; Burkert [173], 1–14.
- 2 See Diogenes Laertius, VIII. 6–8=**14 A 19**; Iamblichus, **A 17**; Galen, **A 18**; see especially Burkert [173], 218–20 (who deals adequately with *Ion*, **36 B 4**, and Heraclitus, **22 B 129**, texts which appear to ascribe writings to Pythagoras).
- 3 See the list in van der Waerden [408] (cf. Aristoxenus, **58 D 6**, § 198); a full account of the pseudepigrapha in Thesleff [174] and [175].
- 4 Mathematics: e.g., Proclus, **58 B 1**; Aristoxenus, **B2**; Diogenes Laertius, VIII.11. (Pythagoras’ theorem: Proclus, **58 B 19**; Diogenes Laertius, VIII. 12. See especially Burkert [173], 409–12, 428–9.) Astronomy: e.g., Aëtius, **41 A 7**; Diogenes Laertius, VIII.48=**28 A 44**. Harmonics: e.g., Xenocrates, fr. 9 H; Iamblichus, *VP* 115. (Harmonics and astronomy as sister sciences: Archytas, **47 B 1**; Plato, *Republic* 530D. Music of the spheres: Aristotle, *Cael* 290b142– 291a28=**58 B 35**. See especially Burkert [173], 350–7; West [108], 11–14.) Metaphysics: Aristoxenus, **58 B 2**.
- 5 In what follows I rely heavily on Burkert [173] (see also Reinhardt [30], 131–6; Heidel [406], 350–4); for critical comment on Burkert’s scepticism see van der Waerden [408], 277–300; de Vogel [181], ch. 3; Kahn [177].
- 6 Our sources for Pythagoreanism fall into five classes (see especially Burkert [173], ch. II. 1; Philip [180], 8–23): (a) the genuine fragments of Philolaus and Archytas (see chapter

- XVIII); (b) a handful of pre-Aristotelian reports, most of which are mentioned in the present chapter (see Burkert [173], 109, n. 64; Morrison [182], 136–41); (c) fourth-century accounts, mostly fragmentary (in general see von Fritz [183], 173–9), including Aristotle (see especially Guthrie [25], 1.214–16; Philip [413], and [180]), Dicaearchus, Eudemus, Heraclides, Timaeus, Speusippus; (d) neo-Pythagorean writers such as Porphyry, Iamblichus and Nicomachus; (e) the usual compilers, such as Diogenes Laertius.
- 7 Iamblichus, *comm math sc* 76.16–78.8 (cf. *VP* 81, 87–9); see Burkert [173], 193–7, 206–7 (*contra*; Philip [180], 28–9).
- 8 For the *acousmata* see **58 C**, with Burkert [173], ch. II. 4. Aristoxenus, **58 D**, contains a lot of sensible stuff about ethics, political theory and education; but it is probably a fourth century version of the *acousmata* (Burkert [173], 107–9).
- 9 Pythagoras is sometimes called a shaman (e.g., Burkert [173], 162–5; cf. Dodds [43], ch. 5); but I doubt if the phenomenon of shamanism sheds any light on early Greek philosophy (see Philip [180], 158–62; Kahn [177], 30–5).
- 10 The passage is from Porphyry, *VP* 19; for the attribution to Dicaearchus see Burkert [173], 122–3.
- 11 ‘Metempsychosis’ is the orthodox name for the view later and more accurately referred to as ‘*palingenesis*’ or ‘*metensômatôsis*’ (Servius, *ad Aen* III.68).
- 12 See *Meno* 81AD; *Phaedo* 70A; etc. (see especially Long [188], 65–86).
- 13 References in Burkert [173], 126, n. 38; cf. Herodotus, II.18; Hellanicus, *FGrH* 4 F 73. Reinhardt tried to find cyclical transmigrations in Heraclitus (Reinhardt [30], 191–9); some scholars find them in Parmenides’ Way of Opinion (cf. Simplicius, *ad 28 B 13*). For Egyptian origins of Pythagoreanism see also Isocrates, *Busiris* 28=14 A 4; Suda, 7 A 2; and see Philip [180], 189–91; Burkert [173], 126.
- 14 Numerals followed by ‘Z’ refer to the order of the fragments in Zuntz [193]. The fish in **86** is a dolphin: Wilamowitz [194], 635–6.
- 15 **B 129** is often mistranslated; for the correct version see, e.g., Zuntz [193], 208–9. Most scholars see a reference to Pythagoras (see Burkert [173], 137–8); but that is far from certain. *Ion*, **36 B 4**, ascribes some doctrine of survival to Pythagoras, but does not explicitly refer to metempsychosis; so too Herodotus, IV.95–6= **14 A 2**.
- 16 There is no reason to doubt Diogenes’ reference to Pythagoras (see Burkert [173], 120, n. 1), though Diogenes is of course wrong to refer to Pythagoras’ *own* incarnations. Reference to later Pythagorean texts on metempsychosis in Thesleff [175], Subject Index IV; but some later Pythagoreans played the doctrine down (see Burkert [173], 124). I have nothing whatever to say about Orphism (see, e.g., Burkert [173], 125–33).
- 17 I note the probable answers of Empedocles to my peripheral questions. Hippolytus, **31 A 31**, implies that all *psuchai* transmigrate, but **B 112.4** and **B 113.2** suggest that transmigration is limited to an *élite* (but see Burkert [173], 136–7). As far as we can tell, all animals and at least some plants receive *psuchai*. There is a cycle of transmigration with a fixed time-table (**B 115**) (on a Pythagorean time-table see Diogenes Laertius, VIII.14; Thesleff [175], 171, n. 21); and transmigrations are hierarchically arranged (see Zuntz [193], 232–4). There is no evidence for gaps between incarnation or for *post mortem* Judgment. A moral theory is erected on the doctrine (above, pp. 122–6).
- 18 E.g., *Iliad* XIX.350–4; *Odyssey* X.229–40; see especially Bacigalupo [189], 267–76.
- 19 Metempsychosis is ascribed to Pherecydes (Suda, 7 A 2; see, e.g., Vlastos [161], 110, n. 60); for Epimenides see Dodds [43], 143. Note that Heraclitus **22 B 129** accuses Pythagoras of plagiarism.
- 20 See, e.g., Long [188], 2; Jaeger [48], 84–5. Burnet [185], 257, claimed that the personal *psuchê* was an invention of Socrates, and many scholars have believed him. But see, e.g., Zuntz [193], 270; Lloyd-Jones [51], 8–10. There is no standard Greek terminology for personhood (see especially Dodds [43], 138–9); but we can hardly say that ‘strictly speaking, a doctrine of personal immortality could scarcely be developed without a word

- for “person” (Kahn [493], 13, n. 24). The notion of an occult, non-personal self seems to figure in the doctrine of Pindar, fr. 116 B (see Burnet [185], 249–51; Kahn [493], 12–13), but that has nothing to do with the orthodox Pythagorean doctrine.
- 21 This argument, the *auxanomenos logos*, has had a long history. For the ancient part of the story see Plutarch, *Moralia* 1083AD and Bernays [198]; for the modern part see R. Hall ‘Hume’s Use of Locke on Identity’, *Locke Newsletter* 5, 1974, 56–75. **88** has often been connected with Pythagoreanism for the absurd reason that the debtor’s opening remarks refer to a Pythagorean ‘Lehre vom Geraden und Ungeraden’.
- 22 Burkert [173], 136.
- 23 Burkert [173], 136.
- 24 According to Plutarch, Empedocles denied that we can remember our earlier incarnations (*ad 31 B 116*); but Empedocles certainly claimed some such memories. In Plato the connexion between pre-existence and recollection is familiar. Further texts on Pythagorean mnemonics: Cicero, *Cato* 11.38; Proclus, *in Tim* 124.4–13; Porphyry, *VP* 40; Diodorus, X.viii (see Burkert [173], 213, n. 19; Gladigow [187], 412–14). But memory was cultivated in Greece, and a good memory is an advantage even to the non-Pythagorean sage (see, e.g., Aristophanes, *Clouds* 129, 414; Plato, *Republic* 486D).
- 25 I think that this argument lies behind the remarks in Diogenes of Oenoanda, fr. 34 Ch (cf. new fr. 2: M.F. Smith, ‘New Readings in the Text of Diogenes of Oenoanda’, *CQ* n.s. 22, 1972, 162); see Chilton [22], 85–8; 128–30.
- 26 Kahn [177], 167.
- 27 Cf. Herodotus, II.123=14 A 1; Alexander Polyhistor, *apud* Diogenes Laertius, VIII.28=58 B 1a; Cicero, 7 A 5.
- 28 See especially Guthrie [25], 1.351–7; Mugler [201], who argues ingeniously that men die and their *psuchai* survive because their physiological cycles break down and their psychic cycles are eternal. With **93** compare Heraclitus, **22 B 103**; [Hippocrates], *de victu* 19=22 C 1 (see Reinhardt [134], 76–80).
- 29 On *aeikinêton* (‘ever-moving’) and the variant *autokinêton* (‘self-moving’) see especially Robinson [202], 111–12, with references; on the sense of *pasa psuchê*, *ibid.*, 111 (see also Hackforth [203], 64–6; Robinson [205]). This argument for immortality was one of the most quoted passages of Plato; see references in Moerschini’s edition of the *Phaedrus*,
- 30 See, e.g., Skemp [204], 5–6; Burkert [173], 296, n. 97. The argument was connected with Alcmeon by Simplicius: *in An* 32.1–13. See further Stella [200], 276–7, for other Platonic references.
- 31 So too Philoponus, *in An* 71.6; Sophonias, *in An* 11.25.

### VII The Moral Law

- 1 Pythagorean abstention was a standard butt of comedy (see **58 E**); but the nature and extent of the practice was hotly debated from the time of Aristoxenus (see especially Burkert [173], 180–3).
- 2 Zuntz [193], 183–
- 3 Omitting line 4 with Wilamowitz [194], 634, and Zuntz [193], 194–6.
- 4 In line 2 I translate Zuntz’ *oiktra toreunta*: that emendation makes sense, the MSS. text does not.
- 5 Burkert [173], 180; a more careful assessment in von Fritz [183], 195–7. For Theophrastus, see Porphyry, *de Abst* III. 26 (Burkert [173], 122, n. 6); for Xenocrates, fr. 98 H (cf. Hippolytus *ad 31 B 115*; Diodorus, X.vi.1). Note also the Empedoclean sentiments in the speech of Ovid’s Pythagoras (*Metam* XV.75–175, 457–78; on Ovid’s sources here see van der Waerden [184], 854–5).

6 P.D.Singer, 'Animal Liberation', *New York Review of Books*, XX.5, 1973, 18.

7 Cf. Diogenes Laertius, IX.12=22 A 1:

Some entitle Heraclitus' book *Muses* [cf. Plato, *Sophist* 242D=A 10], others *Concerning Nature*; Diodotus calls it

A certain Steering to a Balanced Life, others *Judgment* [gnômê: cf. B 41], *Manners* [êthê: cf. B 78], *Turnings* [tropai: cf. B 31], *One Universe for All* [cf. B 89].

The MSS. text is corrupt, and I have tacitly emended it in places; at any event, it is plain that more than one ancient scholar found moral philosophy at the core of Heraclitus' book.

- 8 I quote only the second half of B 5: the first half, though on the related topic of ritual observances, seems to be a separate fragment. See also B 14=87 M; B 15=50 M.
- 9 Heraclitus' views on psychology and death are controversial (see especially Marcovich [140], 303–5; Nussbaum [477]). I offer a brief sketch of one possible reconstruction: 'Souls are fiery (Aëtius, 18 A 9), and the drier they are the better (B 118=68 M; cf. B 119=69 M); "for souls it is death to become water" (B 36=66 M; cf. B 76=66 (e) M; B 77=66 (d) M; and perhaps B 12= 40 M). But B 36 does not imply that all souls do in fact become wet and die; and there may well be survival for some. Thus something unexpected awaits us after we die (B 27=74 M; cf. B 98=72 M); and the fate we meet with then depends upon the life we lead now (B 25=97 M; B 136=96 (b) M (see Kirk [213]; West [214]); cf. B 63=73 M; B 24=96 M). Souls are immortal (Aëtius, A 17); and perhaps they undergo a cyclical series of incarnations (B 88=41 M)'. See further, pp. 473–4.
- 10 See also: B 29=95 M; B 66=82 M (but see below, n. 20). Other moralizing fragments: B 43=102M; B95=110 M (perhaps to be connected with B 117= 69 M); B 110=71 M.
- 11 'What must be', *chreôn*, is in fact an emendation. See also B 137=28 (d) M; Aëtius, I. 28.1; pseudo-Galen, 42.
- 12 See Aëtius, Censorinus, A 13=65 M; Aëtius, A 18; Plutarch, Philo, Censorinus, A 19=108 M; cf. B 100=64 M. See especially Reinhardt [134], 75–83; Kirk [136], 295–305.
- 13 This interpretation of 109 is taken from Cleve [37], 83–7; see further Marcovich [140], 309–10.
- 14 On early uses of *nomos* see especially Ostwald [211], 20–54; he ends by distinguishing no less than thirteen senses of the word.
- 15 Clearly descriptive *nomoi*: Aeschylus, *Choephoroi* 400; Sophocles, *Antigone* 613; Euripides, fr. 346. Clearly prescriptive *nomoi*: Aeschylus, *Supplices* 670; Sophocles, *Antigone* 450; Euripides, *Hippolytus* 1328. See also Dover [206], 256–7.
- 16 Vlastos [111], 56; cf. Jaeger [48], 115–16; Lloyd [50], 210–32. Cornford [40], 21, says that 'the word "law" is missing from the vocabulary of Greek science. "Law" suggests a rule of behaviour, an enactment associated with the notions of cause and effect, of action and its consequences.' Cornford here seems to confuse prescriptive and descriptive laws; and he is quite mistaken in saying that legislative vocabulary was foreign to Greek science.
- 17 *Kata to chreôn*: some scholars see a normative notion in the phrase—'what should be' rather than 'what must be' (see especially Fränkel [230], 187–8). Even if that is right, Anaximander exhibits the confusion between descriptive and prescriptive laws which I am labouring here.
- 18 Justice figures in other Heraclitean fragments: on B 23=45 M see Mouraviev (130); on B 28=20+19 M see above, p. 145; on B 66=82 M see below, n.20.

19 For the conjunction of **B 114** and **B 2** see Marcovich [129], 91–2. **B 114** may have followed close upon **33** (so West [59], 117; cf. Sextus, **A 16**), thereby giving prominence to the ethical content of Heraclitus' book. The text of **B 2** is uncertain. Sextus' MSS. read:

Going on a little, he adds: For that reason one should follow what is *koinos*, for what is *koinos* is *xunos*; yet...

Diels-Kranz print:

Going on a little, he adds: For that reason one should follow what is *xunos* (that is, what is *koinos*—for the *koinos* is *xunos*); yet...

I adhere to the orthodox opinion, which accepts this text and treats the parenthesis as an un-Heraclitean gloss on the rare word *xunos*. West [59], 118, begins the quotation at the word 'yet', ascribing the preceding clause to Sextus (cf. Bollack-Wismann [143], 65); that is implausible.

20 **B 66=82 M** reads:

Fire, coming upon them, will judge and convict all things.

Its authenticity is defended by, e.g., Marcovich [129], 435; but Reinhardt [135], 64–7, argues—to my mind cogently—that it is Hippolytan, not Heraclitean. **B 33=104 M** reads:

It is a *nomos* too to obey the will of one.

Some take 'one' to refer to God; but the presence of 'too' (*kai*) is against this. The fragment should rather be connected with **B 49=98 M** and **B 121=105 M**.

### VIII The Principles of Human Knowledge

1 I follow the text suggested by Wachtler [199], 34–8 (cf. Stella [200], 237, n. 1).

2 *Iliad* II.484–6 (trans. Chapman); cf. Theognis, 141–2; Pindar, *Nemean* VI. 1–6; Herodotus, VI.50; Heraclitus, **22 B 78=90 M**, **B 79=92 M**; Philolaus, **44 B 6**. See especially Snell [55], ch. 7.

3 Lloyd-Jones [51], 35.

4 But Xenophanes was not a pure sceptic in Sextus' opinion: see *Pyrr Hyp* I.223–5 = **A 35**; II.18; III.219; *adv Math* VII.48–52. See also Aristocles, **A 49**, and Diels [3], 45. I am not sure how Xenophanes' rejection of divination (Cicero, Aëtius, **A 52**; pseudo-Galen, 105) connects with his scepticism.

- 5 In line 1 I read *iden* rather than *genet'* (see Fränkel [215], 342–3). An alternative translation of line 2 runs: '...and concerning what I say about everything'. In line 3, *tuchoi* may mean '...if he should happen...' rather than '...if he should actually manage...'. In line 4 I take *pasi* to be masculine; if it is neuter, the line reads: 'but in the case of all things, there is only belief. The fragment is frequently cited or alluded to: see references in Diels [3], 45.
- 6 See especially Heitsch [217] 208–16.
- 7 See also Varro, *apud* Augustine, *Civitas Dei*, VII. 17:

sed ut Xenophanes Colophonius scribit, quid putem, non quid contendam, ponam. Hominis est enim haec opinari, dei scire.

- 8 For the phrase, used to refer to Ionian science, see, e.g., Plato, *Apology*, 18B; cf. Aristophanes, *Clouds* 187–95 (see Mejer [529]).
- 9 So Sextus, *adv Math* VII.48–52; Epiphanius, III.9. Timon reproaches Xenophanes for 'dogmatizing' about God (fr. 59–60=A 35); and some scholars hold that Xenophanes' positive theology rules out a sceptical interpretation of 121 (e.g., von Fritz [158], 1557–8; Rivier [216], 55–7). But I do not see that Xenophanes' theology is 'dogmatic'; and I suppose that 124 is Xenophanes' anticipatory response to Timon's charge.
- 10 *adv Math* VII.48–52; 326. Plato, *Meno* 80D, perhaps suggests the same interpretation (see Fränkel [215], 344).
- 11 Clement paraphrases Xenophanes; Diels' tentative restoration of the original verses has become canonical, but it is speculative.
- 12 See **B 40=16 M**; **B 57=43 M**; **B 106=59 M**; **B 129=17 M**; **B 81=18 M** (see Reinhardt [219]); **B 42=30 M**.
- 13 See the table in Kirk [136], 47. With 128 compare *Odyssey* XVIII. 130–7; Archilochus, fr. 68 D. I read *hokoiois* (Bergk) for *hokosoi*.
- 14 Cf. Archytas, **47 B 3**:

...to discover without inquiring is difficult and rare, with inquiry it is plain sailing and easy—but impossible if you do not know how to inquire.

- 15 I follow, doubtfully, Mouraviev [130], 118–22.
- 16 Plutarch, *adv Col* 1118C, interprets 136 differently: 'I probed myself' (cf. **B 116=23 (e) M**); see Westman [15], 295–7. Cf. Epicurus, fr. 117 Us.; *contra*: Dio Chrysostom, 54.2.
- 17 137 is imitated by Democritus, **68 B 64** (cf. B 65); with 138 contrast Ion, **36 B 4**. For a related distinction between polymathy and wisdom see Anaxarchus, **72 B 1**; Plato, *Laws* 819A; see Pfeiffer [24], 138.
- 18 See especially Archytas, **47 B 3**; Plato, *Phaedo* 99C; cf. Xenophanes, **21 B 3.1**; Pindar, *Olympian* II.86–8 (see Ramnoux [142], 324–5); Parmenides, **28 B 1.32**; Empedocles, **31 B 14**. For Heraclitus see **B 17=3 M**; **B 55=5 M**; and note *didaskein* in **B 40=16 M**.
- 19 Some translate: 'The things of which there is sight, hearing, perception (*mathêsis*)—these I prefer' (see Marcovich [129], 21); but that does not agree with Heraclitus' use of *manthanein*.
- 20 So Fränkel [145], 271–2; Cherniss [32], 15. For the obvious interpretation see Diogenes Laertius, IX.7=A 1. Note that the heavenly bodies are carried about in *skaphai* or basins (Diogenes Laertius, IX.9=A 1; Aëtius, A 12).
- 21 **B 46=114 M** reads thus:

He used to say that thinking was a sacred disease (*hieros nosos*: epilepsy), and that sight deceives.

(cf. **B 131=114 (d) M**). The second clause of **B 46** is surely derived from **B 107=13 M**. The first clause is presented as an apophthegm, not as a quotation. Its meaning is anyone's guess. **B 46** does not require a sceptical interpretation.

22 Many scholars feel that there is an incompatibility between **141** and **137**. On my interpretation of **137** there is evidently no incompatibility; but neither is there on the orthodox interpretation. For on that interpretation, **137** denies that polymathy is a sufficient condition for wisdom, while **141** asserts that it is a necessary condition. On the pre-philosophical background to **141** see Stokes [56], 88–9.

23 Nussbaum [477], 10.

24 Alcman, fr. 125 P reads:

Experience (*peira*) is the beginning of learning.

Lanza [223], argues cogently that 'Alcman' here is a mistake for 'Alcmeon'. (The same mistake is certainly made at Theodoretus, *curatio* V.17). Note that the fragment fits well with the *Phaedo* theory. Cornford [114], 34, says that 'in the practical art of medicine we find the root of empirical epistemology'; but he is right only *per accidens*: Alcmeon's epistemology has no logical connexion with his medical practice. Vlastos [115], 47–8, finds no empiricist epistemology before *Phaedo* 96B (in which, by implication, he sees no Presocratic traces).

#### *IX Parmenides and the Objects of Enquiry*

1 See the condemnatory judgments of Plutarch, **A 16**, Proclus, **A 17**, **A 18**, and Simplicius, in *Phys* 7.3, 21.19. On Parmenides' style see Diels [224], 4–11; Mourelatos [237], ch. 1.

2 In line 29 I read *eukukleos*; for the variant, *eupeitheos* ('persuasive'), see, e.g., Diels [224], 54–7. In line 31, 'these' (*tauta*) are the mortal opinions (*contra*; Schwabl [243]; Reale [269], 226–34). In lines 31b–32, which are among the most disputed in Parmenides' poem, I incline to take *perônta* (read *perôntas*?) as masculine, and to accept Diels' *dokimôs* for *dokimôs*; thus I translate:

...you will learn...the way in which men were bound to judge the things that seem to be, since they always journey through them all.

i.e., 'You will learn how men who always have appearances thrust upon them could not help believing them to be real.' But the sentence does not have the importance some would ascribe to it: the central problem of the relationship between the Way of Truth and the Way of Opinion can be securely established without reference to

lines 31b-32. The arrangement of the verses at the end of **B 1**, and their connexion with **150** and **156**, are disputed (see Bicknell [228]); I follow the orthodoxy of Diels-Kranz. But Bicknell [229] plausibly puts **B 10** after **B 1**.

- 3 It contained some interesting astronomy (see **A 37–44**; **B 10–15**): Parmenides is said to have identified the Morning Star with the Evening Star (Diogenes Laertius, IX.23=**A 1**; Aëtius, **A 40a**), and to have been the first upholder of a spherical earth (Diogenes Laertius, IX.21=**A 1**; VIII.48=**A 44**). On the contents of the Way of Opinion see especially Hölscher [227], 106–23, who suggests connexions with the later theories of Empedocles and Philolaus.
- 4 For this translation see, e.g., Tarán [226], 41–4, with references. The traditional translation is: ‘Thinking and being are the same’ (e.g., Kahn [253], 721–4); but I can make no sense of that unless it is glossed in such a way as to make it equivalent to the translation I prefer. Full details of interpretations of **149** in Untersteiner [225], CII–CVI.
- 5 The grammar is horrid: should we read *legei te noei t’*, taking *to* as a relative pronoun? Then translate: ‘It is necessary for what one says and thinks to be being’. Other interpretations documented in Untersteiner [225], CIX, n. 29.
- 6 See especially Verdenius [233], 65–6; Mourelatos [237], 68–70. Kahn [253], 713, n. 18, and Mourelatos [251], render *phrazein* in **148.8** by ‘point out’ and gloss *legein* and *phasthai* by ‘say truly’; but that gloss is unacceptable. In this context reference is often made to von Fritz [62]. But I do not know what von Fritz thinks he has shown. Originally, perhaps, *nous* referred to insight or intuitive knowledge. But even in Homer and Hesiod, *nous* is not always veridical; i.e., you can *noein* that *P* though *P* is false. Hence *nous* is nearer to thought than to knowledge. By the fifth century, *nous* covers reflective thought and intellect in general (see also Furley [186], 8–10).
- 7 Kahn [253], 703, n. 4, offers a different account of **148.2**: *noêsai* is ‘loosely epexegetical...with *hodoi*’; i.e. ‘what ways of enquiring there are that lead to thought’.
- 8 The reference of *fantês* in **150.3** has caused some difficulty (see especially Stokes [56], 112–15); but as far as I can see that word refers simply enough to the Road discussed in **148** and **150.1–2** (see Cornford [242], 99–100).
- 9 The second half of **148.3** is syntactically ambiguous: the *esti* in *ouk esti me einai* may be either ‘personal’ or ‘impersonal’ (‘It is not for not being’ or ‘It is not possible for it not to be’). Line 5 proves that the *sense* is: ‘It cannot not be’; and I take it that either syntax will yield that sense.
- 10 See especially Kahn [255]; there is a useful table on p. 82 presenting a summary classification of the roles played by *einai*.
- 11 Eudemus, fr. 43 W=**A 28**, says that the Eleatics ignore different uses of *einai*; but the Peripatetic and the modern accusations are quite distinct. Furth [257] maintains that the notions of existence and of the copula are ‘impacted or fused in the early Greek concept of being’ (243). He cites no evidence; and he does not explain the difference between fusion and confusion. Kahn [255], 320–3, argues that existential *einai*—his Type VI—was invented in the fifth century; but I cannot distinguish Type VI from the early Type I.
- 12 ‘...negative judgments (*hoi apophatikoï logoi*), as Parmenides says, fit principles and limits’ (Scholiast to Euclid, **A 22a** in Untersteiner’s edition); but the sense and reliability of the report are uncertain.
- 13 The veridical use of *einai* is discussed in Kahn [252], and applied to Parmenides in Kahn [253]. Kahn’s view is complicated by the fact that he maintains first that the veridical use of *einai* involves both the existential and the predicative uses ([253], 712), and second, that Parmenides’ *esti* means both ‘it is the case’ and ‘it exists’ (ibid., 336). Mourelatos [237], ch. 2 and Appendix 2, claims to follow Kahn; but he says that *esti* is the ‘is’ of ‘speculative

- predication' (predication which gives insight into the identity of something or says what it is). That is not a special sense of *esti*; nor can I give any account of the three Roads in terms of it. Hölscher [227], 79 and 98, holds that *esti* is neither existential nor predicative: it means 'seiend sein', 'Bestand haben', 'wahr sein'. Jones [258], 290–1, thinks that Parmenides is proposing a new sense of *einai*, which he explains in **149**. None of these modern suggestions has any linguistic or interpretative plausibility; and none is worth considering unless there are grave objections to the existential construe of *esti*.
- 14 Some scholars talk vaguely of an 'indefinite' subject. Loenen [238], 12–14, emends line 3 to read: ...hopes *esti ti kai has...* ('that something (*ti*) is ...'). Untersteiner [225], LXXV–XC, takes the subject of *esti* to be *hê [hodos]*, 'the one [road]'; and **156**.17–18 supports the suggestion. But that gives Parmenides grammar at the cost of sense.
- 15 Reinhardt [30], 60, supposes a lost line before **148** in which Parmenides refers to *to eon*; Cornford [231], 30, n. 2, emends line 3 to read: *he men hopôs eon esti...*
- 16 Tugendhat [256], 137, says that 'what Parmenides is dealing with is that (i.e. "the Whole") which previous philosophers had always dealt with'; so that the philosophically educated reader will grasp the subject of the poem at once (cf. Verdenius [233], 32; Verdenius, 73–5, argues that the poem was explicitly entitled *Concerning Nature*). The Milesians had indeed described the universe as a whole; but they had not, in any very obvious sense, made statements about 'the Whole'.
- 17 See especially Owen [244]; I quote from Stokes [56], 119–22.
- 18 As well as (4), (3) yields: (4a) If O can exist, then O can be thought of  
—there are no unthinkable mysteries. Parmenides does not need  
(4a) for his argument; for some reflexions on it see Anscombe [250], 128–32.
- 19 Parmenides had an ancient reputation for criticizing his predecessors (Simplicius, **A 19**; Plutarch, *adv Col* 1124C); but no details survive. For references to the modern controversy over the mortals of **150** see Untersteiner [225], CXII–CXVII; Mondolfo–Tarán [131], XLVI–LXIV.
- 20 *Pantôn* is usually taken as neuter; then 'the path of all things is backward turning' is part of mortal opinion. For the translation adopted in the text see Stokes [56], 116–17; Ballew [267], 194–5.
- 21 Parallelism with **156**.40 supports it; comparison with **B 8**.57–8 suggests that 'the same and not the same' means 'the same as itself and not the same as other things'.
- 22 See further J. Barnes, *The Ontological Argument* (London, 1972), 39–45.
- 23 Basson [265], 83.
- 24 Gorgias worked by 'putting together what others had said' (*MXG* 979a14); the *MXG* specifically mentions Melissus and Zeno (979a22; b22–5).
- 25 So Diels-Kranz, who do not even print the *MXG*.

### *X Being and Becoming*

- 1 Diels [224], 25–6, guessed that we possess nine-tenths of the Way of Truth and one tenth of the Way of Opinion. On the status of **B 4** see above, p. 213. Loenen [238], 75–7, discovers three new fragments of the Way of Truth, of which he thinks we have only a small portion. He has convinced no one.
- 2 Discussion of **155** in Jameson [266] (sceptical) and Ballew [267] (over-elaborate). Hölscher [227], 77, locates **155** between **B 1** and **148**, and supposes that the goddess means only that the order of the two Ways is indifferent.

- 3 Owen [244], 322.
- 4 For ‘signs’ (*sēmata*) see **B 8.55**, which indicates that the ‘signs’ are the characterizing properties of what exists and not proofs that what exists has those properties.
- 5 Diels-Kranz, and many others, print *esti gar oulomeles...* (cf. Untersteiner [225], XXIX). Their source is Plutarch, *adv Col* 1114C. But Plutarch is quoting from memory; and the words *esti gar* are plainly Plutarch’s and not a part of his quotation (see Westman [15], 236–9). *Oulon mounogenes*, which I translate, has the support of Simplicius, Clement and Philoponus; it was the standard text in late antiquity; and most modern scholars now accept it.
- 6 *Ateleston* is defended by Untersteiner [225], XXX–XXXI; most scholars emend to *êde teleion* or the like (‘and complete’). (References in Tarán [226], 88–93). For *atalanton* see Empedocles, **31 B 7.19** (cf. T.J.Reilly, ‘Parmenides, Fragment 8.4: a correction’, *AGP* 58, 1976, 57).
- 7 Numerals followed by ‘**R**’ refer to the edition of Melissus by Reale [269].
- 8 See Reale [269], 31–2; Jouanna [270], 314–23.
- 9 Melissus is talking about ‘whatever is’ (**B 1**); equivalently, he is supposing that ‘something is’ and asking what follows from that supposition (Simplicius *ad B 1*; *MXG* 974a2=A 5). His subject is not ‘the Whole’ or ‘Nature’ or ‘Being’ or any of those odd things.
- 10 After (T 12), the *MXG* adds: (12a) O is not mixed (974a24–b2=A 5). See especially Reale [269], 305–8.
- 11 ‘Not existing, it exists’: *esti mê on*. Most scholars translate ‘it is non-existent’, gratuitously importing into the text a confusion between existential and predicative *einai*.
- 12 In his paraphrase Simplicius says:

Melissus begins his treatise on generation and destruction thus: ‘If it is nothing, what could be said about this as if it were something existent?’ (ad **B 1**).

Reale [269], 34–6, 368–9, prints this as a genuine fragment (cf. Burnet [31], 321, n. 5). But *MXG* 975a34–5 implies that Melissus produced no such argument. If he did, he was of course only epitomizing Parmenides.

- 13 The MSS. read *ho ti ên* (‘whatever was’); I accept the conjecture of Loenen [238], 144–7, *ho ti esti* (but see Reale [269], 59, n. 60; 370).
- 14 Note that Parmenides deals with generation and destruction together: Melissus probably does not deal with destruction until **B 7**.
- 15 See Wiesner [273]: Diels took lines 7–9a to be directed against generation, 9b–10 against growth. Calogero took 7–11 to be against generation, 12–13 against growth. For the colourless use of ‘grow’ (*auxanesthai*) see, e.g., Empedocles **31 B 17.1**.
- 16 The dilemmatic interpretation pairs ‘Neither...’ (*oute...* in line 7) with ‘Nor...’ (*oud’...* in line 12). It is tempting to emend *oud’* to *out’*. My interpretation pairs *oud’* with the *de* of line 9.
- 17 Aristotle’s commentators find the dilemma in Melissus (**A 10aR**); but the text of Melissus nowhere hints at a dilemma, and the *MXG* implies that there was none (see especially 975a22–32=A 5). There is a dilemma in Gorgias, **157** § 71; but it is a bastard: in the disjunction, *ek mê ontos* or *ex ontos*, the first *ek* introduces a generator, the second does not. Aristotle also refers to the dilemma (*Phys* 191a23); but in his dilemma, *ek* does not introduce a generator at all.

- 18 See especially Stokes [56] 253–5: Anaxagoras and Empedocles attempted to answer Parmenides’ argument, and they saw in it no more than the claim that every generation requires an instigating cause (against their answers Aristotle later applied the Principle of Sufficient Reason: *Phys* 252a4).
- 19 Lloyd [50], 103–6, observes that the disjuncts in line 11 are not exhaustive, and he faults Parmenides for relying on a false ‘principle of Unqualified Exclusion’; but the ‘principle’ of line 11 is the conclusion of an argument, not an assumption.
- 20 See especially Reinhardt [30], 39–42; further references in Tarán [226], 95–102. Stokes [56], 310, n. 78, notes a number of places where scribes have erred over negation signs.
- 21 I translate the MS. text; many emend (references in Tarán [226], 104–5).
- 22 Thus I doubt if line 5 rests on two premisses: *homou pan*, proved in 6b-21, and *suneches*, proved in 22–5 (Schofield [275], 118–19); nor am I sure that the *suneches* of line 6a should be linked to that of line 25. Certainly, *hen*, *suneches* does not repeat *oulon*, *mounogenes* (Stokes [56], 308, n. 68). On *hen* in the sense of *suneches* see Stokes [56], 13–15.
- 23 Adherents of (a) must gloss line 5 thus: ‘it is the case neither that *O* used once to exist [but does so no longer], nor that *O* will exist [but does not yet]’. Against that gloss see especially Owen [274], 320–2; but see Schofield [275], 122–4.
- 24 See Owen [274], 318–19; criticized by Schofield [275], 128–9.
- 25 I prefer *esti de* to Diels-Kranz’ *esti te kai* (‘Since it did not come into being, it both is and always was...’); and I take ‘unlimited’ in a temporal sense (*contra*: Reale [269], 82–6, but the point has no substantial significance). Raven [178], 82–4, refers to Aristotle, *Cael* 268a10=58 B 17, and to Ion, 36 B 1; he conjectures that Ion and the Pythagoreans objected against Parmenides that his ‘One’, like everything else, would be a plurality of beginning, middle and end, and he supposes that Melissus in 159 was out to scotch that objection.
- 26 For the temporal use of *pan* see B 7.3. Most scholars take *pan* spatially. Reale [269], 86–98, argues that his interpretation saves Melissus from Aristotle’s objection; similarly Cherniss [6], 67–71, and Verdenius [278]. But at best those interpretations displace the fallacy, and do not avoid it; and the spatial reading of *pan* introduces a foreign element, and a wholly disputable premiss, into Melissus’ argument.
- 27 *Top* 167b13–20; 168b35–40=A 10. The details of Aristotle’s accusation are not clear: see Reale [269], 73–7.

### XI Stability and Change

- 1 References in Reale [269], 77–9; cf. *MXG* 975b38–976a13. Gorgias certainly made the inference (157 §§ 68–9; cf. *MXG* 979b21–3: ‘if it is ungenerated, he [sc. Gorgias] assumes, by the axioms of Melissus, that it is unlimited’: but see Nestle [260], 555); so too did Metrodorus, 70 A 4 (pseudo-Plutarch).
- 2 See especially Reale [269], 98–104; he treats the last sentence of 162 as a fragment of Melissus, and infers that the fallacious deduction of spatial infinity ‘should be considered a closed chapter in the history of the interpretation of Melissus’.
- 3 At line 49 I read *toigar* (Wilamowitz); the MS. reading, *hoi gar* gives the wrong logical connective.
- 4 For the use of *mallon hêton* see [Plato], *Minos* 313B.
- 5 For the doxography see, e.g., Hippolytus, A 33; Aëtius, A 31.
- 6 References in Untersteiner [225], CLXIII, n. 174; cf. Simplicius, A 20:

If he says that the one existent is ‘like the bulk of a well-rounded ball’, do not be surprised; for because of his poetry he also indulges in a sort of mythical fiction.

- 7 'But a plurality of spheres could not be close-packed.' (a) In the *Timaeus* Plato invents a vacuumless world of close-packed figures, which geometry will not allow to pack close enough: Parmenides may have made the same mistake. (b) Did Parmenides ever reject vacuums? (above, p. 222) (c) A very clever person might toy with the idea of packing the interstices between the spheres with infinitely many ever smaller spheres.
- 8 For the insertion of 'unlimited' see Reale [269], 121, n. 51. **B 5** reads:

If it was not one, it would be limited against something else.

I guess that this is a paraphrase of **164** rather than a separate fragment.

- 9 Kirk-Raven [33], 300.
- 10 The dots mark the omission of '*en hōi pephatismenon estl*'. I adopt the translation suggested by Hölscher [227], 99–100, paraphrasing thus: 'If you think, your thought bears on that existing thing, whatever it may be, which makes the utterance conveying your thought something more than a mere "name".' But that is difficult; and the phrase has suggested numerous different interpretations.
- 11 Woodbury [283], argued for the reading *onomastai* instead of *onom' estai*, translating: 'with reference to it (sc. *to on*) are all the names given that mortals ...' (cf., e.g., Mourelatos [237], 180–5). But that gives a remarkably feeble sense. For the orthodoxy, to which I adhere, see, e.g., Tarán [226], 129–36.
- 12 On homogeneity see especially Reale [269], ch. V. I accept the interpretation of *homoios* given by the *MXG* (976a 14–8=**A 5**); and I suppose that the argument in the *MXG* is Melissan (*contra*: e.g., Stokes [56], 151; Solmsen [282], 9, nn. 18–19).
- 13 Owen [244], 92, takes *homoion* adverbially: 'it all exists to a similar extent'; but that does not seem to me to affect the argument. Owen, *ibid.*, finds the premiss of lines 22–5 in line 11; Stokes [56], 136, finds it in line 16.
- 14 *Leusse d' homōs apeonta noī pareonta bebaiōs*. Diels-Kranz read *homōs* as 'nevertheless'; I prefer to take it for *homoios* (see Bollack [284], 56, n. 3). The point of the adverb is this: 'Don't make any distinction between the absent and the present'. *Noī* is often connected with *apeonta...pareonta* ('things absent and things present to your mind': cf., e.g., *Iliad* XV.80); it might go both with *leusse* and with *apeonta...pareonta*; it might go just with *leusse...apeonta*. And a little ingenuity will conjure up a dozen different construes of the line. On *kata kosmon* in line 4 see Tarán [226], 47–8.
- 15 The suggestion is from Hölscher [227], 117–18. Bicknell [228], 47–8, puts **167** between **151** and **156**; for attempts to insert **167** into **156** see Untersteiner [225], CXLVI, n. 107.
- 16 Covotti proposed *apolluoi ti* ('nor would it lose anything') for *apoloito* (see Reale [269], 388). That gives a neater contrast between (T8) and (T9); if it is accepted, we may suppose Melissus to have taken destruction as the limiting case of loss.
- 17 Accepting Heidel's emendation (*metakosmêtheî ti tôn eontôn* for *metakosmêthentôn eontôn ti ê*); see Reale [269], 389–90.
- 18 Omitting *to hugies kai*, with Gomperz. The MS. text reads: 'for what is healthy and what is would perish'.
- 19 Sentences [i]–[xviii] and [xix]–[xxvii] may be independent fragments (see Solmsen [282], 10). For various attempts to elucidate **168** see Reale [269], 386–8.
- 20 Cf., perhaps, Empedocles, **31 B 17.31**: 'If they were destroyed continually, they would not exist': 'if there is any destruction, destruction will continue; and so, in the course of infinite time, all will be destroyed'. I translate *toinun* as 'again'; the normal translation, 'therefore', does not help; and *toinun* is not inferential in Melissus (cf. **158**, **159**; and see J.D.Denniston, *The Greek Particles* (Oxford, 19542), 574–7).

- 21 A *kosmos* is an arrangement or structure; *metakosmêthênai* must mean here ‘change structure’, ‘be rearranged’ (see Diller [540], 363; cf. Reale [269], 164–70).
- 22 I follow Loenen [238], 162–4. The rival translations of the first sentence are equivalent, given (T4). For the import of *ouk oun...ge...* in the third sentence see Dennison, *op. cit.*, n. 20 (above), 422–5.
- 23 We may smell the old Melissan fallacy in sentence [xxiii]; but if it is there, it does not infect the main argument of the passage.
- 24 The second clause of **169** admits of different translations: ‘If it moves, it does not exist’; ‘It cannot be a moving thing’; ‘If it moves, it is not [full]’. Fortunately, those variants make no difference to the argument.
- 25 For *houneken* meaning ‘because’ see especially Fränkel [230], 191–2; further references in Untersteiner [225], CLV, n. 140.
- 26 I read *epidees me eon de*, which was certainly Simplicius’ text (see Coxon [287], 72–3); and I follow Hölscher [227], 53, in translating *me eon* by ‘otherwise’. Other suggestions listed in Untersteiner [225], CLVI, n. 145.
- 27 Lines 22–5 do not reject vacuums as such (*pace* Guthrie [25], II.33), but at best only internal vacuums. According to Raven [178], 29, ‘there is...no need to argue that these lines [sc. **156.7–9**] are simply a rejection of the Void’; but the lines say nothing at all about the void. **167** rejects intra-mundane void, but leaves open the possibility of extra-mundane void. In any case, none of this helps the argument of lines 30–2.
- 28 *Principles of Philosophy* II.40 (*Oeuvres*, ed. Adam and Tannery, VIII.65); cf. II.4 (*Oeuvres*, VIII.42); letter to More of 1649 (*Oeuvres*, V.267=*Philosophical letters*, ed. Kenny, 237–45). See also Capek [390], 54–8.
- 29 In these paragraphs I draw heavily on D.H.Sandford, ‘Locke, Leibniz and Wiggins on Being in the Same Place at the Same Time’, *PR* 79, 1970, 75–82.
- 30 I append a pleasant curio:

There are some who think it evident from the rare and dense that there is void. For if nothing is rare and dense, nothing can come together and felt up. And if that cannot happen, either motion will simply not occur or the universe will swell like the sea, as Xuthus said (Aristotle, *Phys* 216b22–6= **33 A 1**).

Did Xuthus, whom Simplicius calls a Pythagorean and who may have lived in the second quarter of the fifth century, imagine a full and finite universe in which motion nevertheless took place? (The internal convolutions would produce ripples or waves on the outer surface of the world.) If so, was he objecting to a finite and motionless Parmenidean sphere? And did Melissus invent an infinite universe partly to combat that suggestion? Speculation is seductive (see Kirk-Raven [33], 301–2).

- 31 According to Aristotle, Parmenides and Melissus do not admit the existence of non-perceptible things (Cael 298b21=**28 A 25**; cf. Alexander, apud Simplicius, in *Cael* 560.5–10).
- 32 The text of **B 9** in Diels-Kranz runs together **170** and **171**. For the argument see above, p. 240, on Zeno; Plato, *Sophist* 244E–245A.
- 33 Simplicius, *ad 160*, refers to ‘limitlessness in respect of sublimity’; see also Loenen [238], 157–8; Vlastos [289], 34–5. *Contra*: e.g., Guthrie [25], II.110, n. 2.

- 34 Gomperz [288] argued that *asômatos* means the same as *leptos*: not ‘incorporeal’ but ‘fine, not dense’; Guthrie [25], II.110–13, holds that it means ‘non-finite and imperceptible’ (cf. Reale [269], 211–20). Gomperz and Guthrie suggest that *pachos* is not solidity but ‘palpable density’.
- 35 Incorporeality is not ascribed to O by the *MXG*; and *MXG* 976a10-13 and 28–31 =A 5 imply that Melissus made no explicit statement about the corporeality of O.
- 36 According to Cherniss [32], 21, Parmenides thinks that his argument ‘precludes the possibility of any characteristic [sc. of what is] except just *being*’ (cf. Furth [257], 264–7). That view—which is a *communis opinio*—is surely absurd.
- 37 So Popper [35], 79; Mourelatos [237], xi.

### *XII Zeno: Paradox and Plurality*

- 1 Russell [316], 347; cf. Russell [318], 175: ‘They are not...mere foolish quibbles: they are serious arguments, raising difficulties which it has taken two thousand years to answer, and which even now are fatal to the teachings of most philosophies.’ It is Russell’s advocacy which has spurred modern philosophers to take Zeno seriously; but it should be said that Russell himself acknowledges that the decisive turn in Zeno’s fortunes was due to the work of the Frenchmen, Tannery, Noël, and Brochard. For the history of Zeno’s reputation see Cajori [295].
- 2 The reports, mostly worthless, about Zeno’s life are discussed by von Fritz [298] 53–5. The curious will read the Arabic life of Zeno by Mubaššir, printed in Jacoby [457].
- 3 Aristotle discusses four paradoxes of motion; Elias says there were five (A 15: see Untersteiner [293], 68), and Simplicius thinks there may have been more than four (*in Phys* 1012.27–9). Bicknell [342], 103–5, suggests that the argument in Diogenes Laertius, IX.72 (above, p. 276), may have been the fifth paradox.
- 4 ‘He wrote *Disputes, Account of Empedocles, Against the Philosophers, Concerning Nature*’ (Suda, A 2). *Disputes* and *Against the Philosophers* may be the forty *logoi*; for the Empedoclean title, see below, n. 6. Some natural science is ascribed to Zeno in Diogenes Laertius, IX.29=A 1 (cf. Aëtius, I.7.27–8); but the value of the report is uncertain (see Untersteiner [293], 14–17; Longrigg [300]). The report that Zeno wrote dialogues (Diogenes Laertius, III.48=A 14) is merely confused (Untersteiner [293], 62–3).
- 5 A complex architecture was first suggested by Tannery [29], ch. 10, and developed by Noël and Brochard (see Cajori [295]); it was revived by Owen [307], whose view is tellingly criticized by Stokes [56], 188–93.
- 6 The literature is immense: for the view that Zeno is reacting against Pythagoreans see especially Tannery [29], ch. 10; Raven [178], ch. 5; *contra*; e.g., Burkert [173], 285–8, with references. The ancient assertions that Zeno was a Pythagorean (Proclus, 28 A 4; Strabo, 28 A 12) are worthless. Gaye [340], 106–16, argues that the Stadium was aimed against Empedocles (see Suda, A 2, above, n. 4); but he does not convince.
- 7 But Protagoras is said to have written against the monists (Porphyry, 80 B 2); and some scholars (e.g., Nestle [260]) think that Gorgias, 82 B 3, is a skit on Eleaticism.
- 8 In a passage designed to show that ‘excessive subtlety produces great evil and is hostile to truth’, Seneca asserts that ‘Zeno...says that nothing exists’; and ‘if I believe Parmenides, there exists but one thing—if Zeno, not even one’ (*Epistle* 88.44–5: cf. A 21). Dillon [294] draws attention to Proclus, *in Parm* 862.25ff: Proclus says that Zeno used the argument of *Parmenides* 131B3–6, to prove that ‘the many share in some one thing, and are not deprived of one even if they stand very far apart from one another’. Dillon wonders if that comes from a positive Zenonian argument for monism; but I am sceptical.

- 9 Alexander's view is uncertain: at 138.3–30 Simplicius says that Alexander shared Eudemus' opinion and borrowed it from him; at 99.12–16 he says that Alexander wrongly argued that Eudemus did not ascribe an attack on monism to Zeno.
- 10 Numerals followed by 'L' refer to the arrangement in Lee [292].
- 11 According to Owen [307], 140–1, 'Zeno's major question is: if you say there are many things in existence, how do you distinguish your individuals?' But that view rests on one among several readings of the Eudemus fragment; and no reading will show that this little anecdote enshrines Zeno's 'major question'.
- 12 Aristotle, fr. 65 R<sup>3</sup>=A 10 (see especially Fränkel [308], 199 n. 1); cf. Diogenes Laertius, IX.25=A 1; Suda, A 2; Philostratus, A 9. For different interpretations of Aristotle's remark see Lee [292], 7–8, 113–19; von Fritz [298], 78.
- 13 According to Alcidamas, Zeno later in life 'philosophized on his own account' (Diogenes Laertius, VIII.56=31 A 1; *contra*: pseudo-Plutarch, 29 A 23).
- 14 *Antilogikos*: Plato, *Phaedrus* 261D; Plutarch, A 4; *eristikos*: Epiphanius, III.11; pseudo-Galen, 3. Modern advocates of an antilogical Zeno include Bayle [299], note B; Fränkel [308]; Solmsen [301]. Against them, see especially Vlastos [303].
- 15 I guess that the two conjuncts of (Z) are what Plato calls the 'hypotheses' of Zeno's *logoi*; so that the 'first hypothesis of the first *logos*' (*Parm* 127D) will be (Z1a).
- 16 Proclus, in *Parm* 619.34–620.3 adds 'equal and unequal'; Isocrates X.3 adds 'possible and impossible'. See also the suggestions in Cornford [231], 58.
- 17 Proclus, in *Parm* 721.25–726.27, has a long and tedious discussion; clearly, he had no textual evidence. For some guesses at Zeno's reasoning see, e.g., Untersteiner [293], 47–51.
- 18 It is disputed how much of Zeno's work Simplicius had access to: see Guthrie [25], II.81, n. 3; Vlastos [309], 137, n. 7. The course of Simplicius' argument in 138.3–141.10 is controversial (see especially Solmsen [301], 128–31); but this is not the place for an analysis.
- 19 In [vi] I retain the MSS. reading *esti* for Diels' *estai*. In [vii] I accept Fränkel's palmary emendations: *apeiron* for *apeirôn*; *ek tou* placed after *pollôn*. The general sense of Simplicius' report is uncontroversial.
- 20 Gomperz emends *oute* to *hôte* in [xiii]; his text translates: '...for no part of it will be last in such a way that there will not be another part related to another'. That expresses the same sentiment as the MSS. text, but more elegantly.
- 21 The argument for (Z2b) in no way depends on that for (Z2a) (*pace* Fränkel [308], 211–12, 216, n. 2); nor can B 1 be read as a self-standing argument for (Z2) (*pace* Solmsen [301], 131–7).
- 22 So, e.g., Fränkel [308], 212; Vlastos [309], 119–20. See also Xenocrates, fr. 44 H =Simplicius, in *Phys* 138.10–13.
- 23 Fränkel [308], 217–20, finds 'a very great difference' between 'what is added is nothing' and 'what is added does not exist', and he suggests that Zeno passed from the former to the latter by way of the Polyphemus fallacy. I cannot see that the fallacy infects Zeno's argument.
- 24 For the geometrical interpretation see especially Grünbaum [313], ch. III, who holds that Zeno's arguments 'were designed to show that the science of geometry is beset by paradox' (3). Salmon [296] opines that 'the force of this argument is geometrical' (13); but he recognizes that Zeno's paradoxes 'are—so to speak—paradoxes of applied mathematics. No theory of pure mathematics can fully resolve them' (34).
- 25 'That no physical cut or fission is intended here is quite obvious' (Vlastos [309], 125): Zeno is certainly not thinking of cuts which an engineer can make 'with his present tools'; but he is certainly thinking of physical bodies, and claiming that they have physical parts.
- 26 See further Xenocrates, fr. 43–9 H. Plato too believed in atomic lines (Aristotle, *Met* 992a22; Alexander, in *Met* 120.6); but we are not told why (and Vlastos [401], 125, n. 28,

- doubts the report). The ancient evidence is confusing, (a) The argument of Zeno's which precipitated atomic lines is usually identified as the Dichotomy (see especially [Aristotle], *lin insec* 986a17–28=Xenocrates, fr. 42 H=A 22), but sometimes as the present argument against pluralism (see Alexander, A 22: cf. Furley [387], 81–3). (b) Aristotle, *Phys* 187a1–3, says that 'some' gave in to the 'dichotomy' and posited atomic magnitudes: he probably refers to the Abderite atomists (see Ross [12], 479–80; Furley [387], 81–3), but all his ancient commentators refer to Xenocrates.
- 27 See especially Grünbaum [313], 40–64. On Epicurus' spatial atomism see Luria [398], 148–72; Mau [402]; Vlastos [401].
- 28 This, the classical solution, is plainly stated by Descartes in a letter to Clerelier of 1646 (*Oeuvres*, ed. Adam and Tannery, IV.445–7=*Philosophical Letters*, ed. Kenny, 196–9); see further Cajori [295], 79–80. Fränkel [308], 226–7, attempts to pre-empt it by denying that (Z2b) states that the many things will be infinite in magnitude; but see Furley [387], 68–9. Zeno's 'hidden premiss' was set down as a luminous truth by Epicurus (*ad Hdt* 57: cf. Furley [387], 14–16), and generally adopted by the later tradition (e.g., Sextus, *Pyrr Hyp* III.44; Simplicius, *in Phys* 141.15–16; 459.25–6; *in Cael* 608.12–15; 635.11–26: cf. Vlastos [297], 370b–371a). See below, n. 30.
- 29 'He' in Porphyry's text, which Simplicius quotes *verbatim*, refers to Parmenides; but Simplicius is right in maintaining that the dichotomy argument belongs rather to Zeno.
- 30 Aristotle, *Phys* 206b7–9, knows that (9) is not unrestrictedly true. I incline to speculate that Zeno imagined that (9) held without restriction; that Aristotle scotched that supposition; and that Epicurus saw that a restricted version of (9) was defensible. Later subscribers to Zeno's 'hidden premiss' tacitly suppose the Epicurean version of it. Vlastos [309], 131–3, thinks Zeno assumed that any infinite sequence must have a smallest member. If that assumption were true, then (9) would hold unrestrictedly. But the assumption is false; and there is no evidence that Zeno made it.
- 31 Vlastos [297], 37 1b. Vlastos says that only a Cantorian sophistication can pinpoint Zeno's error; but we do not need the 'diagonal method' to show how Zeno errs. The concept of one-one correspondence is expounded most famously by Gottlob Frege (*foundations of Arithmetic*, §63); but, as Frege points out, it is already present in that most unsophisticated of mathematicians, David Hume.
- 32 See especially Simplicius, *in Phys* 96.15–99.31, quoting Alexander and Eudemos; Philoponus, *in Phys* 42.9–45.15 (cf. A 21 and 3–8 L).
- 33 For *plêthos henadôn* see, e. g., Philoponus, *in Phys* 42.21; 24 (cf. *synthesis tôn kath' hen* in Gorgias, 157 § 74). For the sense of *henas* see, e.g., Plato, *Philebus* 15A: *henas* does not mean 'arithmetical unit', and it is a mistake (*pace* Raven [178], 71–2) to invoke any 'Pythagorean' theory about arithmetical units.
- 34 Simplicius is quoting Alexander's quotation of Eudemos; and Simplicius says that the argument Alexander retails is not in Zeno's book (*in Phys* 99.18). Eudemos is hardly inventing: either the argument fell out of Zeno's book in the millennium separating Eudemos from Simplicius; or else Simplicius means only that the argument does not occur *verbatim* in Zeno.
- 35 Solmsen [301], 128, n. 38, connects *katêgorikôs* with the Aristotelian categories. But the rest of the quotation shows that 'a is many *katêgorikôs*' simply means 'a is many in virtue of the predicates (*katêgoriai*) true of it'.
- 36 The ascription to Zeno is also made by Alexander (*apud* Simplicius, *in Phys* 96.22–30) and by Philoponus (see especially *in Phys* 42.24–8=8 L, with an anachronistic illustration). For doubts about the ascription see, e.g., Lee [292], 27–9; Burkert [173], 286–8.
- 37 Lycophron tackled this, or a very similar, puzzle: pseudo-Alexander, 83 A 1.
- 38 The main text is Simplicius, *in Phys* 562.1–564.13; further references in Lee [292], 36. Diels-Kranz, 1.498, accept Calogero's suggestion that *in Phys* 562.3–6 is an actual fragment of Zeno; but Simplicius himself makes it clear first that he does not possess

Zeno's own words here, and second that he does not believe that the form of the argument given at 562.3–6 is authentic.

- 39 Philoponus, in *Phys* 513.8–12, did not know what point Zeno was trying to make; Cornford [231], 148–9, constructs a slightly different dilemma.
- 40 So too Plato, *Timaeus* 52 B. Zeno's premiss is used by Gorgias, 157 §§ 69–70 (*MXG* 979b25 explicitly ascribes to Gorgias this use of 'Zeno's argument about place'); it appears at *Parmenides* 145E, 151A; according to Aristotle, *Phys* 208a30, it was a commonplace (cf. Kahn [255], 237: it was 'firmly grounded in the idiomatic expression of existence').

### XIII Zeno: Paradox and Progression

- 1 Texts collected in Lee [292] (19 L-36 L, with supplementary references). The Greek commentators say that Achilles' rival was a tortoise (the tortoise is not in Aristotle; Plutarch races a tortoise against a horse); apart from that, they add nothing (see Ross [12], 71). Aristotle probably found the arguments already numbered; he refers to previous attempts at a solution (*Phys* 239b11); and he remarks upon a non-Zenonian version of the Dichotomy (above, p. 263). (Aristotle may have composed a monograph on Zeno (Diogenes Laertius, V.25; cf. Untersteiner [293], 74); Heraclides Ponticus did (Diogenes Laertius, V.17).) Favorinus said that 'Parmenides and many others' raised the Achilles paradox (Diogenes Laertius, IX.29=A 1).
- 2 'The Dichotomy' derives from *Phys* 239b22=L 26 (on 187a3=A 22, see above, p. 337, n. 26); 'the Stadium' derives from *Top* 160b8=A 25. Aristotle himself probably knew no title for the paradox (see Vlastos [321], 95, n. 2).
- 3 Cf. *Phys* 239b18–20=A 26=26 L; and note that the 'counting' version requires this diagram. See, e.g., Fränkel [308], 204, n. 3; Vlastos [321], 95–6.
- 4 Cf. *Phys* 263a6–11; *lin insec* 968a18–b4; see Furley [387] 70–1; Grünbaum [313], 70 (Zeno is 'enticing us to attempt a one-by-one contemplation in thought' of all the temporal parts of the runner's task). On the counting paradox itself see Grünbaum [313], 90–2; Black [326], 100–8.
- 5 Cf. Black [326], 108, who distinguishes between 'the finite number of real things that the runner has to accomplish and the infinite series of numbers by which we describe what he actually does' (cf. Grünbaum [313], 73–8; and especially Wisdom [328]). Some scholars discuss the Dichotomy in terms of 'making infinitely many runs'; they declare that the term 'run' has two senses; and they find an equivocation in Zeno (see especially Grünbaum [313], 73–8; Vlastos [321]). I cannot find two relevant senses of 'run'; nor does Zeno himself say anything about 'making infinitely many runs'.
- 6 E.g., C.S. Peirce: 'This ridiculous little catch presents no difficulty at all to a mind adequately trained in mathematics and in logic' (*Collected Papers*, VI. 122). Peirce is talking of the Achilles; but his remarks apply equally to the Dichotomy.
- 7 For Strato see fr. 82 W=Sextus, *adv Math* X.155; on the thesis he adopts see Grünbaum [313], 50–2.
- 8 But Ross [12], 73–4, argues strongly that Aristotle's objection in Z 9 is cogent *ad hominem*, and hence that Zeno himself did mention the finitude of *T*; and Grünbaum [313], 52, thinks it is the temporal aspect of the Dichotomy which 'constitutes the heart of the conviction' which it often carries (cf. Ushenko [314], 157).
- 9 The lamp was introduced into the literature, with far more finesse than in my sketch, by Thomson [331].
- 10 For Aristotle's discussion see *Phys* 234a24–b9; 235b6–32; 236a7–27; 236b32–237b22; 238b36–239b4; 263b15–264a6. My argument in the text abstracts from those remarks and is not an interpretation of them.

- 11 This argument is adapted from some subtler remarks in Bostock [322].
- 12 Diodorus' dilemma is designed to show that *atoms* do not move (fr. 123 D= Sextus, *adv Math* X.86–90; cf. fr. 116–24 D); he also offered, apparently as a distinct argument, something answering to Aristotle's non-dilemmatic text (Sextus, *adv Math* X.112).
- 13 On the text of *Phys* 239b5–7, see especially Ross [12], 657–8, whom I follow.
- 14 See especially Vlastos [335], 3, n. 2 (Fränkel [308], 209, n. 5, and Untersteiner [293], 149–51, offer different explanations). The 'space equal to itself' is the *place* of an object, in the strict Aristotelian sense (*Phys* 209a33; 211a2); it is that notion of place which is employed in the Paradox of Place. The Arrow is presented in characteristically Aristotelian terminology; but it is fruitless to attempt to recover Zeno's phraseology.
- 15 Russell [316], 347, 350; [317], 65. Epicurus, fr. 278 Us, and Diodorus Cronus, fr. 121–9 D, advance theories of motion interestingly similar to Russell's (see Furley [387], 131–5).
- 16 Bergson [320], 63.
- 17 Adapted from Black [338], 138–9; Black's own conclusion is that there are two senses of 'move'.
- 18 Vlastos [335], 11.
- 19 At 240a5–7 the MSS. offer a choice of readings: 'A', 'AA', 'AAA', 'AAAA', etc.; Ross rightly plumps for 'AA', but that does not mean that Aristotle had precisely two As in mind: 'ta AA' means simply 'the As'.
- 20 Palaeographically there is nothing to choose between '*to B*' and '*to prôton B*' (abbreviated to '*to a B*'); and one MS. reads '*to a B*' (see Ross [12], 665). Bicknell [341], 43, defends '*ta B*'.
- 21 Thus I retain sentence [x], which many editors excise (see especially, Ross [12], 665).
- 22 The Greek at 240a1 ('half the time is equal to its double') may mean either ' $\frac{1}{2}T=T$ ' or ' $\frac{1}{2}T=2T$ '; see, e.g., Lee [292], 88; Gaye [340], 100–1; Stokes [56], 329, n. 31.
- 23 A classical example in Bayle [299], n.F; a modern example in Bicknell [341] (but Bicknell [342], 81, recants).
- 24 (i) Defenders of *fig. 5* must change the text at 240a6: they must either (a) omit 'of the As (*tôn A*)' after 'starting from the middle'; or else (b) add 'of the Bs (*tôn B*)' after 'starting from the end'. One MS. offers '*tôn B*', several omit '*tôn A*' (see Ross [12], 663). (ii) At 240a11 most MSS. and the Greek commentators read '*taA*', which I translate; two MSS. read '*taB*'. Adherents of *fig. 5* have a choice: either (a) they accept '*ta B*' instead of '*ta A*' and interpolate '*ta A*' later in the sentence ('the *C* had passed all the *Bs* and the *B* half the *As*')—so Diels-Kranz; or else (b) they omit '*ta A*' ('the *C* has passed all, and the *B* half'), and gloss the resulting sentence as 'the first *C* has passed all the *As* and the first *B* has passed half the *As*' (so Ross [12], 662). (ib) is tolerable, and (ia) may well be right; but both (iia) and (iib) are counsels of desperation, defensible only if *fig. 5* must at all costs be established.
- 25 The inventor of the sophisticated Stadium was Tannery [29], ch. 10 (further references in Guthrie [25], II.95–6); *contra*: e.g., Furley [387], 73–4; Stokes [56], 185–7. Sextus, *adv Math* X.144–7, preserves an argument similar to the Stadium which explicitly uses *minima*; see also Bayle [299], n. G.

#### XIV The Ports of Knowledge Closed

- 1 So Cornford [231], 32, referring to [Hippocrates], *de victu* I.23; Verdenius [233], 55, referring to 156.38–41; cf. Antiphon, 87 B 44 (Diels-Kranz, II.348.6).
- 2 I do not translate *homoureôn* (*homou rheôn?*), the sense of which is obscure.
- 3 The bracketed sentence makes no sense here, where it stands in Simplicius' text. Karsten transposed it to follow '...from water' at the end of [iii], and most scholars accept his

transposition. But the sentence is inapposite at the end of [iii]. Moreover, it is linguistically objectionable: *hōste* and *sumbainein* are used in a sense that is not Presocratic; we have *ta onta* for *ta eonta*; and *gignōskein* misinterprets *sunienai*. The sentence is a marginal gloss written in a later jargon.

- 4 Melissus refers simply to ‘men’ (*hoi anthrōpoi*): he is attacking the *communis opinio*, not any particular philosophical school (see Reale [269], 242–52). Mourelatos [237], 362–3, says that Melissus ‘does not, of course, intend the paradoxical and self-contradictory thesis that *this* to which I point (the earth, the sea) does not exist. The verb “to be” here has a special sense’. The thesis is not self-contradictory, and Melissus surely did intend it: it is paradoxical—but what is Eleaticism if not paradoxical?
- 5 I.e. ‘ $a_1, a_2, \dots, a_n$  seem to be real, but in fact are not so’ (see Loenen [238], 133–4). The usual translation reads: ‘...those things do not correctly seem to be many’.

### XV The Ionian Revival

- 1 For Anaxagoras’ dates see especially Diogenes Laertius, II.7=59 A 1 (cf. Guthrie [25], II. 322–3). Euripides: Strabo, A 7; Diodorus, A 62; etc.; Pericles: Isocrat.es, A 15; Plutarch A 16; etc. For the trial see, e.g., Plutarch, A 17, A 18 (see Derenne [345], 13–41). Gershenson-Greenburg [361], 346–8, argue that the whole story of the trial is an invention based on Plato, *Apology* 26D=A 35 (see also Jacoby [457], 41, n. 159).
- 2 On *Met* 984all see esp. O’Brien [348], with copious references.
- 3 See also Diogenes Laertius, VIII.46=44 A 4; IX.38=A 2 (see, e.g., Burkert [173], 228–9).
- 4 He is also called an Abderite (e.g., Diogenes Laertius, IX.30=67 A 1). Probably Miletus was his birthplace; ‘Eleatic’ and ‘Abderite’ were applied to him for his philosophical connexions (see Bailey [383], 66–7). For convenience I shall frequently refer to Democritus and Leucippus as ‘the Abderites’.
- 5 The Greeks dated the fall of Troy variously between 1334 and 1136 (see F. Jacoby, *Das Marmor Parium* (Berlin, 1904), 146–9); we cannot tell what date Democritus favoured. The only other publication date for a Presocratic that we possess is given by Olympiodorus, who asserts that Gorgias wrote his treatise *Concerning Nature* in the 84th Olympiad, 444–1 BC (82 A 10). If we believe Olympiodorus, we shall date Melissus’ treatise to the early 440s at latest; unless, of course, we hold that Melissus was defending Parmenides against the ridicule of Gorgias (see Nestle [260], 561). In any case, Olympiodorus’ report is suspect: see Untersteiner [434], 100, n. 96=[435], I.167, n. 98. Democritus was a widely travelled polymath: on his travels see Guthrie [25], II.387, n. 1; on his learning, see Steckel [385], 212–21.
- 6 See especially O’Brien [351], 129–44; Bollack [349], III.49–80. Hölscher [356], 201–9, makes 194 a biological fragment; Mansfeld [357] offers a heterodox reading of lines 3–5.
- 7 I.e. ‘the elements’ (see line 18); but Bollack [349], III.50 offers a different construe.
- 8 I.e. ‘the one type of generation and destruction’: see especially Stokes [56], 154–5 (but *contra*: Bollack [349], III.53–4).
- 9 Accepting Panzerbieter’s palmary emendation (‘*threphtheisa*’ for ‘*thruphtheisa*’): see Bollack [349], III.55–7 (who, however, makes a different proposal).
- 10 Line 9 is interpolated from B 26.8: both sense and syntax require it (but see Bollack [349], III.59–60).
- 11 On Empedoclean atomism see Aristotle, *GC* 334a18–25=A 43; *Cael* 305a1=A 43a; Aëtius, A 43, A 44. Atomism is accepted by Longrigg [359]; but it was clearly disposed of by Reinhardt [491], 111–13.
- 12 On the problems caused by these appellations see especially Bollack [349], III. 169–85, who quotes a host of doxographical texts omitted from Diels-Kranz.

- 13 It is hotly disputed whether there were periods of rest between worlds. In the end, everything turns on **B 27.4=B 28.2**: ‘a round Sphere, exulting in its joyful (?) *moniê*’. Some connect *moniê* with *monos* (‘alone’) and translate ‘solitariness’ (e.g., Bollack [349], III.137–8); others—to whose view I subscribe—connect *moniê* with *menein* (‘rest’) and translate ‘rest’ (e.g., Jaeger [48], 237, nn. 56–9).
- 14 Aristotle praised Empedocles’ poetry in his early work, *On Poets* (fr. 70 R<sup>3</sup> = **A 1**), but later denied him the title of poet (*Poet* 1447b18=**A 22**). The later judgment became canonical (e.g., Dionysius, **A 25**).
- 15 Millerd [352], 21.
- 16 Already noted by Theophrastus (Diogenes Laertius, VIII.55=**A 1**); according to Alcidas, Parmenides ‘taught’ Empedocles (Diogenes Laertius, VIII.56= **A 1**).
- 17 So Aristotle, *Phys* 187a25=**59 A 46**; Simplicius, **A 64**; Aëtius, **A 63** (see, e.g., Guthrie [25], II.313–15). Two fragments have been thought to bear on the question. In **B 8** Anaxagoras says that:

The things in the one world (*ta en tôi henî kosmôî*) have not been separated from one another.

That has been taken to prove that Anaxagoras believes in a unique cosmos. I doubt if the phrase will bear that weight; but I am not sure what precisely it does mean.

Second, there are the references to what happens ‘elsewhere’ in **B 4** (quoted above, p. 319, as texts 199–201). **B 4** has been taken to imply: (a) the coexistence of many—perhaps infinitely many—different worlds (e.g., Gigon [364], 25–6); (b) different stages in the development of the unique world (e.g., Simplicius, *in Phys* 157.17); (c) different inhabited parts of the earth’s surface, as in Plato, *Phaedo* 109B (e.g., Kahn [90], 52–3); (d) an inhabited moon (cf. Diogenes Laertius, II.8=**A 1**; Aëtius, **A 77**); (e) another inhabited earth (see references in Burkert [173], 345–8); (f) the counterfactual hypothesis that in every cosmogony there *would* be an inhabited world like ours (Fränkel [362], 288–91). I think that (b), (c), (d) and (f) can be ruled out: they do not fit the text closely enough. (e) is less ambitious than (a); but Democritus embraced (a), and the fact that he explicitly denied that all the other worlds have a sun and a moon suggests that Anaxagoras had asserted that they did (Hippolytus, **68 A 40**). See Vlastos [372], 53–4.

18 O’Brien [351], 244; see especially Bollack [349], I.169–73.

19 Guthrie [25], II.140; see especially Cornford [231], 15. The view is found in Nietzsche [28], 395–6.

## XVI Anaxagoras and the Nature of Stuffs

1 Lanza [360], 187.

2 I should perhaps mention the heterodox opinion of Gershenson-Greenburg [361], 378: ‘these so-called fragments cannot be used as the basis of a reconstruction of Anaxagoras’ theory.... They can be assigned no more importance than their late chronological position relative to the time of Anaxagoras indicates.... The so-called fragments are assuredly far from direct quotes from Anaxagoras’ book’. That view is deliciously wicked, but quite implausible; and the arguments on which it rests are worthless. It must be admitted, however, that the texts in Diels-Kranz are tidier than they should be: some of the fragments are patch-worked from various pages of Simplicius (see below, n. 5), and the text of none is wholly free from doubt.

3 I take ‘quantity (*plêthos*)’ in a numerical sense: Lanza [360], 190–1, construes it as ‘mass’; but that loses the contrast with *megethos* in **196**.

4 ‘Contained’ renders *kateichen*: see Guthrie [25], II.294, n. 1; Lanza [360], 191–3. I construe ‘contain’ metaphorically, to amount to ‘predominate over’ (above, p. 325).

5 Diels-Kranz print **199**, **200** and **201** continuously. Burnet [31], 259, n. 1, claims responsibility, falsely stating that Simplicius thrice quotes the remarks continuously. The true situation is set out by Fränkel [362], 287, n. 1; but it is worth repeating the salient facts. In *Phys* 34.21–6 quotes ‘*prin...chrêmata*’ (Diels-Kranz, II. 34.17–35.5); in *Phys* 34.29–35.9 quotes ‘*toutôn...allêi*’ (II. 34.5–16); in *Phys* 156.2–4 quotes ‘*toutôn...hêdonas*’ (II. 34.5–8); in *Phys* 156.4–9 quotes ‘*prin...heterôi*’ (II. 34.17–35.3); in *Phys* 157.9–16 quotes ‘*eneinai...chrôn tai*’ (II. 34.5–14); in *Cael* 608.24 quotes ‘*en têt sumpanti...chrêmata*’ (II. 35.4–5); in *Cael* 609.5–11 quotes ‘*toutôn...hêmin*’ (II. 34.5–12).

I doubt if we can make any safe inferences about the arrangements of Anaxagoras’ words in the text which Simplicius used; and there is in any case a general opinion that Simplicius was using not a complete text of Anaxagoras but an epitome first prepared by Theophrastus (see Lanza [360], VIII-IX). Fränkel, *loc. cit.*, finds three separate fragments: (a) II. 34.5–16; (b) II. 34.17–35.3 (*heterôi*); (c) II. 35.4–5 (according to Fränkel, the phrase ‘*toutôn de houtôs echontôn*’ at II. 35.3 belongs to Simplicius, not to Anaxagoras). My three fragments run thus: **199**: II. 34.5–8; **200**: II. 34.8–16; **201**: II. 34.17–35.5. For other suggestions see Lanza [360], 199–200.

6 Aëtius, **A 46**, gives an unorthodox sense to *homoiomereia* (accepted by, e.g., Bailey [383], 554–5; Peck [376], 62); but I do not think that we can get anywhere by abandoning the Aristotelian notion of homoiomereity.

7 See, e.g., Guthrie [25], II. 325–6.

8 See, e.g., Peck [371], 28–31; Reesor [367], 33, n. 3; but I see no reason to restrict the stuffs to ‘organic’ stuffs (Peck), or even to natural stuffs (Reesor).

9 Why not simply say that Anaxagorean things are both stuffs and qualities? (So Peck [371], 31–3; Reesor [366], 4, relying on *Phys* 187a24, b4–7=A **52**). But then Anaxagoras’ theory is inelegant; and *he* gives no hint that his ‘things’ fall into two classes. No doubt the qualities (and the stuffs proper?) were conceived of in terms of ‘powers’ or *dunameis* (see especially Vlastos [372], 470–3).

10 I ignore the term ‘*panspermia*’ (*GC* 314a29=A **46**); its sense and origin are alike obscure (see Lanza [360], 77).

- 11 There is a massive literature on *spermata*: see especially Vlastos [372], 461–5.
- 12 **201** speaks of ‘seeds unlimited in quantity and not like one another’. Cornford [369], 22, glosses: ‘there is a large number of different *kinds* of seeds’ (but Anaxagoras says ‘unlimited’ not ‘large’). I prefer to read ‘unlimited in quantity’ in the same way as I read the phrase in **197**.
- 13 According to some scholars, *apokrinesthai* is a biological term, referring to organic growth or formation (see Lanza [360], 195).
- 14 The particulate interpretation comes from Aristotle; he says that things are generated ‘from what exists and inheres but which, because of the smallness of the bodies (*onkoi*), is imperceptible to us’ (*Phys* 187a36-b1). The word *onkoi* commits Aristotle to a particulate interpretation of Anaxagoras (*pace* Lanza [360], 104—but the word may only be a carelessness); and the passage is a prime source for the doxography.
- 15 An *atomist* theory is, of course, immediately ruled out by (B); but you can, I suppose, be a corpuscularian without being an atomist.
- 16 ‘Anaxagoras was really striving after the idea of a union closer than mere mechanical juxtaposition, and more like our notion of chemical fusion, a union in which things are not merely placed side by side, but are, as it were, completely merged in a new substance’ (Bailey [383], 545; Bailey owes the view to J.A. Smith).
- 17 Cornford [369], 14; *contra*: see especially Kerferd [378], whose main aim is to show that ‘there is no logical inconsistency between the major doctrines attributed to Anaxagoras in antiquity’ (129).
- 18 Aristotle is defended by, e.g., Raven [373], 132–3; Kerferd [378], 134–6. **B 15** is sometimes taken to show that earth is non-elemental; but that construe depends upon an uncertain emendation (see Lanza [360], 237; Stokes [365], 218–21). Simplicius, *ad B 16*, tries to find a distinction between element and compound in that fragment; but see, e.g., Stokes [365] 16–19.
- 19 Thus in the view of Vlastos [372], 484–6, *x* contains *S* if and only if *x* possesses all those powers that are constitutive of *S*.
- 20 What of allomorphs? Anaximenes in effect treats all stuffs as allomorphs of air; and Empedocles is the first man explicitly to introduce the notion of a compound: the element/allomorph distinction is different from the element/compound distinction; but there is no evidence that Anaxagoras heeded the difference.
- 21 Charges of incoherence in, e.g., Cornford [369], 91; Guthrie [25], II. 290.
- 22 The MSS. read ‘*ouden estin homoion ouden* (nothing is like anything else)’. Wasserstein [363] excises *ouden*, rightly. (The verbal parallel to the MSS. text at **201** is *no use, pace* Guthrie [25], II. 274, n. 1; Lanza [360], 232; the contexts of the two fragments are quite different.)
- 23 ‘We have to assume that Anaxagoras’ substance words, both particular and generic, are systematically ambiguous’ (Strang [374], 102; *contra*: Stokes [365], 2–4). Strang fears an infinite regress: ‘Suppose *x* is predominantly *S*. Consider that predominant *S*-portion: presumably *it* is *S* only because *S* predominates in it; then consider *that* predominant *S*-portion...’ (cf. Cornford [369], 93; Vlastos [372], 51). The regress does not arise once we distinguish carefully between *pieces* of *S* and *portions* of *S*.
- 24 ‘The “portions” must be thought of as proportions that cannot be directly located or directly measured’ (Hussey [34], 137; cf. Strang [374], 102–3): they cannot be located at all, since they have no location; they can be measured, but only indirectly.
- 25 Cornford [369], 90, observes that at *Phys* 203a23 Aristotle signals (by the word *eoike*, ‘it seems’) that his argument for (A) is a conjecture; and Cornford adds that ‘Simplicius, after loyally searching Anaxagoras’ book for every text that could support the interpretation based upon it by Aristotle, ends by rejecting that interpretation’. As for Simplicius, he may not have had a complete text of Anaxagoras (above, n. 5); and in any event, he does not reject Aristotle’s interpretation but only modifies it. Nor, I think, does Aristotle indicate

- that (1) is conjecturally ascribed to Anaxagoras: what was unclear was the precise connexion between (1) and (A). Finally, (A) is indubitably Anaxagorean; and if we drop (1) we leave (A) unsupported.
- 26 The last clause is obscure, and no satisfactory account of *ekchôreousi* is to hand (see Guthrie [25], II. 301, n. 1). I agree with Stokes [365], 229–44, that **211** deals with changes in the present world and not with cosmogony.
- 27 See especially Kucharski [379]; Longrigg [63]; Müller [52], 69–72, 126–37. Jaeger [48], 156–7, stresses Anaxagoras’ empiricism; but there is nothing innovatory about that. The connexions between the *vet med* and Anaxagoras are especially strong: see Longrigg [63], 158–67.
- 28 Cornford [369], 18, finds (1) ‘grotesquely superfluous and uneconomical’—and he would no doubt say the same for (C). ‘Economical’ is a slippery word: it seems to me that in a fairly clear sense (C) is the *most* economical hypothesis that Anaxagoras could have excogitated to explain the facts he observed.
- 29 See especially Schofield [380], 14–24, who suggests Eudemus as the ultimate source of the scholion.
- 30 Fraser, quoted with reference to Anaxagoras by West [23], 323.
- 31 Raven [373], 129 (cf. Strang [374], 102, n. 8) stresses the word *moira*, ‘portion’, which he contrasts to *meros*, ‘part’; unfortunately, *moira* in Greek may mean ‘part’ as well as ‘portion’ (see Stokes [365], 12–13).
- 32 Guthrie [25], II.289. But later, 298, n. 2, Guthrie suggests that if we ascribe an understanding of infinite divisibility to Anaxagoras we will ‘look back at Anaxagoras from Aristotle, whereas he was starting from Parmenides and Zeno’.
- 33 So Gigon [364], 14–15, who likewise connects sentence [iii] to Zeno B 1. A verbal similarity: much of Anaxagoras’ language ‘echoes’ that of Zeno; it does not follow, and I do not think it is true, that Anaxagoras is trying to answer—or even thinking of—Zeno’s arguments.
- 34 Reesor [366], 2; Guthrie [25], II. 289, n. 2.
- 35 The proper comparison is not with Zeno but with Parmenides, 151.1. Zeller’s conjecture in [ii] (*tomêi* for *to mê*: ‘for what is cannot not be by cutting’) gives the wrong sense; and it is in any case poorer grammar than the MS. text whose grammar it was designed to improve.
- 36 This interpretation was suggested to me by John Guiniven.
- 37 E.g.: ‘A large portion of *S* and a small portion of *S* contain as many stuffs—for they contain all the stuffs’ (Burnet [31], 260); ‘A large portion of *S* and a small portion of *S* contain stuffs in the same ratio’ (Vlastos [372], 46, n. 64); ‘For every larger there is also a smaller’ (Reesor [366], 2); ‘A large portion of *S* and a small portion of *S* are equal in extent, for size is relative’ (Lanza [360], 199).
- 38 An understanding beyond the reach of Plutarch, who argued that if  $a > b$ , then *a* must have more parts than *b* (*comm not* 1079AB). But what of the end of **197**? ‘These are the *greatest...in quantity*’: if air is greater in quantity than anything else, how can everything be infinite in quantity? We must assume a slight infelicity of expression here: Anaxagoras means, I suppose, that in the present world there are more discrete, macroscopic, portions of air than of anything else; there are lungfuls of air in every creature, bubbles of air in the water, pockets of air underground, and so on. In any case, the weight of the argument falls on the last phrase: ‘These are the *greatest...in magnitude*’.
- 39 I take *dunaito* impersonally (Lanza [360], 214): it is implausible to make ‘the least’ its subject.
- 40 *Kai* means ‘even’ here (*pace* Lanza [360], 214–15): the translation ‘and’ gives a strange syntax and an odd argument.
- 41 Reesor [367], 30; cf. [366], 3.
- 42 It is worth listing Anaxagoras’ vocabulary:

*apokrinesthai*: **197, 200** (twice), **201, 202, B 7, B 9, B 12** (five times), **B 13, B 14, 211** (twice).

*perichôrein*: **B 9, B 12** (eight times), **B 13**.

*diakrinesthai*: **B 5, B 12** (twice), **B 13** (twice), **B 17**.

*kinein*: **B 13** (four times).

*summignusthai*: **B 12** (twice), **B 17**.

*sumpêgnusthai*: **200, 211** (twice).

*sunkrinesthai*: **199**.

*proskrinesthai*: **B 14**.

*sunchôrein*: **B 15**.

43 Anaxagoras' cosmogony and cosmology, which I shall not itemize, was wholly Milesian in spirit: see especially Stokes [365], 217–50 (a heterodox view in Bargrave-Weaver [368]).

### XVII The Corpuscularian Hypothesis

1 Heisenberg [394], 7, 32.

2 I speak usually of 'the Atomists', not distinguishing between the views of Leucippus and those of Democritus. I doubt if our texts will sustain any systematic distinction: the best attempt to make it remains Bailey [383].

3 But McDiarmid [395], 293, n. 1, holds that this comes from Aristotle, *Phys* 265b25, and is not genuinely Abderite.

4 The doxography regularly uses *sômata* or *prêta sômata* ('bodies', 'primary bodies') to refer to the atoms (**68 B 141; B 156; Phys** 203a33=A **41**; and see Diels-Kranz, III. 419a15–27). Epicurus states the first axiom of his philosophy by way of *sôma*: '...the universe is body (*sôma*) and place' (*adHdt* §39). He says that *perception* shows there are bodies (*adHdt* §39); but nothing we perceive has those properties (e.g., solidity, immutability) which are characteristic of the Atomists' bodies. Perhaps we perceive *sômata*: we surely do not perceive *prôta sômata*.

5 But Epicurus appears to have adhered to the Eleatic argument (*adHdt* §§54–5).

6 Cf. Theophrastus, **68 A 132**; Simplicius, **67 A 13**; in *Phys* 82.1–3; Diogenes Laertius, IX.

44=**68 A 1**. In **68 A 49** Galen appears to assimilate impassivity to indivisibility, and to sever it from immutability. On the sense of '*apatheia*' see, e.g., Aristotle, *Met* 1019a26–32, 1073a11–3.

7 It is often said, vaguely enough, that Atomism is Elea minus monism (see, e.g., Burnet [31], 328; Bailey [383], 45, 71); but see Guthrie [25], II. 392, for some apposite qualifications.

8 Simplicius, in *Cael* 609.17, probably means to ascribe both (C) and (D) both to Leucippus and to Democritus. Galen, **68 A 49**, ascribes (C) to the Epicureans and (D) to the Leucippans, and he implies that Leucippus did not use (C); but the passage is muddled.

9 So, e.g., Bailey [383], 204. But Furley [387], 95–6, suggests that the ascription of large atoms to Democritus is a careless inference from this text of Epicurus (cf. Lucretius, II. 481–521).

10 Reading '*ho*' for '*hon*' (see Ross [11], II. 211).

- 11 Cf. Lucretius, I. 599–634; and see, e.g., Vlastos [401]; Furley [387], 7–43.
- 12 So, e.g., Furley [387], 97–9; *contra*: Luria [398], 172–80 (but Luria is driven to the unpalatable conclusion that Democritus recognized two different sorts of atom).
- 13 See especially Furley [387], 81–2 (see above, p. 619, n. 26).
- 14 Atoms are also said to be ‘partless’ (*amerê*) by Aëtius, **68 A 48**; cf. [Aristotle] *lin insect* 969a21.
- 15 Repeated by Simplicius, *in Cael* 649.1–9; 665.6–8; Philoponus, *in GC* 164.20–4.
- 16 Democritus was ‘too good a mathematician’ to believe in mathematically indivisible atoms, according to Heath [19], I. 181; other scholars assert that if atoms have magnitude they cannot be mathematically indivisible (e.g., Burnet [31], 336). Heath echoes the reaction of Philoponus to Plato’s geometrical atomism (*in GC* 210.12) and of Simplicius to Xenocrates’ (*in Phys* 142.16). On Democritean mathematics see Guthrie [25], II. 484–8.
- 17 For *minima* see, e.g., Luria [398], 138–41; against: e.g., Nicol [312], 120. On 233 see especially Hahm [403], with references at 206, n. 3.
- 18 *Contra*: Luria [398], 145–6; he quotes Plutarch, *Plat quaest* 1003F, which shows that, in the view of the ancient commentators, Plato held that a sphere was compounded of cubes.
- 19 Furley [387], 102, n. 17, concedes that ‘Aristotle seems to have believed that the infinite divisibility of the geometrical continuum entails the infinite divisibility of matter’. But he adds: (a) that theoretical divisibility is definitely needed if Democritus is to counter Zeno’s arguments; (b) that Aristotle cannot simply have overlooked a Democritean distinction between physical and theoretical indivisibility; and (c) that Democritus was probably ‘no clearer’ about the relation between physical and theoretical indivisibility than Aristotle was. I answer (a) later. On (b), I do not suppose that Democritus ever made the distinction; rather, the question of theoretical divisibility never explicitly arose for him. And as to (c), Democritus may have been as unclear as Aristotle without sharing Aristotle’s views.
- 20 Furley [387], 95, dismisses Simplicius’ mention of the parts of Democritean atoms (*in Phys* 82.1) as a ‘hasty inference’: I should as soon see a hasty inference in **229**.
- 21 See especially Mau [399], 25–6; *contra*: Luria [398], 129, who thinks that the *GC* contains ‘a genuine fragment of Democritus’. That Philoponus calls the argument ‘Democritean’ (*in GC* 38.28, etc.) is neither surprising nor significant.
- 22 Furley [400], 92–3. The argument is accepted by Locke, *Essay* II. xiii.20.
- 23 Furley [400], 92–3, conflates this argument with Archytas’ argument and also with Aristotle’s fifth argument (*Phys* 203b22–5); and he ascribes the amalgam to Democritus.
- 24 Cf. Lucretius, I. 1014–20; Diogenes of Oenoanda, fr. 19 Ch.
- 25 Simplicius, *in Phys* 467.16; Philoponus, *in Phys* 405.23; cf. Lactantius, *de Ira* X, 10. See especially Luria [398], 37–40.
- 26 ‘Now logically, of course, infinite differences in shape imply infinite differences in size’ (Bailey [383], 127; cf. Marx [388], 56). Bailey wrongly ascribes his own error to Epicurus. Klowski [424], 232, argues that if there are infinitely many phenomena and only finitely many possible combinations of atoms, then there must be infinitely many atomic shapes. But why suppose the combinations finite?
- 27 See especially Müller [52], 85–90, with references. To say that atoms have weight is not to say that they have a ‘natural’ motion ‘downwards’: that view is Epicurean, not Abderite.
- 28 ‘*eikontos kai me antitupountos*’: cf. Plato, *Cratylus* 420D. Sambursky [396], argues that the phrase is Democritean: it is more likely that Simplicius is echoing—consciously or unconsciously—the Platonic phrase. (*Antitupos* was an Epicurean and Stoic technical term for the resistance or solidity essential to body.)
- 29 *Peripalassesthai* has been restored at Theophrastus, *Sens* §66=**68 A 135**; *peripalaxis* *ibid.*; Aristotle, *Cael* 303a8; Simplicius, *in Cael* 609–25 (where two MSS. give it). McDiarmid [395] rejects all those emendations, and prefers *periplekesthai* in 246; Bollack [397], 38–42, allows the term only in 246. The translation ‘vibrate’ is favoured, e.g., by Bailey [383], 88; Liddell and Scott give ‘collide’ (following Hesychius); Bollack [397], 42, prefers

‘éclabousser’; the atoms are ‘spattered about in the void’ as the brains of a dead warrior spatter the ground. Epicurean atoms vibrate (*ad Hdt* §§43, 50). The Epicurean term is ‘*palmos*’; and Aëtius reports that:

Democritus maintained one sort of motion to be that by *palmos* (**68 A 47**).

It is possible that a Democritean theory of atomic vibration lies behind Aëtius’ report, but Aëtius may merely be reading an Epicurean idea into Democritus.

- 30 In the third clause, editors restore the old form of zeta, ‘ $\zeta$ ’, and consequently read ‘H’ for ‘N’; then we should read ‘H’, ‘HA’ and ‘AH’ earlier in the sentence. In the Roman alphabet, ‘N’ is required.
- 31 The MSS. of Plutarch, *adv Col* 1110F=**68 A 57**, read ‘*ousias atomous kai diaphorous*’; Diels-Kranz print the emendation ‘*kadiaphorous*’ (‘and indifferent’), which makes Plutarch report the view I am describing. But Westman [15], 266–7, plausibly prefers ‘*kai adiaiphthorous*’ (‘and indestructible’).
- 32 For the text see Westman [15], 253–4. The saying is also quoted by Sextus (**B 9**), Galen (**B 125; A 49**), and by Diogenes Laertius (IX.72, *ad B 117*); cf. Diogenes Laertius, IX.45; Diogenes of Oenoanda, fr. 6 Ch. The differences among these quotations all lie in the listing of the *nomôi* items.
- 33 I follow the text and interpretation of McDiarmid [404]; the controversy is about details, and the general point I am illustrating is not in doubt. If ‘to us the whole theory seems almost a play of fantasy; yet we must not forget that to its author it was a serious attempt, on the most scientific and common-sense lines at that time known, to account physically for these sensations’ (Beare [39], 164).

### *XVIII Philolaus and the Formal Cause*

- 1 For the text of Diogenes see Burkert [173], 241 n. 10.
- 2 The evidence is dissected by Burkert [173], 224–7; von Fritz [411], 456–60.
- 3 I follow, in almost all respects, the masterly account of Burkert [173], ch. III.
- 4 Philip [180], 116, 32.
- 5 Many scholars have tried to reconstruct Pythagoreanism from its conjectured influence on other fifth-century philosophies; I agree with Burkert [173], ch. III. 3, that all such attempts are doomed to failure.
- 6 See, e.g., Guthrie [25], I. 232–3.
- 7 See especially Burkert [173], ch. III. 1 (cf. 234, n. 83); Burns [412]; *contra*: e.g., Philip [180], 121–2; de Vogel [181], 84–5.
- 8 For this meaning of *mathêma* see Burkert [173], 207, n. 80. Plutarch continues in a Platonizing vein, and his anecdote is not wholly trustworthy.
- 9 Burkert [173], 427; cf. especially Heidel [406]. On the other side see especially van der Waerden [58], 92–105; [408], 271–300.
- 10 On Hippias see the classic paper by von Fritz [407]—rejected (rightly) by Burkert [173], 456–65. Archytas worked at arithmetic (Boethius, **47 A 19**) and geometry (Diogenes Laertius, VIII.82=**A 1**; Proclus, **A 6**; Eutocius, **A 14**); and he more or less invented mechanics (Diogenes Laertius, VIII. 82=**A 1**; Eratosthenes, **A 15**, Vitruvius, **B 7**: see Burkert [173], 331). He built a child’s rattle (Aristotle, Pol 1340b26=**A 11**) and a

- mechanical dove (Gellius, **A 10a**). On Archytas' contribution to harmonics See **B 2**; Ptolemy, **A 16**; Porphyry, **A 17**; etc. cf. Burkert [173], 379–80. It is surely significant that Proclus, in his epitomic history of early Greek mathematics, mentions no Pythagorean prior to Archytas.
- 11 Iamblichus, *comm math sc* 78.8–18; Burkert [173], 50, n. 112, convincingly argues that this comes from Aristotle's *Protrepticus*.
- 12 Burkert [173], 399.
- 13 (a) *proëgagon* is usually taken to mean that they 'advanced' mathematics, in a technical way; that goes against the facts, and fits Aristotle's argument ill. (b) *prôtoi* is often taken with *hapsamenoi*: that gives quite the wrong sense.
- 14 I agree with Burkert [173], 44–5, that there is no significant difference between these two ways of specifying the relation between numbers and things.
- 15 See **B 5**; **B 7**; **B 19**; pseudo-Iamblichus, **A 12** (but see Burkert [173], 247); Proclus, **A 14**; etc.
- 16 But the report is rejected by Burkert [173], 461, n. 71.
- 17 See the elaborations in Speusippus, fr. 4=44 **A 13** (Burkert [173], 246); Theo of Smyrna, 93.17–99.23; Sextus, *adv Math* IV.3; Aëtius, I.3.8; [Aristotle], *Problems* 910b36=58 **B 16**.
- 18 On the *Hypomnemata* see especially Festugière [410]; Burkert [173], ch. I. 3. Burkert concludes (82) that 'the "derivation system" is an achievement of Plato and the Academy, a genuine *transposition platonicienne* of an older, Pythagorean number philosophy'. I prefer to believe in a pre-Platonic system, later modified by the Platonists. On the 'derivation system' see especially Raven [178], chh. X–XI; Guthrie [25], I. 240–82.
- 19 Cf. pseudo-Galen, 71. Perhaps moon creatures do not excrete because they live off smells (Aristotle, *Sens* 445a16=58 **B 43**). Pythagoras did not excrete (Diogenes Laertius, VIII. 19). For an inhabited moon see also Xenophanes, 21 **A 47**, and perhaps Anaxagoras (above, p. 625, n. 17).
- 20 Burkert [173], 342, 350; von Fritz [411], 474.
- 21 Van der Waerden [408], 293–4, ascribes the Philolaic system to Hiketas, because 'Philolaus was...no logical mathematician'. The little we know of Hiketas' astronomy precludes that suggestion.
- 22 Anticipated, perhaps, by Hippasus, a Pythagorean who adopted a *phusilogia* in the Milesian style (Simplicius, **18 A 7**). But we know virtually nothing about Hippasus.
- 23 Retaining '*en tōi kosmōi*' (Burkert [173], 250, n. 58); Heidel proposed '*tō kosmō*' ('the nature of the universe').
- 24 **277** continues with an analysis of the musical intervals: two independent passages from Philolaus have been fortuitously conjoined in our source. For the text see Burkert [173], 250–1, nn. 59–65. I follow him on all but two points, (a) He defends *isotachê* ('of equal speed'); but I can make no sense of that, and I adopt Heidel's emendation *isotagê* ('of the same order'), (b) In the last sentence I translate Burkert's text, but prefer a slight anacoluthon to his proposal to begin a new sentence at '*ananka*'.
- 25 'Being (*estô*) is a condition not of knowledge, but of the origin of this world of ours' (Burkert [173], 251, n. 62). The text of sentence [ii] is usually emended to read: *ouch hoion t' ên ouden tôn eontôn kai gignôskomenon huph' hamôn ga genesthai* ('none of the things that exist could even become known, by us at least, if...'). The emendation makes Philolaus' argument epistemological; but it is unnecessary.
- 26 Why did Philolaus not say, more simply, that what is known is limited, and that what is limited must consist of a limiting and an unlimited component? Perhaps he did not believe that everything that is known is limited. The Pythagoreans held that 'entities can neither exist apart from number nor in general be known, but numbers are known even apart from the other things' (Aristotle, fr. 203): Philolaus' limiters will turn out to be shapes, and hence numbers; so that he may have held that only limiters and limiteds, numbers and numbered things (*arithmoi* in both senses of the word) can be known.

- 27 I take *'erga'* quite generally: other interpretations in Burkert [173], 254, n. 79–
- 28 See especially *Philebus* 23C; cf. Raven [178], 180–6.
- 29 See Cornford [231], 3. Burkert [173], 255–6, rejects the attempt to find an Aristotelian form/matter distinction in Philolaus. Some scholars identify the being (*estô*) of things with 'the unlimited' and hence with matter, and they assimilate limit, form and harmony. Others identify the unlimited matter with the even numbers, and the limiting form with the odd numbers. Burkert rightly rejects these views; but they are distinct from the interpretation I offer, and I do not think that Burkert's objections tell against it.
- 30 The same thought is embroidered in **B 11**; but the fragment is probably spurious (Burkert [173], 273–5; *contra*: de Vogel [181], 43–54).
- 31 According to one definition, a number is even if it is divisible into equal parts, odd if it is divisible only into unequal parts: the number 1, not being divisible at all, is thus neither odd nor even, but falls into a kind of its own: the 'even-odd' (see Aristotle, *Met* 986a20; fr. 199; fr. 203; cf. Raven [178], 116–18). There is no evidence that Philolaus adopted those definitions of even and odd; the 'third kind' of number plays no part in his system; and the phrase I translate 'of each kind' (*hekaterô eideos*) means literally 'of each-of-the-two-kinds'. I conclude that the clause introducing the even-odd into Philolaus' text is a later interpolation.
- 32 See, e.g., Burkert [173], 32–4, 51–2.
- 33 **A 3** may be 'of dubious authenticity' (Burkert [173], 41, n. 69); but it is surely a fair representation of what Eurytus did. 'Plaster' translates *asbestos*—more suitable for sticking pebbles on than Guthrie's 'whitewash'. 'Sketching' is *skiagraphhein*: Guthrie [25], I.274, n.1, thinks that the sense is 'do a shaded drawing' (to give an illusion of solidity) rather than 'do an outline drawing'.
- 34 Guthrie [25], I. 274; cf. Raven [178], chapter VIII.
- 35 The 'hearth' is the central fire of Philolaic astronomy (Aristotle, fr. 203; Aëtius, **A 16**). The text of **284** reads: *to praton harmosthen to hen...* ('the first thing to be harmonized, the one...'). I think that *to hen* is a dittography (see Burkert [173], 255, n. 83); but it is perhaps defended by **B 8**: 'He says that the one is a principle of everything' (i.e., 'cosmogony starts from the central fire, or the One'); and by Aristotle, *Met* 1080b20; 1091a15 (see de Vogel [181], 40–2). **B 8**, however, is hardly genuine; and Aristotle's Pythagoreans may be an orthodoxy from which Philolaus deviated. Even if *to hen* is retained, we cannot infer that 'the number one is itself a *harmosthen*, and is therefore not simply *perainon*' (Burkert [173], 255); for if things are determined by their numerical shape, they may clearly be designated by the names of their shapes: Eurytus might have said 'And then man, 250, is generated', without implying that the *number* 250 is not a limiter.
- 36 On text and translation of 285 see Burkert [173], 268–9; *achri tou mesou* is hard, but the sense must surely be: 'the cosmos began to be formed at the middle'.
- 37 De Vogel [181], 33, judges that the limited/unlimited theory described by Aristotle is older than Philolaus' view (cf. perhaps Alcman's *poros* and *tekmôr*: above, p. 12); von Fritz [411], 230, takes the opposite view. The important point is that they are quite different theories: more evidence that Philolaus' book was not Aristotle's prime source on Pythagoreanism.

### XIX The Logic of Locomotion

- 1 *MXG* 976b26=fr. 96 Bollack. Diels-Kranz amalgamate this with fr. 48 Bollack to make their **B 14**; but see Bollack [349], III.84–5, 140–1.
- 2 See the illustrations on plates 4 and 5 of Bollack [349], III.

- 3 **B 100** is 'one of the most important discoveries in the history of science-' (Burnet [31], 229); it gives an 'implicit proof of the corporeality of the air', even though Empedocles 'knew nothing of the experimental method as it is now understood' (Kirk-Raven [33], 342). O'Brien [417], 168–9, and Furley [415], 34, show clearly that there is no trace of an 'experiment' in **B 100**; see also Guthrie [25], II. 224–6.
- 4 So Gigon [364], 21, rightly comparing Hippolytus, **A 42**.
- 5 Gigon [364], 20–2 (cf. Stokes [56], 337–8, n. 14) implies that the problem simply did not arise; for Melissus wrote after Empedocles and Anaxagoras, and before him no one had connected motion with the void. But why then should Empedocles and Anaxagoras have bothered to reject the void?
- 6 The *MXG* probably means to ascribe *antiperistasis* to Anaxagoras too; and that may be right. But I find no other evidence to support the ascription.
- 7 Aristotle frequently refers to the theory (see H. Bonitz, *Index Aristotelicus*, 65a19–21, a57–b24); on the later history of the theory see, e.g., Bailey [383], 658–9.
- 8 *Principles of Philosophy* II.33; cf. Leibniz, *Nouveaux Essais*, preface; see Capek [390], 111–17.
- 9 Russell, *The Philosophy of Leibniz*, 93 n. (quoted by Capek [390], 112); Capek [390], 113. The objections in Lucretius, I.370–97, are feeble.
- 10 See, e.g., Diogenes Laertius, IX. 31=**67 A 1**; IX. 44=**68 A 1**; Aristotle, *Met* 985b5=**67 A 6**; *Phys* 265b24=**68 A 58**; Alexander, **68 A 165**; Simplicius, **67 A 8**. See also Metrodorus of Chios **70 A 2** (Aëtius), **A 3** (Theophrastus), etc; Epicurus, *ad Hdt* §§39–40; fr. 75 Us.
- 11 'Thing' is not wholly satisfactory, since (unlike *den*) it is not a rare word; but had Democritus written in English he would certainly have used it, playing on 'thing' and 'nothing'.
- 12 See, e.g., Ross [12], 582–3, who vainly refers to *GC* 325a23–32.
- 13 *Pace* Diogenes, these words are not taken verbatim from Anaxagoras.
- 14 Zeller proposed *haploon* ('simple') or *amoiron* ('portionless') for *ape iron*; Lanza [360], 226, renders *apeiron* as 'unlimited by anything else'. But if mind is everywhere (**B 14**), then it will be *apeiron* in the ordinary sense.
- 15 The text of **303** is hopelessly corrupt. Diels-Kranz print: *Ho de nous, has aei esti, to karta...* ('Mind, which always is, in truth now is where...'); Sider [422] proposes: *Ho de nous hosa estin ekratêse,...* ('Mind controls the things that are, and now is where...'); Marcovich [423] suggests: *Ho de nous, has aei ên kai estai, karta...* ('Mind, which always was and will be, in truth now is where...').
- 16 For Anaxagoras, as for Plato and Aristotle, plants have souls: [Aristotle] *de plantis* 815a15=**A 117**.
- 17 The first sentence of **204** is ambiguous between: (a) 'All stuffs contain a portion of every stuff other than mind', and (b) 'All stuffs other than mind contain a portion of every other stuff. I prefer (b).
- 18 I.e. the 'efficient' cause; but some take Simplicius to mean the 'final' cause (see Lanza [360], 47).
- 19 Aëtius (**A 48**) identifies mind as God (accepted, e.g., by Vlastos [161], 114, n. 76); but the testimony is frail.
- 20 See **B 11b-11i**: eight book titles, *Aitiai Ouraniai*, *Aitiai Aeriai*, etc.
- 21 Fr. [34] [30] (p. 352.3–15) Arr (I translate Arrighetti's text, which differs substantially from that in Diels-Kranz).
- 22 Gigon [364], 150, says of **309** that 'this sentence...can only mean the following: The activity of *nous* is rejected'. But **309** neither says nor implies that. On the Principle of Causality see especially Kłowski [424]; but he denies the Principle to Anaximander (ignoring **12 A 11**), and to Parmenides (ignoring **156.10**); he also denies the Atomists the notion of natural regularities (228–40).
- 23 Already in Nietzsche [28], 412–3.

- 24 Some infer from Aristotle, *Phys* 252a27–32, that Empedocles used an inductive argument to show that Love and Strife are the twin forces of nature. But the induction is Aristotle's and he does not ascribe it to Empedocles (though he may well have **B 17.22** in mind, as Hölscher [356], 184, believes).
- 25 For the varied nomenclature of Love and Strife see especially Jaeger [48], 235, nn. 38–9.
- 26 Cf. *MM* 1208b11=**A 20a**; Plato, *Lysis* 214B. At *GC* 334a5, Aristotle repeats his ascription; but his quotation of **B 54** is hardly apposite.
- 27 Cf. Aristotle, *Phys* 198b12; Hippolytus, *ad B 115*; Aëtius, **A 32**, **A 35**; Philo, **A 49**; Cicero, *de Fato* XVII.39; Plutarch, *soll anim* 964DE; Simplicius, *in Phys* 465.12, 1184.5.
- 28 Simplicius, *in Phys* 1184.9–10, quotes two verses: the second is **B 115.2**, and the first is very similar to **B 115.1**. Most scholars plausibly suppose that Simplicius' first verse is in fact a slight garbling of **B 115.1**; Bollack [349], I.153, n. 6, III. 151–2, thinks it a distinct fragment, and he thus finds two separate appeals to necessity in Empedocles' fragments.
- 29 Simplicius quotes, in order: **B 59.2** (but Bollack [349], III.226, sees a separate fragment here); **B 98.1**; **B 85**; **B 75.2**; **B 103**; **B 104**. Cf. pseudo-Plutarch, **A 30**; Philoponus, *in An* 261.17.
- 30 But Plutarch, **A 45**, says that Necessity is simply the union of Love and Strife (cf. Hippolytus, *ad B 115*).
- 31 That, and not the use of *sunkurein*, is why Aristotle quotes the line.
- 32 Bollack [349], III.453, says that *Tuchê* or Chance here stands for 'le bonheur de Philotès'; he has no argument for that strange suggestion.
- 33 The full text reads: '...are made not by any compelling nature (*nulla cogente natura*), but by a certain chance concurrence': either Cicero is confused, or else '*nulla cogente natura*' means 'without the compulsion of any natural agent'.
- 34 The point was firmly grasped by Marx [388], 43–5.
- 35 On **340** see above, p. 604, n. 22. On the equation of chance and necessity see also Gorgias, **82 B 11**, §§6, 19 (cf. Immisch [472], 16–19); and see Guthrie [25], II. 415, n.1.

### XX The Neo-Ionian World Picture

- 1 I ignore Aristotle's other criticisms of Love and Strife: they are petty (see, e.g., *Met* 985a21–31=**31 A 37**; *Cael* 295a29–61; and especially *GC* B6, on which see Bollack [349], I. 43–8).
- 2 Simplicius suggests that the ordering of the world by *nous* is not a cosmogonical event but a pedagogical device (**59 A 64**; compare the similar interpretation of the *Timaeus*); Lanza [360], 114, 235, agrees that the activity of mind is extra-temporal. That is very far-fetched.
- 3 Strictly speaking, the Atomists need not posit eternal motion: they could, in logic, hold that there was no first moment of motion, even though motion has not gone on for ever (see above, p. 271).
- 4 E.g., Lanza [360], 102–3; Schofield [380], 17, n. 59; cf. *Phys* 187a29–30= **A 52**.
- 5 On the text of **355** see Bollack [349], III. 81–2: I translate his text; but the only significant problems are in the last line which is in any event incomprehensible.
- 6 Kirk-Raven [33], 329, mark a lacuna after line 32.
- 7 But the point was perhaps implicit in Parmenides' Way of Opinion: see Reinhardt [30], 75; Kahn [90], 154, n. 2.
- 8 *Ouk orthôs nomizousin*: many scholars say that *nomizein* here refers to the use of language (see Heinimann [445], 49; Fahr [163], 22–3). But Anaxagoras is saying not that the Greeks misuse words, but that they misdescribe events.
- 9 On *phusis* meaning 'birth' see, e.g., Guthrie [25], II. 140, n. 1. For the contrary view, that *phusis* here means *ousia* or 'essence' see Aristotle, *Met* 1015a1 (cf. Burnet [31], 205, n. 4).

Bollack [349], III.88, n. 1, has an idiosyncratic interpretation. See also Ovid, *Metamorphoses* XV.254–7.

- 10 For the text see Bollack [349], III.92–5. In the last line we should probably read *hê themis, ou kaleousi*... (see West [23], 274).
- 11 Müllet [52], 167–73, argues that the neo-Ionian view of generation and destruction was not so far removed from ordinary conceptions of birth and death. See, e.g., Euripides, fr. 839: ‘None of the things that come into being dies; but they are dissociated (*diakrinomenon*) one from another, and reveal a different form’ (further references at 168, nn. 48–51).
- 12 Anaxagoras holds that:

All the stuffs come into being and are destroyed in this way only: by association and dissociation. They neither come into being nor are destroyed in any other way, but persist, eternal (Aristotle, *Met* 984a14–6=**59 A 43**; cf. Simplicius, **A 41**).

### That is not a careful paraphrase of **359**: Aristotle assimilates Anaxagoras to the Atomists.

- 13 So, e.g., Kirk-Raven [33], 329; Guthrie [25] II.153. Different versions in O’Brien [351], 324, n. 1; Long [358], 404, n. 11, who holds that the ‘roots’ are not immortal.
- 14 On the text of **366** see von Blumenthal [427], 18–19. The ‘three things’ were air, fire and earth (Philoponus, **36 A 6**); and the *Triagmos* was a cosmological work (Scholiast to Aristophanes, **A 2**). Philosophically, Ion may have been close to Empedocles.
- 15 J. Bennett, *Kant’s Dialectic* (Cambridge, 1974), 40; in these paragraphs I am indebted to Bennett’s discussion (see especially, 54–6).

### XXI The Sophists

- 1 On the history of the word ‘*sophistês*’ see, e.g., Grant [208], 106–15; Guthrie [25], III. 27–34. For the fees charged by sophists see Harrison [437], 191, n. 44.
- 2 If they were not primarily natural scientists in the Ionian tradition, the Sophists had certainly studied science: see, e.g., Prodicus, **84 B 3–4**; Hippias, **86 A 2** (Philostratus); Antiphon, **87 B 22**. Gomperz [433], especially ch. II, states in its most extreme form the thesis that the Sophists were above all interested in rhetoric.
- 3 I translate the text of **371** as it appears in Diogenes Laertius, IX.51=**A 1**; other authors append to the first sentence the clause ‘nor what they are like in form’. The addition is accepted by Diels-Kranz; but see Gomperz [439], Versions of **371** appear in Plato, *Theaetetus* 162D=**A 23**; Timon, fr. 5=**A 12**; Cicero, **A 23**; Sextus, **A 12**; Eusebius, *ad B 4* (see further Müller [440], 148, n. 4). On Protagoras’ condemnation and the burning of his book see also Hesychius, **A 3**; Eusebius, *ad B 4*; Sextus, **A 12**. Von Fritz [438], 910 (comparing Plato, *Meno* 91E) and Müller [440], 149–51, judge the whole tale a fabrication.
- 4 The continuation of Diogenes’ text is uncertain (see Chilton [441]; [22], 56–7); but there is no way of getting Diogenes off the hook. His *gaucherie* is repeated by Epiphanius, III.2.9.
- 5 Müller [440], 144–7, suggests: ‘Of the gods I *know* nothing, but this is what I *believe*:...’ (cf. Fahr [163], 94–6); and he notes that Diogenes Laertius (IX.54=**A 1**) and Eusebius (*ad B 4*) speak of a Protagorean work *Concerning the Gods*. There have been fanciful attempts to reconstruct Protagoras’ *Peri Theôn* (see Untersteiner [434], 38, n. 47=[435], I 69, n. 47); but I doubt if Protagoras ever wrote a theology. There is no evidence beyond the title in

- Eusebius and Diogenes; and Diogenes and Eusebius are simply using the first two words of **371** as a title for the work they begin (as we use *Pater Nos ter* or *Ave Maria*).
- 6 References to the discussion of this passage in Untersteiner [434], 72, n. 24= [435], I.118.24; Guthrie [25], III.64, n. 1.
- 7 The main texts, apart from Democritus and Protagoras, are; Hesiod, *Works and Days* 109–201 (see Kleingünther [444], 11–15); Aeschylus, *Prometheus* 436–506 (see *ibid.* 66–90); Xenophanes, **21 B 18** (see especially Edelstein [446], 3–11); Hecataeus, *FGrH* F 15; Euripides, *Supplices* 195–249; [Hippocrates], *vet med* 1; Anaxagoras, **59 B 4, B 21a, A 102** (Aristotle); Archelaus, **60 A 4**; Xenophon, *Memorabilia* I.iv; IV.iii.
- 8 See, e.g., *Odyssey* XVII.485–7; Aeschylus, *Supplices* 381–6; *Persae* 827–8; fr. 530 M; Euripides, *Heracles* 387–8; fr. 506; fr. 1131.
- 9 When the plague struck Athens in 430 BC, ‘no fear of god or law of man restrained the people, who judged worship and no worship to be indifferent because they saw that all perished equally’ (Thucydides, II.53.4).
- 10 Cf. *Phoenissae* 1726; *Hercules* 346–7; fr. 645. On Euripidean theology see Guthrie [25], III.232–4; and especially Nestle [459], 87–151. Thrasymachus’ view is stated again by Aristodemus in Xenophon, *Memorabilia* I.iv. 11; it is reported by Plato at *Laws* 885B and 888C, and argued against at 899E–903A.
- 11 On the list see Diels [4], 58–9; Müller [440], 151, n. 4.
- 12 Numerals followed by ‘**J**’ refer to the arrangement in Jacoby [457] (Diagoras does not appear in Diels-Kranz). Diagoras is regularly called ‘*ho atheos*’: e.g., Scholiast to Aristophanes, II.2 **J**; Suda, III. 3 **J**; Cicero, *de natura deorum* I. 63=V.6 **J**. The explicit statement of atheism in Athenagoras is found again in Diogenes of Oenoanda, fr. 11 Ch. Editors of Diogenes restore his text so as to ascribe the statement about Diagoras to Eudemus; but the stone is fragmentary, and no letter of Eudemus’ name appears on it.
- 13 ‘Sensational pamphlet’: Jacoby [457], 25; no book: Woodbury [458], 207–8 (see Aristoxenus, fr. 127a W; Philodemus, III.5 **J**); no ‘intellectual defence’: *ibid.* 208 (cf. Guthrie [25], III.236); *atheos* means ‘ungodly’: *ibid.* 208–9; ‘leader of progressive thought’: Dodds [43], 189.
- 14 Following Jacoby [457], 37, n. 106, Woodbury [458] thinks that the anecdotes point to ‘a problem of popular belief, not a philosophical issue; and they compare Solon, fr. 1.25–32; Hesiod, *Works and Days* 267–73; Aeschylus, *Prometheus* 1093; Theognis, 731–52. It is doubtless a popular puzzle that the good gods apparently let evil prosper; but Diagoras, I hope, raised that banal puzzlement to an intellectual level and used it to ground an argument for atheism.
- 15 Cole [448], 153–63, suggests that the later aetiologies of Euhemerus, Diodorus, and Leo originate from a Democritean model; but those later views are perhaps closer to Prodicus than to Democritus.
- 16 On the text see Kahn [90], xiv; 148, n. 3. Air is perhaps divinized by Diogenes of Apollonia, **64 B 5** (below, p. 580); cf. the Derveni papyrus (quoted below, p. 647, n. 11); Aeschylus, fr. 70; Epicharmus, **23 B 53**. With **381** compare especially Herodotus, I. 131; Euripides, fr. 941 (cf. fr. 877).
- 17 The Suda (III.3 **J**) says that Democritus bought Diagoras as a slave. Derenne [345], 59, believes the story and thinks that Diagoras caught atheism from Democritus.
- 18 In line 13, *exheurein* might mean ‘discover’ rather than ‘invent’; in line 26 *pseudês* might mean ‘insincere’ rather than ‘false’. But no candid reader will seriously dispute my translations.
- 19 On Prodicus’ religious views see also Sextus, *adv Math* IX.39, 41; Epiphanius, III.21 (see, e.g., Gomperz [433], 238–42; Untersteiner [434], 221, n. 9 and 222, n. 27=[435] II. 30, n. 9 and 32, n. 27).
- 20 Or ‘wished’: there is a long and somewhat pointless debate over the sense of *eucheto*: in the vernacular, even atheists pray that good will come to them.

- 21 For the text see J.Blomqvist, *Eranos* 66, 1968, 90–2.
- 22 See new fr. 1 (Chilton [22], 124–7) and new fr. 12 (see M.F.Smith, *American Journal of Archaeology* 75, 1971, 376–8): fr. 12 appears to link with **388**, and it may upbraid Democritus for giving truth and substance to empty *eidōla*; but (as so often) the crucial words of the fragment are scholarly restorations.
- 23 So Bicknell [464], 321–6.
- 24 Luria [514], 4–5, judges that **389** is spurious; Eisenberger [463], 150–2, makes it a politico-ethical fragment.
- 25 Scholars divide over the question of whether this definition is Gorgias' own; references in Untersteiner [434], 202, n. 7=[435], I.312, n. 7.
- 26 On the pre-sophistic rhetoricians, Corax and Teisias, see Radermacher [471], 28–35 (texts on the rhetorical activities of the Sophists are conveniently assembled, *ibid.* 35–106). Note that Gorgias' teacher Empedocles was called the founder of rhetoric by Aristotle (fr. 65=**82 A 1**; cf. Sextus, **31 A 19**). Literary studies began with Theagenes of Rhegium, a contemporary of Xenophanes, who wrote about Homer (Tatian, **8 A 1**; Scholiasts on Dionysius Thrax and Homer, **A 2a, A 3**). In the fifth century, Stesimbrotus and Glaucus followed Theagenes (e.g., Plato, *Ion* 530C=**61 A 1**), and so too did Anaxagoras (Diogenes Laertius, II.11=**59 A 1**). See also the evidence on Anaxagoras' pupil, Metrodorus of Lampsacus: Plato, *loc. cit.*; Diogenes Laertius, *loc. cit.*; Porphyry, **61 A 5**.
- 27 Protagoras

was the first to divide utterance (*logos*) into four types: prayer, question, answer, command...which he called the foundations of utterances (Diogenes Laertius, IX.53=**80 A 1**).

Again:

He divided up the types of names: male, female, and chattel (Aristotle, *Rhet* 1407b6=**80 A 27**).

Both 'divisions' enabled him to criticize Homer for solecism (Aristotle, *Poet* 1456b15=**A 29**; *Top* 173b18=**A 28**), criticisms which delighted Aristophanes (*Clouds* 658–79=**C 3**). Protagoras' thoughts are not syntax in any technical sense; but they do mark the beginning of syntactical studies.

- 28 Pfeiffer [24], 37; cf. Classen [466], 34–6. Mayer [469], 18, exaggerates when he says that Prodius 'was the first to attempt consciously to give a *logical analysis* of the meanings of terms in ordinary language'.
- 29 Cf. Plutarch, *aud poet* 15D. The anecdote about Simonides ('Why don't you deceive the Thessalians?—They're too stupid': *ibid.* 15C) is ascribed to Gorgias by Untersteiner, on the authority of Wilamowitz; but see Rosenmeyer [474], 233.
- 30 See, e.g., Pindar, *Olympian* I.28–33; Parmenides, **28 B 8.52**; Aristophanes, *Frogs* 910 (but see *Aeschylus Vita* 7); Aristotle, *Poet* 1460a18–9. Reference to an aesthetic *theory* may perhaps be seen at: Plato, *Republic* 598E; Ephorus, *FGrH* 70 F 8; Polybius, II. 56.11; Horace, *Epistles* II. 1, 211; Josephus, IA VIII.56; Epictetus, I. iv.26. On *apatê* in general see especially Pohlenz [473], 154–62; Rosenmeyer [474]; Segar [475].
- 31 Prodicus objected to the Greek use of *phlegma* for 'mucus': *phlegma* is cognate with *phlegain*, 'to burn', but mucus is moist and wet (**84 B 5**; cf. Soranus, **68 A 159**). For

Democritus' etymologizing see, e.g., Cole [448], 68, n. 17; for early essays in the same genre see Pfeiffer [24], 4–5.

32 These paragraphs draw heavily on H.P.Grice, 'Meaning', *PR* 66, 1957, 377–88.

### XXII De Anima

- 1 Anaximander's name is omitted in Stobaeus' version of Aëtius, and none of the three versions of the report inspires much confidence (but see Kahn [90], 114).
- 2 **21 A 50** is probably an inference from **21 B 33**; it is contradicted by Diogenes Laertius, IX. 19=**21 A 1** ('soul is breath (*pneumaa*). **28 A 45** (Macrobius) conflicts with **399**.
- 3 But see Tugwell [479]. Perhaps compare **22 B 85=70 M** ('It is hard to fight with spirit (*thumos*); for whatever it wishes, it buys at the cost of soul'); cf. Verdenius [478]. See also above, p. 607, n. 9.
- 4 Cf. Aristotle, *Resp* 471b30–472a25=**68 A 106**; *An* 406b15–22=**A 104**; Aëtius, **A 102**.
- 5 *Onasômatos* see above, p. 617, n. 34.
- 6 On Iamblichus' different report of Hippasus' psychology (**18 A 11**), which is also wrong, see Burkert [173], 249, n. 50.
- 7 See Burkert [173], 247–8 (and above, pp. 186–90). **44 B 21** is spurious (ibid. 242–3); on later Academico-Pythagorean psychology, see ibid. 73–5.
- 8 Burkert [173], 73, n. 130, compares Alexander Polyhistor: 'The whole air is full of souls' (Diogenes Laertius, VIII.32=**58 B 1a**); and he observes that mote-souls are 'rather compatible than otherwise with metempsychosis' (121, n. 3).
- 9 See also Alexander, **67 A 29**. Most scholars say that the eye of *a* emits effluences, and that the conjunction of eye-effluences with effluences of *b* compresses the air midway between *a* and *b*; the mid-air compression then causes *a* to see *b*. But our evidence does not support that bizarre theory (see Baldes [480]).
- 10 See Beare [39], 93, n. 2.
- 11 Note that Gorgias claims to have been present at Empedocles' magical operations (Diogenes Laertius, VIII.59=**31 A 1**).
- 12 Alcmaeon used *poroi*, and some think that Empedocles borrowed them from him. But Alcmaeon's pores lead from the sense organs to the brain (e.g., Theophrastus, *Sens* §26=**24 A 5**); Empedocles' lead from the surface of the body to the sensitive interior of ear and eye.
- 13 Aristotle read a theory of vision into **B 84** (*Sens* '437b23–438a5; cf. Alexander, *ad B 84*); and so he saddles Empedocles with two theories:

Sometimes he says we see in this way [i.e. by rays leaving the eye],  
sometimes by effluences from the seen objects (*Sens* 438a4–5).

Some scholars follow Aristotle's interpretation of **B 84**, but attempt to construct a unified theory from the two theories which Aristotle distinguishes; and they thus make Empedocles anticipate the view of *Timaeus* 45B. But once we realize that **B 84** deals with the structure of the eye and not with vision (see especially O'Brien [417], 140–6, with full bibliography at 157–9), we may be sure that there are neither two theories nor one *Timaeus* theory in

**Empedocles.** (Theophrastus probably grasped the matter aright: *Sens* §§7–8=**31 A 86**).

- 14 Sextus, *adv Math* VIII.286, quotes line 10 by itself; Bollack [349], III. 512, characteristically and implausibly supposes that the line occurred twice in Empedocles' poem. Note that according to Democritus, 'everything has a share in soul of some sort' (Aëtius, **68 A 117**; cf. Albertus Magnus, **A 164**).
- 15 Differing attempts to unravel the knots of **B 77** and **B 78** in Bollack [349], III.513–7, and Zuntz [193], 209–11.
- 16 For the translation of **B 108.2** see Bollack [349], III.458–9. Simplicius and Philoponus (*ad B 108*) explain the fragment as an account of dreaming; but see Verdenius [233], 20.
- 17 Hence *opôpamen* ('we see') in **425.1** is metaphorical for 'we think' (so Aristotle, *Met* 1000b5), and the fragment has nothing to do with perception. That reading is confirmed by **B 17.21**: 'Gaze at it [sc. Love] with your mind (*noôi*), and do not sit gaping with your eyes.'
- 18 'Turned', *tetrammena*, is the MSS. reading, accepted by Bollack [349], III. 444–6, who takes the four roots to be the subject. Most scholars prefer the emendation *tethrammenê* ('nourished'), and suppose that *he kardia* ('the heart') is the lost subject.
- 19 So Bollack [349], III.576–85. For different interpretations of **430** see especially Long [494], 269–73; Schwabl [486].
- 20 See Theophrastus, *Sens* §10=**A 86**. Bollack [349], III.447, paraphrases **429.2** by: 'where especially, but misleadingly, men call the elements thought'. Hardly plausible. On the importance of the heart in thinking see, e.g., [Hippocrates], *morb sacr* VI.192 L; *cord IX*. 88 L.
- 21 I read *hekastot*, not *hekastos*; *periplanktôn*, not *perikamtôn*; *krasis*, not *krasin*; *parestêken*, not *paristatai*. For discussion see, e.g., Müller [52], 18–25, with references.
- 22 Fr. 68.3 D. Fr. 68. 1–2 D is a version of *Odyssey* XVIII.130–7, but its connexion with fr. 68.3 is uncertain. On the related fragment of Heraclitus, **B 17=3 M**, see above, p. 144.
- 23 This interpretation is elegantly argued for by Popper [35], 408–13–
- 24 Popper argues (i) that Parmenides had no *general* word for 'sense-organ', and so had to invent or adopt one; and (ii) that *guia* which, like *melea*, means literally 'limbs', was used by Empedocles to refer to the sense-organs. Point (i) is true and interesting (cf. Burkert [173], 270, n. 154); point (ii) is false: *guia* at **31 B 2.1** and **B 3.13** refers to the body as a whole (*palamai*, literally 'hands', is Empedocles' word for 'sense-organs': **B 2.1**; **B 3.9**).
- 25 'Body', e.g., Guthrie [25], II. 67; 'elements', e.g., Bollack [284], 67 (referring to **31 B 27a**, **B 30.1**, **B 35.11**).
- 26 So Loenen [238], 53; for further references see, e.g., Bollack [284].
- 27 '*noêma*' here means 'instrument of thought', as it does at Empedocles, **429.3**.
- 28 Hicks [10], 221; cf. e.g., Wilamowitz [194], 658–9.
- 29 E.g., Aristotle, *An* 404b8–15; Porphyry, *ad B 126*; Diogenes Laertius, VIII.77= **A 1**; Hippolytus, **A 31**; Aëtius, **A 32**.
- 30 Unless he was thinking of medical men: cf. [Hippocrates] *morb* I.30; *morb sacr* 17. Critias held that the *psuchê* is blood (e.g., Aristotle *An* 405b5=**88 A 23**); and Philoponus, **88 A 23**, quotes Empedocles 429.3 as a line of Critias. Philoponus may simply have bungled; but it is possible that Critias quoted Empedocles, taking him to have said that the *psuchê* was blood.
- 31 The reference to *harmonia* is unwanted: I take *harmonia* to be a gloss on *logos tês mixeôs*.
- 32 I.e., 'or is it rather some substance distinct from the elements?' Aristotle may be thinking of the *daimôn*. But the phrase 'as something else' (*heteron ti ousa*) is Aristotle's normal way of talking about non-substances; does he mean here: 'Is the *psuchê* not a *logos* but some other non-substantial being'?
- 33 Plotinus, *Ennead* IV. 7.8<sup>4</sup>; Olympiodorus, *in Phaedonem* 57.17; Philoponus, *in An* 70.5.

- 34 **44 B 13** is defended by Burkert [173], 269–70. **44 B 22** is spurious (Burkert [173], 247; *contra*: Gladigow [187], 417–18).
- 35 *Contra*: see especially Gottschalk [490]. Gottschalk objects (a) that the source ascribing *harmonia* to Philolaus is late; (b) that Aristotle shows an ‘inability to name a single adherent’ of the doctrine, and that the anonymity of his reference ‘looks deliberate and pointed’; and (c) that the doctrine is inconsistent with metempsychosis. I shall deal with (c) later. There is no force in (b): anonymous references are frequent in Aristotle; they are not ‘pointed’ but merely assume an ordinary knowledge of history in their audience.

Point (a) is stronger: we may well suppose that all the later references to the Pythagoreans as *harmonia* theorists derive from the *Phaedo*, and that the *Phaedo* is no history book. The question then is this: does the *Phaedo* give us reason to ascribe *harmonia* to Philolaus? Well, Plato does, I think, strongly imply that the doctrine was Philolaic; he has no motive for falsification; and the ascription is inherently plausible. And after all, who else can have propounded the doctrine?

- 36 There is, of course, no question of a harmony of *psychic* parts, as Cornford [405], 146–9, supposed.
- 37 Athenagoras ascribes the *mot* to Philolaus (**B 15**); but he is merely confused.

Clement, **408**, claims to be quoting Philolaus:

The old theologians and seers also bear witness that as a punishment the soul is yoked to the body and has been buried in it as in a tomb.

Is Clement quoting a Philolaic forgery? Or did Philolaus report the views of the ‘old theologians and seers’ without assenting to them?

- 38 Burkert [173], 272; cf. Cornford [405], 146.
- 39 There is a helpful survey of opinions in Guthrie [25], II.124–8.
- 40 I quote, in order: Vlastos [161], 125; 93; Burnet [31], 250; Jaeger [47], I.295.
- 41 See especially Zuntz [193], 236–43, who argues cogently that by and large the arrangement in Diels-Kranz is correct and well grounded.
- 42 See especially Reinhardt [491], 104–11; Zuntz [193], 211–13, 241–2.
- 43 Cf. Jaeger [48], 132: ‘We ought to be no more surprised [by Empedocles] than when we come upon a purely scientific rationalism combined with the religious spirit of Christianity in a man of our own times.’
- 44 Westman [15], 247, thinks Empedocles means that human *bodies* do not simply fail to exist before and after life; but he is hardly making that banal point. Bollack [349], III.98–100, takes the subject of **439** to be the elements; but the mistaken beliefs described in lines 2–3 apply not to the elements but to people. **B 111.9** promises Pausanias that: ‘You will bring the strength of a dead man back from Hades.’ Is that a metaphorical way of saying that Pausanias will be able to show people their immortality, or just the implausible promise that Pausanias will raise the dead? **B 2.8** reads: ‘You, then, since you have come here, will learn...’ Zuntz [193], 406–7, glosses ‘since you have come to earth as a man’; and thus he finds another reference to metempsychosis in *Nature* (but see Bollack [349], III.16–17).

- 45 At 440.2 I read *hêper*, with the MSS., for Diels-Kranz' *helper*; at 441.3 I follow Zuntz [193], 216, in preferring *stêthea* to *mêdea*.
- 46 Line 1: *chrêma* probably means 'pronouncement' (Bollack [349], III.151). Between lines 3 and 4 Diels-Kranz print an invented line: it should be omitted (Zuntz [193], 194–6). Line 5: *hōrai* ('seasons') probably means 'years', and the figure 30,000 simply marks a very long period of time (see, e.g., Zuntz [193], 197). Line 10: I read *akamantos*, not *phaethontos*. Line 12: for the reading *tên kai egô nun eimi* see Zuntz [193], 198.
- 47 Empedocles surely ascribed the tailoring to a female *daimôn*; and that was later (rightly?) interpreted as 'nature' or 'fate'. On clothes of flesh see Zuntz [193], 405–6.
- 48 **B 59** begins: 'But when to a greater extent *daimôn* mingled with *daimôn*...' Simplicius (*ad B 59*) says that the *daimones* are Love and Strife; some scholars think they are the four roots; O'Brien [351], 325–36, implausibly argues that they are to be identified with the *daimones* of 442.
- 49 So Guthrie [25], II.254, n. 1. Cf. **B 148**: Empedocles called 'the body surrounding the soul "man-encircling earth"'.
- 50 In favour of the view O'Brien [351], 328–36, cites 442; Aristotle, *An* 408a18–23; Plutarch, *exil* 607CE; *tranq* 474B. But I fear I can see nothing in any of those passages which supports him. Some scholars have the *daimôn* of 442 enter the world of Love and Strife from a higher, incorporeal realm (see, e.g., Zuntz [193], 252–8); but that is incredible: Empedocles knows no world beyond that of the four roots.
- 51 Main texts on the Great Year are Censorinus, *de die natali* 18; Aëtius, II.32; cf. Plato, *Politicus* 269C–271C; *Timaeus* 39CD. See especially van der Waerden [496].
- 52 The argument is adapted from Nietzsche: see especially I. Soll, 'Reflexions on Recurrence: a Re-Examination of Nietzsche's Doctrine, *die Ewige Wiederkehr des Gleichen*', in *Nietzsche*, ed. R.C.Solomon (New York, 1973).
- 53 Lactantius, *SVF* II.623; Simplicius, in *Phys* 886.12=*SVF* II.627; Alexander, *SVF* II.624; cf. *SVF* II.625–31; I.109. See also Hume, *Dialogues concerning Natural Religion*, ch. VIII.
- 54 Soll, op. cit. 339–40, argues that 'there can be no accumulation of experience from one recurrence to the next. A person can have no direct memories of earlier recurrences'; and he infers that Pythagoras1 is not identical with Pythagoras2. But Soll's second statement does not follow from his first.

### XXIII Conduct Unbecoming

- 1 **448** and **449** are fragments 1 and 2 of Pap. Oxy. 1364 (fragments 3–13 contain only a few letters each); **450** is Pap. Oxy. 1797. Harpocration proves that 448, and hence (presumably) 449, belong to Antiphon (see Diels-Kranz, II.346, n.); on the ascription of 450 see, e.g., Guthrie [25], III. 110, n. 1.
- 2 The papyrus has many lacunae; I translate the restorations accepted by Diels-Kranz, except where noted.

**448**: I. 1: Diels reads *ou]n* ('justice, therefore,...'); Schône proposed *d' ê]n* ('justice, we said, was...'). I.12: 'deal with' translates *chrêsthai*; the word is hard to render, but 'manipulate' (Guthrie [25], III. 108) gives the wrong idea. I.25: *epith]eta*—perhaps rather *sunth]eta*, 'conventional' (but see Untersteiner [430], IV. 76). II.13: for *para to dunatonsome give per impossible*, others 'as far as possible', others 'more than it [sc. nature] can bear'. No translation

is wholly agreeable, and I do not know what to make of the phrase. II. 24: reading *pantôn heneka toutôn*: see Kerferd [502], 28. III.25: reading *t[o gar]* (Hunt), rather than Diels-Kranz' *t[o d' au]* ('but'). III.30: I make *apo* partitive, with Guthrie [25], III.109, n. 1. IV.24: lines 25–31 are beyond restoration; for 30–31 Heinemann [445], 138, n. 48, proposes:

...di]kaioi [no  
mizo]ntai ka[i

'...are thought to be just; and so are those who...'. That gives what is surely the right sense. VI. 1–5 is fragmentary; but the sense of the lines is clear. VI.19: the text is not in doubt; but I cannot make any sense of it. VI.25–30: the text is again fragmentary: I translate Diels-Kranz' text, which gives a tolerable sense; see further Untersteiner [430], IV.89-Col.VII probably continues the catalogue of injustices begun at VI.25; but the papyrus is too lacunose to translate.

449: Only *frustulae* of col. I survive. II.10: Guthrie [25], III.153, translates: 'since by nature we are all made to be alike in all respects, both barbarians and Greeks'; but he allows that 'the Greek is rather unusual', and considers the translation I adopt to be 'more accurate'. II.16–20: the text is reasonably plain, but the sense is obscure; perhaps a line has been omitted after 16. II.20–2 are too fragmentary to translate.

**450**: I.12: reading *eipe]r* (Diels) for Diels-Kranz' *epeipe]r* (Hunt proposed *kai ga]r*). I.20: reading *eikos de]* (Hunt) for Diels-Kranz' *kai hama]* ('and at the same time'). I.21: reading *eis [huste/ro]n ene[sti gar* (Hunt-Crônert), for Diels-Kranz' *[husteron/hô]n hene [ka eipen* ('...later on, on account of what he said'). II.20: as Kranz observes, we expect not *mêde auton adikeisthai* but *mêden auton adikoumenon* ('and for not wronging at all when one has not oneself been wronged at all...'). Perhaps the text is in error.

3 Untersteiner [434], 267, n. 127=[435], II.98, n. 127, places **450** between **448** and **449**; in [430], IV.91, he inserts Pap. Oxy. 414 between **450** and **449**. But see Guthrie [25], III.110, n. 1.

4 'Not everything that is *phusei* is advantageous, and Antiphon's norm must be restricted to *ta phusei xumpheronta*' (Kerferd [502], 31. He translates *ta phusei xumpheronta* by 'what is advantageous to human nature'). But there is no 'norm' laid down in **448**; *ta phusei xumpheronta* contrast with the artificial advantages brought by *nomima*.

- 5 'The principal argument to be extracted with certainty from the fragments is a criticism of *nomos* that is essentially ethical, not anarchistic' (Moulton [504], 331); see *ibid.* 329, n. 1, for references to those scholars who find a 'radical critique' of morality in **448–50**.
- 6 Euripides, *Hecuba* 799–801; Lysias, II.19; Xenophon, *Memorabilia* IV.iv.12–3; Aristotle, *EN* 1129a32–4; cf. Pindar, fr. 169; Plato, *Theaetetus*, 172A; Chrysippus, *SVF* III. 314.
- 7 See especially Kerferd [525]; *contra*: e.g., McDowell [526], 172–3. I pass by the question whether Protagoras is presented as a moral relativist in the *Protagoras*: see Moser-Kustas [507].
- 8 **90 A 1** §8 says that the Peloponnesian War is the most recent war. The text is emended; the reference hardly does the chronological work required of it; and a detailed commentary is required before the piece can be dated with any certainty.
- 9 'The author places side by side, without connecting them organically, elements borrowed from different sophists, among whom Protagoras is pre-eminent both as to thought and as to the methods employed' (Levi [511], 302; cf. Gomperz [433], 138–92).
- 10 Reading *all' allô hekateron* (Blass; cf. §11; **A 2** §12), for the MSS. *all' hekateron*.
- 11 See, e.g., Adkins [207], 124–7 (who strangely states that 'the concept of moral responsibility is...unimportant to the Greek', *ibid.* 3). Compare Euripides' defence of Helen in *Troades* 914–1059.
- 12 A.J.Ayer, *Philosophical Essays* (London, 1954), 275. (For Greek attitudes to chance and responsibility see especially Dover [206], 138–41).
- 13 Ayer, *op. cit.*, 279.
- 14 I translate *kaigar horômen echontes opsin ouch...*(Immisch); the text is very uncertain.
- 15 Immisch [472], 22.
- 16 The text is too corrupt for restoration (see Immisch [472], 39, n. 1); but it is clear enough that *logos* is assimilated to *bia*.
- 17 130 in Stobaeus, 80 under the name of 'Democrates': the authenticity of both sets of fragments has been doubted; see especially Guthrie [25], II. 489–92.
- 18 Luria [514], 6–7, refers to **B 299** and holds that the trivial *gnômai* are translations from Achikar. On early Greek gnomic moralizing see Grant [208], 86–97. Nestle [460], 589–93, finds numerous parallels between Democritus' *gnômai* and the *sententiae* of Euripides' characters.
- 19 'A democrat' (Bailey [383], 211); cf. **B 251**. *Contra*: Aalders [518] (cf., e.g., **B 49**, **B 75**, **B 254**, **B 266**, **B 267**). If the Anonymus Iamblichi (**89 A 1**) is Democritean (see Cole [519]), then there is more evidence available to decide the dispute.
- 20 Democritus propounds 'the first rigorously naturalistic ethics in Greek thought' (Vlastos [513], 62); see Guthrie [25], II. 492, n. 1, for other attempts to find an ethical system in Democritus. But 'Democritus' "ethics" hardly amounts to a moral theory; there is no effort to set the picture of the "cheerful" man on a firm philosophical basis' (Bailey [383], 522).
- 21 Scholars usually see an apparent contradiction between **478** and **479**, which they try in various fashions to reconcile. The contradiction arises from the standard mistranslation of **479** as: 'Accept nothing pleasant unless it is advantageous'.
- 22 References in Luria [514], 3–4.
- 23 So Luria [514], 9–13; cf. Aelian, **A 150a**; Stobaeus, **C 7** §3; Aristotle, *HA* 630b31; [Aristotle], *Mirabilia* 830b1; Xenophon, *Memorabilia* IV.iv.20; see further Heinimann [445], 145–7.
- 24 See Taylor [517], 16–27, who also refers to Diotimus, **76 A 1** (but see Bailey [383], 188–9).
- 25 Bailey [383], 188; cf. Luria [514], 7.
- 26 Bailey, *loc. cit.*

XXIV *The Bounds of Knowledge*

- 1 Line 3: I read *athroisantes* (*athrêsantes*, Diels-Kranz; *athroisantos* or *athrêsantos*, MSS.); and I accept, with little confidence *en zôêsi biou* (see Bollack [349], III.11). Line 6: the MSS. read, unmetrically, *to d' holon euchetai einai*; I translate Fränkel's *to d' holon tis ar' euchetai einai*; (Diels-Kranz prefer to insert *pas* after *holon* ('but everyone boasts...'): Bollack reads *ta d' hol' oudeis* ... ('but no one boasts he has found the wholes'). No emendation is wholly satisfactory; but the import of the line is plain enough. Line 9: retain *ou pleion ge* (MSS.). Diels-Kranz read *ou pleon êe*, with no stop before *ou* ('you will learn no more than human wit achieves'). The emendation is needless, and it produces bathos.
- 2 Line 2: translation as in Bollack [349], II.8. Line 6: 'you' probably refers to the Muse of line 3; Pausanias is not addressed until line 9. But the sentiments of lines 6–8 are odd if put to a Muse: some scholars refer 'you' to Pausanias, and posit a lacuna before line 6.
- 3 *Contra*: Bollack [349], III.8, who refers to Empedocles' alleged theory that vision involves the eye in sending out rays and 'grasping' its object. But that theory is not Empedoclean (above, p. 639, n. 13).
- 4 Bollack [349], III.19–22, rightly connects **B 2** with the promise of **B 111**.
- 5 The Greek of **487** is, unfortunately, not unambiguous. Thus Mourelatos [245], 347, translates: 'What manifests itself to us is the look of things which are not themselves perceptible'; Gomperz [521], 342, gives: 'For the appearances are only the way in which what is unperceived presents itself to us'. Those readings are, of course, thoroughly consonant with Anaxagorean physics; and we can understand Democritus' admiration for the fragment. But Epicurus understood the apophthegm according to the orthodox interpretation which I follow in the text (Diogenes Laertius, X.32); and no doubt Democritus did too.
- 6 *hôs* means 'that', not 'how'. For excellent notes on text and translation see Guthrie [25], III.188–92.
- 7 So, e.g., McDowell [526], 118, who thinks that 152A6–8 may be a quotation from Protagoras; *contra*: e.g., Versenyi [522], 181 (who wrongly cites *Theaetetus* 170A, 170E, 171AC, in support of the collective sense).
- 8 McDowell [526], 120, takes 167A8 to imply that Protagoras 'denies the possibility of non-perceptual judgments'; that is implausible in itself, and it does not follow from the distinction between judgmental and phenomenological seeming.
- 9 'Man is the measure of "all things" (*pantôn chrêmâtôn*): *chrêma* means, quite generally, 'thing'; it is fashionable but futile to recall its etymological connection with *chrêsthai* 'use', and to talk of 'things with a special relation to our involvement with them' (Versenyi [522], 182).
- 10 Democritus perhaps attacked Protagoras at this point: see **68 B 11**.
- 11 A papyrus fragment refers the thesis to Prodicus (see Binder-Lieseborghs [530]); Isocrates refers to it (*Helen* 1); and cf. Plato, *Cratylus* 429DE.
- 12 The *Ou Mallon* Principle had a long history; but I ignore later uses of the Principle, which seem to me to differ considerably from the Abderite use.
- 13 So Weiss [538], 49, n. 1; von Fritz [438], 916.
- 14

[Democritus] says that soul and mind are simply the same; for what is true is what appears (Aristotle, *An* 404a28=**68 A 101**).

Presumably that has to be explained by way of **504** (see Kapp [537], 166–7).

15 Cf. Sextus, **A 59**, **A 110**, **A 134**.

16 The ‘new fragment’ of Protagoras (see Gronewald [528]) makes him a sceptic:

e.g., I see the moon, another man does not: it is unclear (*adêlon*) whether it exists or not.

But the ‘fragment’ is full of Stoic terminology and has no authority.

17 Plutarch distressingly contradicts Aristotle’s report. Colotes, it seems, had ascribed to Democritus the restricted Principle of Equipollence; Plutarch vehemently retorts:

So far is Democritus from thinking that each thing is no more (*mê mallon*) thus than thus, that he attacked Protagoras the sophist when he said this, and wrote many convincing things against him (**68 B 156**).

We know nothing more of Democritus’ attack on Protagoras than the *peritropê*. Democritus attacked Protagoras on matters intimately connected to the Principle of Equipollence, and he drew quite un-Protagorean conclusions from the Principle: Plutarch, who is engaged in heated polemic, may have wrongly inferred that Democritus rejected the Principle outright. In any event, I prefer the testimony of Aristotle and Colotes to that of Plutarch.

18 Cf. Sextus, **70 A 25**; Philodemus, **A 25**; Epiphanius, **A 23**; Diogenes Laertius, IX.58=**72 A 1**. The text of **505** is reconstructed in part from Cicero’s translation, and the details are far from certain.

19 The MSS. read *diathêkên* (‘disposition’); for the emendation see, e.g., Steckel [385], 207.

20 The word ‘*epirhusmiê*’ itself has foxed the scholars; de Ley [539] plausibly suggests *ameipsirhusmiê* (cf. **B 139**), which would have the sense I give to *epirhusmiê*.

21 And some translate *idmen* in **506** as ‘know by experience’ (see especially Cleve [37], 428–31). Compare Fränkel’s version of Xenophanes’ sceptical fragment (above, p. 138). But *idmen* means no more than ‘know’; and **B 7** and **B 8** are more than enough to impose a scepticism on Democritus.

### XXV *The Last of the Line*

1 Diels-Kranz, II.59, think that these are different titles for (parts of) a single work; *contra*: Theiler [541], 6–7.

2 Hussey [34], 141.

3 See, e.g., Aristophanes, *Clouds* 225–36=**C 1**; *Frogs* 892; Euripides, *Troades* 884–9=**C 2**. And perhaps the pseudo-Hippocratic *de natura hominis* singles out Diogenes as the representative of Ionian science (seejouanna [270], 307–14).

4 Some may suspect that **514** refers to Diogenes of Smyrna, who ‘believed the same things as Protagoras’ (Epiphanius, **71 A 2**).

5 ‘Diogenes agreed with the atomists in holding that sensations were subjective and relative’, but ‘this subjectivity...did not for him carry with it the denial of sensible qualities to the primary substance itself, as the atomic theory demanded’ (Guthrie [25], II.377 and n. 3).

That ascribes a strange view to Diogenes; and there is no textual evidence to show that he did not agree with the Atomists on both counts.

- 6 ‘Third Explanation of the New System’, in Leibniz, *The Monadology*, ed. R.Latta (Oxford, 1898), p. 333.
- 7 Diogenes is presumably ‘speaking with the vulgar’, if he really denies generation and destruction.
- 8 The source of the passages (I.iv and IV.iii) is much debated: see especially Theiler [541], 14–54, who argues that they are in part based on Diogenes; Huffmeier [542], who strangely denies any ideological thoughts to Diogenes.
- 9 Air and thought: e.g., Theophrastus, *Sens* §§39, 44=A 19; Aristotle, *An* 405a21=A 20; cf. Aëtius, A 30. Divine air. e.g., Philodemus, Cicero, Aëtius, Augustine, A 8.
- 10 The MSS. read *apo gar moi' touto ethos*, which makes no sense. Diels-Kranz, and most scholars, accept Usenet’s emendation: *auto gar moi touto theos*. I translate, hesitantly, Panzerbieter’s: *auto gar moi toutou ethos*.
- 11 Two fragments tell against that interpretation:

And this itself is a body, both eternal and deathless; and of the rest, some come into being, others depart (**525**).

But this seems to me to be clear, that it is both great and strong and eternal and immortal and multiscent (**B 8**).

Simplicius quotes **B 8** immediately after **525**, and he takes the subject of both fragments to be the *archê*. Hence the *archê* is multiscent, and therefore (by the argument of **528**) it is air—and presumably also the divinity. But Simplicius found **B 8** ‘elsewhere’, i.e., not in the same context as **525**; and we are not obliged to associate the two fragments as he does. Compare also column 15, lines 1–3 of the Derveni papyrus:

And since the things that exist are, each one, called after that which predominates (*epikratountos*), everything by that same argument was called Zeus; for the air predominates over everything to the extent that it wishes.

(Text in G.S. Kapsomenos, *Archaiologikon Deltion* 19, 1964, 17–25; discussion in Burkert [67]). Air is the divinity and the predominant element: and the connexions between this fragment and Anaxagoras and Diogenes are not far to seek. But there is no suggestion that air is also the *Urstoff* or material *archê*.