

ON THE USE OF *STOICHEION* IN THE SENSE OF ‘ELEMENT’

TIMOTHY J. CROWLEY

ARISTOTLE says that Empedocles is the first to name fire, air, water, and earth as the four kinds of *stoicheia*, or ‘elements’ (*Metaph. A* 4, 985^a32; cf. 984^a8). But it is well known that Empedocles does not call fire, air, water, and earth *stoicheia*; rather, he calls them the ‘roots of all things’ (πάντων ῥιζώματα) (31 B 6 DK).¹ The use of the term *stoicheion* in the sense of ‘element’ or ‘principle of nature’ is usually believed to be a later innovation. How much later is a matter of some dispute. In a fragment preserved by Simplicius, Aristotle’s pupil Eudemus of Rhodes seems to identify Plato as the first to call the ‘elementary principles of natural and generated things’ *stoicheia*.² Diels, in his study of the development of the term ‘element’ in Graeco-Roman philosophy, reviews the evidence for Eudemus’ claim and concludes that before Plato nobody had used the term *stoicheion* with reference to ‘the physical principles’.³ Some commentators, however, have challenged this conclusion. A common view is that the atomists were the first to use the term for the principles of things; Diels himself acknowledges this possibility, and it is repeated by Burnet.⁴ But Burnet also thinks it

© Timothy J. Crowley 2005

The research of which this paper is a partial product was made possible by a Jacobsen Fellowship from the Royal Institute of Philosophy, and a Scatcherd European Scholarship from the University of Oxford. For these awards I am very grateful. I would also like to thank Michael Frede and David Sedley for their helpful comments on earlier drafts of this paper.

¹ Empedocles gives mythological names to the roots in fragment 6, but names them as fire, earth, air, and water at 31 B 17. 18 DK.

² Simpl. *In Phys.*, proem. 7. 10–17 Diels; Eudemus fr. 31, in F. Wehrli, *Eudemos von Rhodos*, 2nd edn. (Die Schule des Aristoteles, 8; Basel, 1969). Cf. D.L. 3. 24.

³ H. Diels, *Elementum* (Leipzig, 1899), 17. See also W. Burkert, ‘*Stoicheion*’, *Philologus*, 103 (1959), 167–97 at 174–6; cf. W. Schwabe, “Mischung” und “Element” im Griechischen bis Platon’, *Archiv für Begriffsgeschichte*, suppl. 3 (1980), 147–9.

⁴ Diels, *Elementum*, 13 n. 1; J. Burnet, *Early Greek Philosophy [EGP]*, 4th edn.

plausible that Plato may have taken this use of the term from the Pythagoreans;⁵ indeed, according to Ryle, Sextus Empiricus identifies *stoicheion*, in the sense of an ultimate material element, as a term of Pythagorean origin.⁶ A more speculative suggestion is offered by Lagercrantz, who imagines that some anonymous Athenian master teacher introduced the term for the specific purpose of explaining Empedocles' doctrine of the four 'roots'; thus Empedocles' four *ρίζώματα* become the four *stoicheia*.⁷

But if there is disagreement about who is to be credited with the first use of *stoicheion* in the sense of 'element', there tends to be a general consensus as to the reason why this particular term came to be used in this sense. For whether one thinks that Plato, or the atomists, or anyone else, is responsible, it is widely assumed that this use of *stoicheion* is metaphorically derived from some other, more familiar, use of the term. In particular, it is usually believed that *stoicheion* primarily means 'letter of the alphabet', and that, by comparing the principles of nature and natural things to the letters that constitute a word, the former also come to be called *stoicheia*.⁸

In what follows I examine what we might call the 'internal' evidence for the view that Plato is the first to use *stoicheion* in the sense of 'element'. By the internal evidence I mean the evidence that is available in Plato's dialogues. The first time Plato uses *stoicheion* in this sense is generally agreed to be at *Theaet.* 201 E;⁹ but he also uses the term in the *Timaeus* and in the *Sophist*. I argue that the

(London, 1930), 336 n. 4. See also C. H. Kahn, *Anaximander and the Origins of Greek Cosmology* [*Anaximander*] (New York, 1960), 120; I. Düring, *Aristotle's Protrepticus: An Attempt at Reconstruction* [*Protrepticus*] (*Studia Graeca et Latina Gothoborgensia*, 12; Göteborg, 1961), 202; G. Vlastos, *Plato's Universe* (Oxford, 1975), 67 n. 4. Cf. J. B. Skemp, *Plato's Statesman: A Translation of the Politicus of Plato with Introductory Essays and Footnotes* (London, 1952) 161 n. 1.

⁵ Burnet, *EGP*, 228 n. 1.

⁶ G. Ryle, 'Letters and Syllables in Plato', *Philosophical Review*, 69 (1960), 431–51 at 431. The reference, not given by Ryle, must be to *M.* 10. 249–50 (= *Against the Physicists* 2. 249–50).

⁷ O. Lagercrantz, *Elementum* (Uppsala, 1911), 17–18.

⁸ Kahn writes: 'In Greek, as afterwards in Latin, this expression [*στοιχείον*] is based on a comparison of the physical principles to the letters of the alphabet (the primary meaning of *στοιχεία*)' (*Anaximander*, 120). Cf. Diels, *Elementum*, 13 n. 1, and 19; Burkert, 'Stoicheion', 175; Burnet, *EGP*, 336 n. 4; W. Charlton, *Aristotle's Physics Books I and II, Translated with an Introduction and Notes* (Oxford, 1970), 46.

⁹ See F. M. Cornford, *Plato's Theory of Knowledge* [*PTK*] (London, 1935), on *Theaet.* 201 E: 'This is said to be the first occurrence [of *στοιχεία*] as applied to the elements of physical things' (143). See also A. E. Taylor, *A Commentary on Plato's Timaeus* [*Timaeus*] (Oxford, 1928), 306.

On the Use of Stoicheion in the Sense of 'Element' 369

relevant passages in these dialogues most naturally indicate that Plato is appealing to an already current usage of *stoicheion*, rather than introducing a novel sense of the term. Hence I am broadly in agreement with those commentators who have urged that the use of *stoicheion* in the sense of 'element' or 'constituent of natural things' pre-dates Plato. But what distinguishes my argument from similar views regarding the use of *stoicheion* is that I have no interest in trying to identify any of Plato's predecessors as sources of this sense of the term. Partly this is because I do not believe there is sufficient evidence to substantiate any such identification.¹⁰ More importantly, however, it seems to me that the very attempt to specify an 'introduction' of the use of *stoicheion* in the sense of 'element' is misguided. For what I also want to argue is that this use of *stoicheion* is a standard, or 'ordinary', usage of the term. In other words, I reject the common assumption that the use of the term *stoicheion* in physical, metaphysical, or more generally cosmological contexts, in the general sense of principle of body, is a metaphorical derivation from some other use of *stoicheion*.

What of the Eudemus fragment? I do not think its evidence can be ignored,¹¹ or dismissed as mistaken.¹² After all, Eudemus

¹⁰ Cf. M. Burnyeat, *The Theaetetus of Plato [Theaetetus]* (Indianapolis, 1990), 152: 'for a number of pre-Socratic theorists . . . the word "element" was coming to be a vogue term'. But the only evidence that Burnyeat can muster to support this claim is Plato's use of *stoicheion* in the *Sophist* and *Timaeus*. The evidence for an atomistic provenance of this use of *stoicheion* is based upon some remarks of Aristotle's, at *Metaph.* 985^b15 and *GC* 315^b6–15 (cf. *De caelo* 1. 7, 275^b31–276^a1). But, remarkably, in neither passage does Aristotle actually use the term *stoicheion*. For a critique of the view that the atomists employed the term *stoicheia* in the sense of the elements of all things, see Taylor, *Timaeus*, 307. The only evidence that *stoicheion* is of Pythagorean origin is that provided by Sextus Empiricus (see n. 6). According to Sextus, the Pythagoreans say that those who are doing genuine philosophy are like those who examine language: as the latter begin by investigating the *stoicheia*, because words are composed of syllables, and syllables of letters, so the true physicist ought firstly to enquire into the *stoicheia* of the universe. This, it must be said, appears more concerned with an issue of methodology than with anything else.

¹¹ Some commentators appear content to ignore Eudemus' claim as evidence for the first philosophical use of the term *stoicheion*. For instance, Vollgraff, Koller, and Lohmann, in their detailed studies of the term, pay very little attention to the fragment; see W. Vollgraff, 'Elementum', *Mnemosyne*², 4 (1949), 89–115; H. Koller, 'Stoicheion', *Glotta*, 34 (1955), 161–74; J. Lohmann, *Musiké und Logos: Aufsätze zur griechischen Philosophie und Musiktheorie* (Stuttgart, 1970). Cf. also A. Lumpe, 'Der Begriff "Element" im Altertum', in *Archiv für Begriffsgeschichte*, 7 (1962), 285–93. Similarly, recent English-language studies of the *Theaetetus* make little or no reference to Eudemus; see e.g. J. McDowell, *Plato's Theaetetus [Theaetetus]* (Oxford, 1973); D. Bostock, *Plato's Theaetetus [Theaetetus]* (Oxford, 1988); Burnyeat, [See p. 370 for n. 11 cont. and n. 12

is usually considered to be a reliable source. But it seems to me that the significance of the fragment ought to be judged in the light of the internal evidence, rather than vice versa. Hence I have little to say about Eudemus in this paper; my focus is, in the main, restricted to a consideration of the use of *stoicheion*, in the sense in question, in Plato's dialogues. I begin, however, not with Plato but with Aristotle, and his account in the *Metaphysics* of the meaning of the term *stoicheion*. This seems to be the best way to start, because here Aristotle lays down quite clearly the various meanings of the term, as well as noting the further possibilities of its use.

1. Aristotle on the meaning of *stoicheion*

Aristotle offers the following account of the meaning of the term *stoicheion* in chapter 3 of *Metaphysics* Delta, a book whose contents he elsewhere refers to as 'the discussion of the number of ways in which things are called what they are' (*Metaph.* Θ 1, 1052^a15; E 4, 1028^a4). It is useful at this point to consider the entire chapter:

An element is said to be the first constituent from which something is composed, indivisible in form into another form, for instance the elements of utterances [*φωνῆς στοιχεῖα*] are those from which the utterance [*ἡ φωνή*]¹³ is composed and into which it is ultimately divisible, and which are not further divisible into utterances different in form; but if they do divide, the parts are of the same form, for example, as a part of water is water—this is not the case for a syllable. In the same way also those who speak of the elements of bodies mean the things into which bodies ultimately divide, and which are not further divisible into things other in form; and whether such things are one or many, they call these elements. Closely resembling this also are what are said to be the elements of geometrical propositions

Theaetetus. But cf. also D. Sedley, *The Midwife of Platonism: Text and Subtext in Plato's Theaetetus* (Oxford, 2004), 155–6.

¹² Cf. D. Furley, *The Greek Cosmologists*, i. *The Formation of the Atomic Theory and its Earliest Critics* (Cambridge, 1987), 151. Furley is prepared to state that, if this use of the term pre-dates Plato, then Eudemus must be wrong to say that Plato first gave the name *stoicheia* to the elements.

¹³ Aristotle defines *ἡ φωνή* as a kind of sound made by animate beings, at *DA* 420^b5, cf. 29; also *HA* 535^a27, *PA* 664^b1. But it is only the sounds of the human voice that have *stoicheia*. A *stoicheion* is indivisible, but what is most distinctive about a *stoicheion* is that it is a constituent of a compound. The indivisible sounds of animals do not combine to make a composite sound, hence, although these are indivisible sounds, they do not constitute anything and are not *stoicheia* (see *Poet.* 20, 1456^b20–2).

On the Use of Stoicheion in the Sense of 'Element' 371

[τὰ τῶν διαγράμμάτων στοιχεῖα],¹⁴ and generally those of demonstrations; for the first demonstrations that are present in many demonstrations are called elements of demonstrations; such as the primary syllogisms, out of three terms through one middle. And, metaphorically, anything that is one and small, and which has many uses, is called an element, thus also the small and simple and indivisible is called 'element'. From this comes the view that the most universal things are elements, because each of these, being one and simple, exists in many things [ἐν πολλοῖς ὑπάρχει], or everything or nearly everything; also the one and the point are believed to be principles. Since, then, the things that are called 'genera' are universal and indivisible—for these do not have a definition—some call the genera 'elements', and more so than the differentiae, because the genus is more of a universal. For to whatever the differentia belongs, the genus follows, while to whatever the genus [belongs], the differentia does not always [follow]. So it is common to all cases that the element of each thing is the first constituent in each thing. (*Metaph. Δ 3, 1014^a26–1014^b15*)¹⁵

In this passage Aristotle explains that *stoicheia*, in the most general sense, are the first things out of which composite items are constituted; they are the first things because they are indivisible into further, prior things. This is the general meaning of *stoicheion* (cf. *De caelo* 3. 3, 302^a10–21). Aristotle then considers three examples of

¹⁴ W. D. Ross, in *Aristotle's Metaphysics: A Revised Text with Introduction and Commentary* [*Metaphysics*] (2 vols.; Oxford, 1924), i. 234, refers to Asclepius (174. 9) for the point that διαγράμματα are geometrical propositions, and not figures. See also T. L. Heath, *Mathematics in Aristotle* (Oxford, 1949), 205–6. J. L. Ackrill, *Aristotle's Categories and De Interpretatione: Translation with Notes* (Oxford, 1963), 111, writes: 'Many geometrical "propositions" are in fact solutions to construction problems (e.g., Euclid I, 1, 2, 3); and the construction of appropriate diagrams plays an important role in the proof of theorems (e.g. the theorem of Pythagoras, Euclid I, 47).

¹⁵ στοιχείον λέγεται ἐξ οὗ σύγκειται πρώτου ἐνυπάρχοντος ἀδιαίρετου τῷ εἶδει εἰς ἕτερον εἶδος, οἷον φωνῆς στοιχεῖα ἐξ ἧν σύγκειται ἡ φωνή καὶ εἰς ἃ διαιρεῖται ἔσχατα, ἐκεῖνα δὲ μηκέτ' εἰς ἄλλας φωνὰς ἑτέρας τῷ εἶδει αὐτῶν, ἀλλὰ κἂν διαιρῆται, τὰ μέρη ὁμοειδῆ, οἷον ὕδατος τὸ μέρος ὕδωρ, ἀλλ' οὐ τῆς συλλαβῆς. ὁμοίως δὲ καὶ τὰ τῶν σωματίων στοιχεῖα λέγουσιν οἱ λέγοντες εἰς ἃ διαιρεῖται τὰ σώματα ἔσχατα, ἐκεῖνα δὲ μηκέτ' εἰς ἄλλα εἶδη διαφέροντα· καὶ εἴτε ἐν εἴτε πλείω τὰ τοιαῦτα, ταῦτα στοιχεῖα λέγουσιν. παραπλησίως δὲ καὶ τὰ τῶν διαγραμμάτων στοιχεῖα λέγεται, καὶ ὅλως τὰ τῶν ἀποδείξεων αἱ γὰρ πρώται ἀποδείξεις καὶ ἐν πλείοσιν ἀποδείξεσιν ἐνυπάρχουσαι, αὗται στοιχεῖα τῶν ἀποδείξεων λέγονται εἰςὶ δὲ τοιοῦτοι συλλογισμοὶ οἱ πρώτοι ἐκ τῶν τριῶν δι' ἑνὸς μέσου. καὶ μεταφέροντες δὲ στοιχείον καλοῦσιν ἐντεῦθεν ὃ ἂν ἐν ὄν καὶ μικρὸν ἐπὶ πολλὰ ἢ χρήσιμον, διὸ καὶ τὸ μικρὸν καὶ ἀπλοῦν καὶ ἀδιαίρετον στοιχείον λέγεται. ὅθεν ἐλήλυθε τὰ μάλιστα καθόλου στοιχεῖα εἶναι, ὅτι ἕκαστον αὐτῶν ἐν ὄν καὶ ἀπλοῦν ἐν πολλοῖς ὑπάρχει ἢ πᾶσιν ἢ ὅτι πλείοσι, καὶ τὸ ἐν καὶ τὴν στιγμὴν ἀρχάς τισι δοκεῖν εἶναι. ἐπεὶ οὖν τὰ καλούμενα γένη καθόλου καὶ ἀδιαίρετα (οὐ γὰρ ἔστι λόγος αὐτῶν), στοιχεῖα τὰ γένη λέγουσιν τινες, καὶ μᾶλλον ἢ τὴν διαφορὰν ὅτι καθόλου μᾶλλον τὸ γένος· ᾧ μὲν γὰρ ἡ διαφορὰ ὑπάρχει, καὶ τὸ γένος ἀκολουθεῖ, ᾧ δὲ τὸ γένος, οὐ παντὶ ἢ διαφορὰ. ἀπάντων δὲ κοινὸν τὸ εἶναι στοιχείον ἐκάστου τὸ πρῶτον ἐνυπάρχον ἐκάστῳ.

the usage of *stoicheion*, and he distinguishes these usages from metaphorical applications. Aristotle elsewhere describes a metaphorical application of a term as a ‘strange’ or unusual application of that term.¹⁶ He often contrasts metaphorical applications of terms with those applications where the term is used in the ‘ordinary’ way, i.e. strictly (*κυρίως*), or properly (*οἰκείως*). By the ‘ordinary’ use Aristotle means the real, or actual, sense, the sense in which everybody uses the term.¹⁷ So, for instance, in the *Poetics* he explains ‘strange’ words (*ξενικόν*), or strange applications of words, such as metaphors, as ‘everything apart from the ordinary’ (*πάν τὸ παρὰ τὸ κύριον*, 1458^a23–5).¹⁸ The first three examples of the use of *stoicheion* in *Metaphysics* Delta, then, ought to be understood as examples of ordinary, or non-metaphorical, usages of the term.

The things that are ordinarily called *stoicheia* are (1) the things into which syllables are divisible; (2) the things into which bodies are divisible; and (3) the things into which geometrical propositions are divisible, or the principles of proofs or demonstrations—that is, the propositions whose proof is involved in the proof of other propositions.¹⁹ Now clearly these things are called *stoicheia* homonymously. For they are all called *stoicheia*, but they are not defined in the same way (see *Cat.* 1^a1–4). The *stoicheia* of syllables, which are phonemes or letters, belong to the science of grammar (see *Cat.* 14^b1–2; cf. *Poet.* 1456^b20–2); the *stoicheia* of bodies belong to the science of nature or physics; and the *stoicheia* of geometrical propositions belong to the science of geometry. They are, however, associated homonyms,²⁰ because, while the definition pertaining to *stoicheia* is different in each case, there is a shared core meaning, which is the general meaning of *stoicheion*: ‘that first, indivisible constituent out of which something is composed’.²¹ So, for in-

¹⁶ At *Poet.* 1457^b6 ff. he defines *μεταφορά* (which is not exactly equivalent to metaphor) as ‘a word used in a strange way’.

¹⁷ See LSJ s.v. *κύριος*; also e.g. *Poet.* 1457^b3–4; cf. *Rhet.* 1404^b5–6. For the use of *οἰκείως* and *κύριος* see *Rhet.* 1404^b31–2 (cf. 1410^b12–13).

¹⁸ For further contrasts between *μεταφορά* and ordinary usage, see *Poet.* 1457^b1–4, also 1458^a33, 1458^b17; *Top.* 123^a33–6, 139^b34, 158^b12; *Rhet.* 1410^b12–13; *MM* 1. 26, 1192^b15–16.

¹⁹ Aristotle offers a similar distinction of the three senses of *stoicheia* at *Metaph.* B 3, 998^a23–8.

²⁰ Associated, as opposed to discrete, homonyms. On this distinction see ch. 1 of C. Shields, *Order in Multiplicity: Homonymy in the Philosophy of Aristotle* [*Homonymy*] (Oxford, 1999).

²¹ C. Kirwan, in *Aristotle: Metaphysics Books Γ, Δ, and Ε. Translated with an*

On the Use of Stoicheion in the Sense of 'Element' 373

stance, the constituent of a syllable and the constituent of a body have the name *stoicheion* in common, but they do not have the same definition; nevertheless, there is something in their definitions that they do share, and that is that they are constituents of compounds and indivisible into further constituents that are different in form.²²

The 'transfer' (μεταφορά) or metaphorical application of *stoicheion* is said to be to anything that is small and simple and indivisible, and that has many uses (1014^b3-4).²³ This transfer opens the way towards applying the name *stoicheion* to things that are most universal. Thus, for example, the point and the One, or unit (τὸ ἓν), might be called *stoicheia*. Here Aristotle presumably has in mind the Platonists' use of *stoicheion*.²⁴ Aristotle occasionally indicates that the Platonists use the term *stoicheia* with reference to the elements of number, i.e., the One and the Great and the Small (1087^b13, 1091^a10), or the One and the Unequal (1087^b9). For instance, in *Metaphysics* Nu he says that they call the principles of numbers *stoicheia* (τὰς ἀρχὰς ἄς στοιχεῖα καλοῦσιν, 1087^b12-13). It would seem, then, that Aristotle regards the Platonist use of *stoicheion* as metaphorical. This point is not without some pejorative implications; Aristotle is not averse to criticizing the Platonists for appealing to metaphors (*Metaph.* 991^a20 ff., 1079^b24 ff.).

The chapter concludes in the same way that it began, with Aristotle repeating the core meaning of *stoicheion* (1014^a26, ^b15). But one might doubt that metaphorical applications of *stoicheion* also share the core meaning. For the notion of being the first constituent of a compound seems to be, if not absent (for the point might be

Introduction and Notes, 2nd edn. (Oxford, 1993), 128, says that the first sense of *stoicheion* at 1014^a26 refers to material substances, e.g. fire, air, water, and earth. But this is mistaken. The account of the term *stoicheion* at 1014^a26, i.e. indivisible constituent of compounds, is the general meaning of *stoicheion*, a meaning that is shared by each one of the ordinary usages of the term. The use of *stoicheion* with reference to the material constituents of bodies is the second example of the usage of the term.

²² Shields offers the following explanation of core-dependent homonymy: 'x and y are homonymously f in a core-dependent way iff: (i) they have their name in common, and (ii) their definitions do not completely overlap, but (iii) they have something definitional in common' (*Homonymy*, 106).

²³ A metaphorical use of *stoicheion*, in the sense of being one and indivisible and with many uses, may be its use in the sense of τόπος, i.e. an argument widely applicable; cf. *Top.* 120^b13, 121^b11, 151^b18 (this is Bonitz's suggestion, reported by Ross, *Metaphysics*, i. 295).

²⁴ Ross, *Metaphysics*, i. 295: 'Aristotle is referring here to Pythagorean and Platonic views'; cf. *Metaph.* 986^a1, 998^a20 ff., 1028^b25-8, 1069^a26-8.

considered, by some, to be a constituent of lines and planes; cf. *Phys.* 215^b18–19), then certainly less crucial in these applications of *stoicheion*. As Aquinas points out in his commentary on this passage, universals are not constituents of things; rather they predicate the substance of a thing.²⁵

Having said that, it may often be difficult to distinguish ordinary from metaphorical usages of the term. There are glimpses of the use of *stoicheion* to capture a notion of ‘principle’ on the remarkably few occasions that the term is found in the extant writings of Plato’s contemporaries. Both Isocrates and Xenophon use the term in the sense of the ground rules, or first parts, of some subject or discipline. Isocrates refers to the most important *stoicheia* of good government, and of the *stoicheia* of rhetoric; Xenophon uses the term in the sense of the ‘first things’.²⁶ *Stoicheion* here means the first parts, or the ground rules, of some thing or discipline. We find this use also in Aristotle, for instance when he, like Isocrates, refers to the parts of rhetoric as the *stoicheia* (*Rhet.* 1. 2, 1358^a35). Again, in the *Organon* Aristotle often employs *stoicheia* in the sense of ‘elementary rules’ (*Top.* 4. 9, 147^a22; see also 4. 3, 123^a28; 6. 5, 143^a13; *SE* 172^b21, ^b31; 174^a21). It might be thought that these examples provide evidence that there is an incipient or rudimentary sense of principle or *archē* connoted by the term *stoicheion*.²⁷ But are these examples instances of metaphorical use?²⁸

Fortunately, thanks to the Delta chapter, we can pick out at least three usages of *stoicheion* that Aristotle explicitly identifies as ordinary or non-metaphorical. For the sake of convenience, let us call the first of these the ‘alphabetic’ sense,²⁹ the second the ‘elemental’ sense, and the third, referring as it does to the principles, axioms, and postulates of geometry, the ‘geometric’ sense. By the ‘elemental’ sense, at this point, I intend nothing more technical than the use

²⁵ Cf. Aquinas, *Commentary on the Metaphysics of Aristotle*, trans. by J. P. Rowan (Chicago, 1964), vol. 1, bk. 5, Lsn 4, Sct 804, p. 317.

²⁶ Isocr. *Ad Nicolem* 16. 7, *Ad filium Jasonis* 8. 8; Xen. *Mem.* 2. 1. 1. 9. A somewhat different, and rather singular, use of the term is Aristophanes’ use of *stoicheion* in the sense of the individual measures or units of a sundial (*Eccl.* 652). But this use may offer the best clue to the original meaning of the term—a question which I do not pursue.

²⁷ See Diels, *Elementum*, 17, 22.

²⁸ For Diels, Isocrates and Xenophon are using *stoicheia* metaphorically in the passages cited above (*Elementum*, 17).

²⁹ ‘Alphabetic’ is perhaps not completely satisfactory, but it seems more appropriate than ‘grammatical’ or ‘linguistic’, and more familiar than e.g. ‘phonic’.

On the Use of Stoicheion in the Sense of 'Element' 375

of *stoicheion* to refer to a constituent, or a principle, of a body, rather than to the constituent of a syllable or a proposition of geometry.

It is important to emphasize that these three senses of the term *stoicheion* are independent of each other, and hence that each can be understood without reference to the other. For instance, *stoicheion* in the elemental sense is not presented as being dependent upon, or metaphorically derived from, *stoicheion* in the alphabetic sense; both senses are ordinary usages of the term.³⁰ This reflects Aristotle's practice elsewhere. In *De caelo* 3, 3, for instance, Aristotle's definition of *stoicheion* in the elemental sense is presented without reference to *stoicheion* in either its alphabetic or its geometric sense (302^a10–21). The context of the definition in the *De caelo* is cosmology, or in general, the study of nature, and Aristotle uses the term *stoicheion* as an appropriate technical term of the study of nature. Similarly, in the *Poetics* he identifies *stoicheion* as a part of speech (or language, λέξις) and defines it accordingly, without reference to either of the other senses of the term (1456^b20–2).

Of the three 'ordinary' usages of *stoicheion* that Aristotle identifies, I think it is quite clear that the alphabetic and the geometric senses were familiar to Plato and his contemporaries. Many examples of the alphabetic sense can be recognized in Plato's works. In the *Cratylus*, for instance, Socrates refers to 'the alpha and beta and the other *stoicheia*' (431 A, cf. 393 D, 426 D, 433 A–B; cf. *Phileb.* 17 A–18 D). The use of the term *stoicheia* in geometry, in particular as the title for treatises on geometry, was made famous by Euclid, but the 'geometric' sense of *stoicheion* may well have been familiar since the fifth century; in his commentary on Euclid, Proclus reports that Socrates' contemporary Hippocrates of Chios was the first to write an 'Elements' of geometry (Procl. *In Eucl.* 66. 4–8 = 42 A 1 DK). Theudius' 'Elements', the immediate precursor to Eu-

³⁰ For a very different reading of *Metaphysics* Delta 3, see M. Crubellier, 'Metaphysics A 4', in M. Frede and D. Charles (eds.) *Aristotle's Metaphysics Lambda* (Oxford, 2000), 137–60. Crubellier suggests that what I have called the elemental, geometric, and metaphorical uses of *stoicheion* are all derived metaphorically from what he calls the 'original' reference, i.e. the alphabetic sense (142). But Crubellier ignores the core meaning of the term with which Aristotle bookends the chapter; and he attempts to force on certain terms, such as ὁμοίως and παραπλησίως, by which the elemental and geometric usages are introduced, an unnatural tone of qualification. Furthermore, he translates καί at ^b3 as 'hence', thereby removing the contrast that, as I have argued, Aristotle intends between ordinary and metaphorical usages of *stoicheia*. I find Crubellier's general claim, that Delta 3 betrays Aristotle's 'distrust' of the term *stoicheion*, to be without foundation.

clid's *Elements*, was the geometry textbook of the Academy.³¹ It is not certain that these pre-Euclidean 'Elements' were actually called *Stoicheia*.³² Proclus does not say that they were. But it is likely that by Euclid's time, *Stoicheia* was the traditional title for treatises on geometry.

Whether or not the 'elemental' sense is a recognized usage of *stoicheion* by Plato's contemporaries, not to mention his predecessors, is, of course, less clear. On the standard interpretation of Eudemus' evidence, Plato himself is responsible for coining the 'elemental' sense of *stoicheion*. Moreover, it is usually thought that he arrives at this novel sense by transferring the term from its familiar 'alphabetic' sense, rather than from its (presumably also familiar) 'geometric' sense, to the context of the study of nature. Ross, for instance, writes: 'in Plato [*stoicheion*] often means an element of spoken language, answering to *γράμμα*, an element of written language, and in *Theat.* 201 E it is metaphorically used of the elements of any complex whole'.³³ So, on this view, the elemental sense of *stoicheion* is metaphorically derived from the alphabetic sense. But if *stoicheion* had not been used in this way before, then, presumably, it would have been quite clear to Plato's audience that the term is being used in a new, and unusual, way. It wears its metaphorical derivation on its sleeve, as it were.³⁴

Now, as we have just seen, in *Metaphysics* Delta Aristotle is careful to distinguish the ordinary usages of *stoicheion* from metaphorical transfers. But he presents the elemental sense of *stoicheion* as one of the ordinary, and therefore non-metaphorical, usages of the term. It seems quite remarkable that Aristotle would identify as a non-metaphorical usage of a term a usage that was introduced by its progenitor in such a way that its metaphorical origins are not merely apparent, but explicit (cf. *Theaet.* 202 E). Could the metaphorical origins of the 'elemental' sense of *stoicheion* have been forgotten by Aristotle's time?³⁵ Such a suggestion seems incredible; for Plato's innovation, if we admit that it is such, would have

³¹ See Ross, *Metaphysics*, i. 234.

³² Note that Diels, *Elementum*, 27, argues that the titles cannot be considered as evidence for the dating of the mathematical use of *stoicheion*.

³³ *Metaphysics*, i. 137–8; cf. n. 8 above.

³⁴ Cf. Kahn: '[with Plato's use of *stoicheion*] the comparison to the letters was still clearly borne in mind' (*Anaximander*, 120).

³⁵ 'Only with Aristotle does *στοιχεῖα* appear as an abstract expression whose metaphorical value has been largely forgotten' (Kahn *Anaximander*, 120).

On the Use of Stoicheion in the Sense of 'Element' 377

had to be relatively recent. For *Metaphysics* Delta, and also the *De caelo*—where the term *stoicheion* is used in the context of physics without qualification or apology—are both usually considered to be early works, while the dialogues where Plato uses the term in the elemental sense are of his middle and late periods.³⁶ In fact, Aristotle already seems to be using *stoicheia* in the sense of ‘first principles of nature’ in the *Protrepticus*, which is traditionally reckoned to be one of his earliest works (B35).³⁷ If Plato did indeed introduce the elemental sense of the term *stoicheion*, then I think one ought to expect some indication of Aristotle’s awareness of this innovation. But there is no such indication. Aristotle thinks that the alphabetic and the elemental senses of *stoicheion* share a core meaning, but nowhere in the corpus does it seem even to have occurred to him that one was derived from the other. There are places where he might have indicated that this is the case, if indeed it were; but he consistently fails to do so.³⁸

There is the suggestion, made by Ross, that the problematic phrase ‘so-called elements’ (τὰ καλούμενα στοιχεῖα, τὰ λεγόμενα στοιχεῖα) is evidence of Aristotle’s acknowledgement that this use of the term *stoicheion* is not yet firmly established in the context of natural philosophy.³⁹ This suggestion is presumably made under the influence of the view that Plato had recently introduced the elemental sense of the term. If Ross were right about the phrase ‘so-called

³⁶ The chronology of Aristotle’s works is something of a minefield, but most commentators would agree that the *De caelo* is an early work; *Metaphysics* Delta is also often regarded as an early work: it is thought to be earlier than many of the other books of the *Metaphysics*, and perhaps even earlier than the physical writings; see Ross, *Metaphysics*, vol. i, p. xxv. For a succinct historical survey of the issue of the chronology of Plato’s dialogues, see L. Brandwood, ‘Stylometry and Chronology’ [‘Stylometry’], in R. Kraut (ed.), *The Cambridge Companion to Plato* (Cambridge, 1992), 90–120.

³⁷ Düring, *Protrepticus*, 210. Düring argues that Aristotle is using the popular language of the Academy. On the dating of the *Protrepticus*, see *ibid.* 287–8.

³⁸ For instance, in *Metaphysics* M 10 he sets up an analogy between the *stoicheia* of syllables and the *stoicheia* of substances, but the analogy works because the *stoicheia* of syllables and of substances share a core meaning, and not because the latter are derived metaphorically from the former (1086^b22–3). See also *Metaph.* Z 17, 1041^b13–31, esp. ^b16–17. Cf. 1013^b17 (same as *Phys.* 195^a16), and *GA* 722^a32.

³⁹ Ross, *Metaphysics*, i. 294. Note that Ross changes his mind on the interpretation of τὰ καλούμενα στοιχεῖα, in *Aristotle’s Physics: A Revised Text with Introduction and Commentary* (Oxford, 1936), 484; there he moves towards an interpretation of the phrase that is close to that in H. H. Joachim, *Aristotle: On Coming-to-Be and Passing-Away: A Revised Text with Introduction and Commentary* (Oxford, 1926); see e.g. Joachim, 137.

elements', then we ought to expect to find 'elements' prefaced by 'so-called' most particularly in the early works, such as the *De caelo* and the *Protrepticus*. But we do not find this at all. Aristotle appears to be confident that everyone will understand what 'element' means when used in the context of a discussion of nature or cosmology.⁴⁰

Now it is well to point out that many terms, scientific concepts in particular, are originally introduced into scientific discourse as metaphors; and over time the original, literal meaning tends to be forgotten and the terms may lose their metaphorical associations, and become 'dead metaphors'. So it need not be very remarkable that Aristotle would identify as an ordinary, non-metaphorical usage of a term a usage that was originally metaphorical. But for the elemental sense of *stoicheion* to be accepted as an ordinary usage so quickly is certainly remarkable. Could it be a simple linguistic fact that Plato's innovation has been very successful, to the extent that Aristotle regards the 'elemental' sense as one of the ordinary usages of the term *stoicheion*, and is uninterested in, perhaps unaware of, its metaphorical origins? Such rapid terminological establishment could be explained, for instance, as being due to a combination of Plato's great personal influence and, perhaps, a renewed interest in physics and cosmology after the *Timaeus*. But this suggestion must be rejected. For if we turn now to examine Plato's own use of *stoicheion* in the elemental sense, it seems that he is taking up a usage that is already established among his own contemporaries—a usage that is, as Aristotle would say, 'ordinary'.

2. *Stoicheia* in the *Timaeus*

The dialogues where Plato uses *stoicheion* in the elemental sense are the *Theaetetus*, the *Sophist*, and the *Timaeus*. The *Theaetetus* is probably the earliest of these,⁴¹ and the term *stoicheion* occurs for the first time at 201 E. It is introduced in a somewhat qualified way;

⁴⁰ Moreover, Ross's suggestion would not explain why later Greek philosophers continue, albeit infrequently, to use the expression τὰ καλούμενα στοιχεῖα; see e.g. S.E. *PH* 3. 62; Plot. *Enn.* 3. 1. 3. 2.

⁴¹ Presuming the *Theaetetus* to be earlier than the *Sophist*, *Politicus*, and *Timaeus*, which is to agree with the conventional ordering of the dialogues and with recent stylometric studies; see e.g. Brandwood, 'Stylometry'. But see G. E. L. Owen, 'The Place of the *Timaeus* in Plato's Dialogues', *Classical Quarterly*, NS 3 (1953), 79–95, for an argument that the *Timaeus* pre-dates the *Theaetetus*.

On the Use of Stoicheion in the Sense of 'Element' 379

Socrates seems rather diffident about using *stoicheion* in this sense. But this is the closest Plato comes to offering an introduction of the term in the sense of element or primary physical ingredient.⁴² For in the *Sophist*, which according to the most widely accepted chronologies would be the next dialogue to feature the elemental sense of *stoicheion*, the term is used just once, and without fanfare. The Eleatic Stranger refers to 'those who make all things come together at one time, and divide into parts at another . . . divided into a limited number of elements [στοιχεῖα] and out of these put together again' (252 B).⁴³ This ready use of *stoicheion* in the elemental sense would suggest that it is a familiar usage. One gets a similar impression from the *Timaeus* (48 B–C). But the apparent familiarity with the elemental sense of *stoicheion* in each of these dialogues does not discount in principle the possibility that Plato himself introduced this sense at *Theaet.* 201 E. Before we take a closer look at the *Theaetetus*, however, let us examine the evidence of the *Timaeus*. It seems better to start with the *Timaeus* because the relevant passage is less problematic than the *Theaetetus* passage, and indeed it may be of help in understanding the latter.

In the crucial passage, Plato, through his spokesman Timaeus, is referring to the popular, but unreflective, belief that fire, air, water, and earth are the principles and elements of everything. This belief is unreflective because no one knows, or has attempted to explain, the nature of these bodies. Plato claims that anyone who thinks seriously about the matter will see that fire, air, water, and earth cannot be regarded as the most basic constituents of things. He writes:

So one must see the nature of fire and water, air and earth before the generation of the heaven and the properties of this; for as the case stands, no one up to this time has revealed the generation of these, but as if people know what is fire and each of the others, we say they are principles, positing them as elements of the whole [στοιχεῖα τοῦ παντός]; though it is not even right for someone with even a little intelligence reasonably to compare them even to the class of syllables. (48 B–C)⁴⁴

⁴² Precisely what sort of things the *stoicheia* at *Theaet.* 201 E are meant to be is a matter of some dispute: they are often thought to be logical atoms or conceptual constituents, rather than physical ingredients. See e.g. G. Ryle, 'Logical Atomism in Plato's *Theaetetus*', *Phronesis*, 35 (1990), 21–46.

⁴³ In this passage Plato is probably referring to Empedocles; see Diels, *Elementum*, 20; Lagercrantz, *Elementum*, 17.

⁴⁴ τὴν δὲ πρὸ τῆς οὐρανοῦ γενέσεως πρὸς ὕδατος τε καὶ ἀέρος καὶ γῆς φύσιν θεατέον

The view that fire, air, water, and earth are the constituents of things appears to be something of a commonplace by Plato's time.⁴⁵ But the significant feature of the above passage is that it seems these four 'Empedoclean' elements are commonly or popularly called *stoicheia* by Plato's contemporaries. In other words, the elemental sense of the term *stoicheion* is already available. For what irks Plato here is precisely that people tend to call fire, air, water, and earth the *archai* and *stoicheia* of everything. This, for Plato, is a mistake. The meaning of *archai* is 'the original sources or principles of things'; and of *stoicheia*, 'the ultimate constituents of things'. Plato would agree that fire, air, water, and earth are constituents, but he wants to deny that they deserve to be called the ultimate constituents, the *archai* or *stoicheia*, of everything. Hence Plato is criticizing the contemporary usage of these terms. Clearly, if *stoicheion* is already regularly used in the elemental sense by Plato's contemporaries, then Plato himself cannot be responsible for introducing this sense of the term.⁴⁶

This might seem a natural reading of the passage. But perhaps the matter cannot be so easily settled. A problem for this reading is that one might think that *stoicheion* at *Tim.* 48 B–C is metaphorical, and clearly so. Fire, air, water, and earth are so far from being *stoicheia*, Plato says, that they are not even like *syllabai*, or syllables. The term *syllabē* has obvious grammatical, or what I have been calling alphabetic, connotations; the most common meaning of *syllabē* is 'a compound of *stoicheia*, in the alphabetic sense', i.e. 'a compound of phonemes (or letters)'. But Plato is not making the point that fire, air, water, and earth are not even compounds of phonemes; rather, at 48 B–C *syllabē* is being used as a metaphor for a (minimally) complex body. But if *syllabē* is being used metaphorically, then one might think that the use of *stoicheion* at *Tim.* 48 B–C is likewise metaphorical. In particular, it may be argued that the term *stoi-*

αὐτὴν καὶ τὰ πρὸ τούτου πάθη· νῦν γὰρ οὐδεὶς πω γένησιν αὐτῶν μεμήνηκεν, ἀλλ' ὡς εἰδόσιν πῦρ ὅτι ποτὲ ἔστω καὶ ἕκαστον αὐτῶν λέγομεν ἀρχὰς αὐτὰ τιθέμενοι στοιχεῖα τοῦ παντός, προσήκον αὐτοῖς οὐδ' ἂν ὡς ἐν συλλαβῆς εἶδεναι μόνον εἰκότως ὑπὸ τοῦ καὶ βραχὺ φρονούντος ἀπεικασθῆναι.

⁴⁵ Cf. *Tim.* 49 B–C. For further evidence in Plato's works that fire, air, water, and earth are popularly regarded as the material constituents of things, see *Phileb.* 29 A 10–11, *Crat.* 408 D, and cf. *Prot.* 320 D.

⁴⁶ Cf. Burkert, who does not think that *Tim.* 48 B–E is of relevance for the question of the usage of *stoicheion*; hence he believes that this passage does not affect the validity of Eudemus' report ('*Stoicheion*', 176).

On the Use of Stoicheion in the Sense of 'Element' 381

cheion ordinarily has the alphabetic sense, but it does not ordinarily have the elemental sense. Thus, Taylor, in his commentary on the *Timaeus*, glosses *στοιχεῖα τοῦ παντός* as 'literally the "ABC of everything"'.⁴⁷ It is but a short step to conclude that the elemental sense is a sense that has been introduced recently, perhaps by Plato himself, by a metaphorical derivation from the alphabetic sense.

Before examining this suggestion, it is important to clarify just what Plato is getting at by the comparison of fire, air, water, and earth with syllables. He believes that fire, air, water, and earth are not the ultimate constituents of things, and to make this point clearly and sharply, he denies that they are even as basic as *syllabai*. In other words, fire, air, water, and earth have constituents, and as such they cannot be regarded as genuine *stoicheia*; but even these immediate constituents are not the genuine *stoicheia*, because they can be analysed into further, even more basic, constituents. The constituents of a syllable, on the other hand, are the *stoicheia*, i.e. *stoicheia* in the alphabetic sense, because a syllable is the first thing that *stoicheia* constitute. The point is that fire, air, water, and earth are not comparable to syllables, because, unlike syllables, fire, air, water, and earth are complex phenomena that admit of more than one division before the genuine *stoicheia* are reached.

Plato explains why this is so a little later in the dialogue. At 53 D he says that it is clear to everyone that fire, air, water, and earth are bodies, and that all bodies are solids. Furthermore, all solids are bound by surfaces, and all surfaces are divisible into scalene and isosceles triangles. These triangles are held to be elementary (53 C–D); for from these all other triangles come to be, e.g. the equilateral triangles that make up the surfaces of fire, water, and air. There is a question as to whether the triangles are the ultimate principles: at 53 D Plato says that '*archai* more ultimate than this only the god knows and such a man who is loved by god'. But it is nevertheless clear why the common or popular notions of fire, air, water, and earth are not even comparable to syllables; they are not even the first compounds of the ultimate *stoicheia*. Fire, air, water, and earth are already at several removes from the basic triangles, and these latter may not even be the ultimate *archai* and *stoicheia* of things.

⁴⁷ Taylor, *Timaeus*, 306. Similarly H. D. P. Lee, in his popular translation of the *Timaeus* (Harmondsworth, 1965), renders *στοιχεῖα τοῦ παντός* 'the alphabet of the universe'. See also R. G. Bury, *Plato, Timaeus* (London and Cambridge, Mass., 1929), 110 n. 1.

Notably, however, Plato does proceed to treat the basic triangles as the *stoicheia* of things (54 D; 55 A, B; 56 B; 57 C; 61 A).

Now I do not wish to deny that Plato appeals to metaphor in his attempt to undermine the popular identification of fire, air, water, and earth as the *στοιχεῖα τοῦ παντός*. The reference to *syllabai* certainly involves an allusion to the alphabetic sense of *stoicheion*. Perhaps it should be noted that the reference to *syllabē* is not necessarily a reference to alphabetic syllables: just as *stoicheion* has a core meaning of ‘primary constituent’, so it is sometimes suggested that *syllabē* has a basic or primitive sense of ‘that which is held together’—that is, of several things held together; hence a composite or complex, as opposed to a simple, object.⁴⁸ But this use seems to be rare, and in any case the force of the critique at 48 B–C is lost if *syllabai* simply means an object composed of other things. For what would it mean to say that fire, air, water, and earth ought not to be compared even to the class of complex objects?⁴⁹ Clearly, then, the term *syllabē* is being used metaphorically, to name that first thing that is composed of the physical or natural *stoicheia*.

But I do not think that it follows that the use of *stoicheia* in the expression *στοιχεῖα τοῦ παντός* is also metaphorical. It makes better sense, both of the passage itself and of the subsequent use of the term, to think that *stoicheion* is already ordinarily used in the elemental sense, a sense that is independent of the alphabetic sense of the term; and hence that Plato in the *Timaeus* is deliberately trying to overturn the popular belief that fire, air, water, and earth are the *stoicheia* of everything.⁵⁰ And the way he sets about doing so is by playing on the ambiguity of the term *stoicheion*, in particular by alluding to one of the other ‘ordinary’ senses of the term, namely,

⁴⁸ See LSJ s.v.; also McDowell, *Theaetetus*, 239, and Burnyeat, *Theaetetus*, 340 n. 1.

⁴⁹ It would have to be specified that *syllabē* means ‘complex object that is composed of simples’, i.e. of *stoicheia*; the alphabetic sense does this job perfectly.

⁵⁰ Compare the brief cosmological aside in the *Philebus* (29 A–B), a dialogue which is generally regarded to be among Plato’s latest (in many aspects of style it is close to the *Laws*, which is almost certainly Plato’s final dialogue: see Brandwood, ‘Stylometry’, 114). Here Socrates refers to fire, air, water, and earth, but he does not refer to them as *stoicheia*. If indeed it were the case that Plato introduced the use of *stoicheia* as a way to refer to such things as fire, air, water, and earth, then it would certainly be a little surprising that he refrains from using his innovation in the *Philebus*. An admittedly speculative suggestion is that Plato deliberately refrains from using *stoicheia* to refer to fire, air, water, and earth in the *Philebus* precisely because he has, in the *Timaeus*, criticized the popular identification of fire, air, water, and earth as *stoicheia*.

On the Use of Stoicheion in the Sense of 'Element' 383

the alphabetic sense. To say that they are 'not even syllables' ought to be taken as an ironic jibe at the common view that fire, air, water, and earth are the *stoicheia* of all things. Plato here is drawing an analogy—albeit an analogy he wants to undermine—between fire, air, water, and earth as the constituents of bodies, and phonemes or letters as the constituents of *syllabai*, or syllables. For it to work, however, *stoicheia* must be a term that is commonly used to refer both to fire, air, water, and earth and to phonemes or letters. Hence, at 48 B–C *syllabai* must be understood in relation to *stoicheia*; but, on the other hand, *stoicheia* must be understood not only in relation to *syllabai*, but also according to its elemental sense.

In fact, while the passage and its context indicate that *stoicheion* is used commonly in the elemental sense, it is quite clear that the compounds of physical elements are not commonly called *syllabai*. For whereas Plato continues later in the dialogue to use the term *stoicheia* to refer to what he considers to be the genuine elements, namely, the basic triangles, he does not use the term *syllabai* after 48 B–C. This would be surprising if he were borrowing both terms from alphabetic discourse. If both *stoicheia* and *syllabai* are being used metaphorically, then why not refer to the first things that the genuine *stoicheia* constitute, e.g. the equilateral triangles or the surfaces, as *syllabai*? I would suggest that Plato does not do so because *stoicheion* is a term that has a recognized elemental sense, whereas *syllabē* is not; *syllabē*, as noted above, may have a primitive sense of 'that which is held together', i.e. a complex object; but to speak of 'physical or material *syllabai*' would evidently be quite unusual, in a way that 'physical or material *stoicheia*' is not. Hence the term that is being used metaphorically in *Tim.* 48 B–C is not *stoicheia*, but *syllabai*.

It is illuminating to compare at this point the brief report of the Platonic doctrine of generation that Aristotle offers in his *Protrep-ticus*. The doctrine of generation that Aristotle reports is similar to, but not quite the same as, that of the *Timaeus*. It is presumably drawn from Plato's 'unwritten doctrines'. According to Aristotle, the Platonists analyse the generation of substance in the following way: 'lines [come to be] from numbers, planes from lines, solids from planes, and what they call syllables from elements' (fr. 33. 9). In other words, at bottom there are numbers, from which everything else comes to be, because these come to be lines, and lines come to be planes, and planes come to be solids; then we have

stoicheia coming to be syllables. There are two points of significance in this passage to which I want to draw attention. Firstly, we have here further evidence that *stoicheia* in the elemental sense commonly refers to fire, air, water, and earth. For Aristotle readily identifies the 'solids' as the *stoicheia*, and the 'solids', as Plato argues in the *Timaeus* (53 D), are fire, air, water, and earth. Evidently, then, even in a very early work like the *Protrepticus*, Aristotle thinks it natural to call fire, air, water, and earth *stoicheia*. At the same time, however, he feels the need to qualify what presumably is a very singular and unusual use of the term *syllabai*. This, indeed, is the second point of significance. Aristotle uses the phrase 'what they call syllables' (*αἱ ὀνομαζόμεναι συλλαβαί*). What is it that Plato and the Platonists call 'syllables' in the context of the explanation of the generation of substance? According to the *Protrepticus*, what they call syllables come to be from the elements; that is, what they call syllables are composites of fire, air, water, and earth. By qualifying the term in this way, however, Aristotle is clearly indicating that *syllabai* is being used in an unusual sense; and to use a term in an unusual, or strange, sense is, of course, to apply the term metaphorically. The Platonists, in other words, use 'syllables' as a metaphor for 'complex bodies'; they adopt a term appropriate to one sphere of discourse, namely, grammar (or, more generally, language), and transfer it into another, namely, physics (and metaphysics). The obvious inference from this and the preceding point is that, whereas *stoicheion* does have an elemental sense, *syllabē* does not ordinarily have a sense corresponding to the elemental sense of *stoicheion*. To speak of *syllabai* as compounds of elemental *stoicheia*, then, is to speak metaphorically.

Our examination of the *Timaeus* offers little indication that Plato is the first to call the elements or principles of things *stoicheia*. On the contrary, the relevant passage suggests that the term is already in use, in this sense, among Plato's contemporaries. This is a conclusion that is supported by Aristotle's account of *stoicheion* in *Metaphysics* Delta, and also by his *Protrepticus*. But what is particularly interesting about the passage we considered from the *Protrepticus* is that it offers evidence that Plato introduced a different term into discussions of nature and the composition of natural things, namely, *syllabē* or 'syllable'. Moreover, this use of *syllabē* seems to be identified by Aristotle as a metaphorical derivation, presumably from the more familiar, alphabetic, sense of the term.

3. *Stoicheia* in the *Theaetetus*

Let us now consider the use of *stoicheion* in the *Theaetetus*. If, as is usually thought, the *Theaetetus* is earlier than the *Sophist* and the *Timaeus*, then the occurrence of *stoicheion* at 201 E is the first occurrence of the term in the elemental sense in the extant literature. But is it also the locus of the first ever use of *stoicheion* in this sense? The context is a discussion of knowledge, and the difference between knowledge and true belief. In order to clarify the distinction between what is knowable and unknowable, Socrates recounts a 'dream': 'for I seem to have heard from some people that the first *stoicheia*, as it were [οἰονπερεῖ], out of which we and other things are composed, have no account' (201 D–E).⁵¹ Now, at first glance one might think that this passage offers good evidence that Plato did not introduce the term *stoicheion* in the elemental sense, precisely because the term is used by Socrates with reference to someone else's theory. Unfortunately the matter is not quite so clear. For one thing, it is very difficult to identify the author, or authors, of this 'dream' theory.⁵² Some commentators have suggested that Socrates is referring to a Pythagorean theory, or the theory of atomism; others have inferred, from the remark that Socrates has dreamt the theory, that Plato is thinking of a theory held by a contemporary and promulgated after Socrates' death.⁵³ Still others, however, suggest that Plato is simply inventing the theory.⁵⁴ Certainly, if Plato is making it up, then he may well be using *stoicheion* in the elemental sense for the very first time. If, on the other hand, Socrates is referring to a theory held by a historical figure, it does not necessarily follow that the author of the 'dream' theory actually used the term *stoicheion*. Hence, whether we think that Socrates is reporting a theory, or the

⁵¹ ἐγὼ γὰρ αὐτὸν ἔδοκον ἀκούειν τινῶν ὅτι τὰ μὲν πρῶτα οἰονπερεῖ στοιχεῖα, ἐξ ὧν ἡμεῖς τε συγκείμεθα καὶ τὰλλα, λόγον οὐκ ἔχοι.

⁵² All references to the author of the 'dream' are in the singular, except the first, which is in the plural; cf. 202 E.

⁵³ Antisthenes is often suggested as the author of the theory. Cf. Cornford, *PTK*, 143–4; W. K. C. Guthrie, *A History of Greek Philosophy*, v. *The Later Plato and the Academy* (Cambridge, 1978), 114–15; Bostock, *Theaetetus*, 202; Burnyeat, *Theaetetus*, 164–5. For Lewis Campbell, *The Theaetetus of Plato: A Revised Text with English Notes [Theaetetus]* (Oxford, 1883), and Taylor, *Timaeus*, 306–7, Socrates is dreaming of Pythagoreans.

⁵⁴ See McDowell, *Theaetetus*, 234, 237. Cf. Diels, *Elementum*, 19; Burkert, 'Stoicheion', 174.

theory is a literary fiction, it remains a distinct possibility that this is the place where Plato introduces the elemental sense of *stoicheion*.

If it were the case that Plato is here using the term for the first time in its elemental sense, then one question that we might reasonably ask is: why use this term? Plato would no doubt be aware of his contemporaries' use of *stoicheion* in the primitive sense of 'principle', e.g. the *stoicheia* of rhetoric or of good government (see Section 1). But the usual view is that he is drawing on the alphabetic sense of *stoicheion*; and, indeed, there does seem to be some support for this view. At 202 E Socrates suggests to Theaetetus that, in order better to understand the 'dream' theory, they ought to take as 'hostages' the models (*τὰ παραδείγματα*) used by the author of the theory. He immediately identifies the 'models' as 'the *stoicheia* and *syllabai* of grammar' (or of writing: *τὰ τῶν γραμμάτων στοιχεῖά τε καὶ συλλαβάς*). This certainly appears to be very strong evidence that the use of *stoicheion* in the sense of 'element' is metaphorically derived from the alphabetic sense of the term. But before trying to evaluate this evidence, let us return to 201 E.

The interpretation of *Theaet.* 201 E depends to a large extent on how we understand the phrase *τὰ οἶονπερεὶ στοιχεῖα*. The rather mysterious expression *οἶονπερεὶ* may indicate that Socrates is introducing, quite self-consciously, the term *stoicheion*, and in particular that he wants clearly to mark that he is introducing it metaphorically. In effect, he may be saying something like this: 'the first "letters", if you will, from which we and other things are composed'.⁵⁵ Obviously this would be the favoured reading if we think that Plato is responsible for introducing the elemental sense of *stoicheion*. Now this reading need not imply that the 'dream' theory is his own invention. The 'dream' theory may be an actual historical theory that Socrates is reporting, but one that does not employ the term *stoicheion*; in order to explain the theory Socrates supplies the term himself. So, by using the expression *οἶονπερεὶ*, Socrates would be flagging his transfer of *stoicheion* from its familiar use in the alphabetic sense to an unusual, or 'strange', use to describe the ultimate constituents of things.⁵⁶

If Socrates is reporting an actual historical theory, however, and

⁵⁵ Bostock renders *οἶονπερεὶ* 'if I may so call them' (*Theaetetus*, 204).

⁵⁶ For Diels, *Elementum*, 19, and Burkert, 'Stoicheion', 175, the alphabetic sense prepares and legitimates the new and strange transfer of the term *stoicheion* to the elemental sense.

On the Use of Stoicheion in the Sense of 'Element' 387

in particular, if he is repeating the term *stoicheion* as it is used by the progenitors of the dream theory, then the use of *οἶονπερεῖ* may indicate that he is unhappy with the way the term is being used. He may be unhappy, for instance, because he believes that the 'dream' theorists identify the wrong sort of things as *stoicheia*. This suggestion would tie in very nicely with Plato's criticism in the *Timaeus* of the use of *archai* and *stoicheia* with reference to fire, air, water, and earth. But, unfortunately, this seems unlikely: the things identified in the *Theaetetus* as *stoicheia*, however we may interpret them, seem comfortably to match the requirements for elemental status, unlike the Timaeian conception of fire, air, water, and earth.

There is perhaps another possibility, however, one which does not require that we make a decision upon the provenance of the 'dream' theory. Why Socrates uses the expression *οἶονπερεῖ* may ultimately resist complete clarification, but nevertheless I think it can be established that the expression does not have to imply either reticence over the use of the term *stoicheion* or a warning that one is about to trade in metaphors. Plato, remarkably, never uses this expression anywhere else, but he does use the similar expression *ὡσπερεῖ*, and interestingly, he uses this latter expression in the *Cratylus* with reference to *stoicheia*. So let us turn now to the *Cratylus*, to see if it throws any light upon *Theaet.* 201 E.

For much of the *Cratylus* Socrates is conducting an etymological enquiry into names, or words (*ὀνόματα*).⁵⁷ He has been analysing names into smaller component names, and he now begins to wonder at what point one should call a halt to such a procedure. For instance, once one has analysed a name into its components, someone might ask for the names from which the component names are formed, and so on indefinitely. The question is: when would the answerer be justified in stopping? Socrates asks his interlocutor Hermogenes:

Wouldn't it be when he reaches the names that are, as it were, the elements [*ἂ ὡσπερεὶ στοιχεῖα*] of all the other statements and names? For if these are indeed elements [*στοιχεῖα*], it cannot be right to suppose that they are composed out of other names . . . if we ever get hold of a name that isn't composed out of other names, we'll be right to say that at last we've reached

⁵⁷ The Greek *ὄνομα* has no exact English translation: in the *Cratylus*, *ὀνόματα* include proper names, nouns, adjectives, and, at 427 C, adverbs.

an element, which cannot any longer be carried back to other names (422 A–B, trans. Reeve)⁵⁸

In what sense is Socrates using *stoicheion* here? Both before and after this passage, Socrates frequently uses *stoicheion* in the familiar alphabetic sense, e.g. at 393 D–E, and then again at 424 C–E, 426 D, 431 E, and 433 A. In these passages *stoicheion* straightforwardly means ‘letter of the alphabet’ or ‘phoneme’. But at 422 A–B it is not used in the alphabetic sense. A *stoicheion* now means a certain sort of name or a word, in particular one of the primary names into which other names may be analysed, and which do not admit of analysis into names that are more primary.

But if *stoicheion* at 422 A–B is not used in the alphabetic sense, can we at least say that it is derived metaphorically from the alphabetic sense? I think to say so would be an error. A metaphorical use is, strictly speaking, the transfer of a term, belonging to one sphere of discourse, to another sphere, where it is used ‘strangely’. But if ‘letter’ is the controlling sense of *stoicheion*, then to refer to certain kinds of words as *stoicheia* is not metaphorical. For it would be to use a term that belongs to a certain sphere of discourse, in this case grammar, in a different sense within that very same sphere of discourse. And while this would, perhaps, be a ‘strange’ use, it would be so only because it is confusing. It seems rather that at 422 A Socrates is using the term *stoicheia* neither in the alphabetic sense, as he has earlier in the dialogue, nor in a sense derived from the alphabetic sense; but rather that he is now drawing on a more basic, and yet also familiar, sense of *stoicheion*. This, I would suggest, is the general sense of ‘primary constituent’. And this is a familiar sense: as Aristotle says in *De caelo* 3. 3, what everyone in every case would understand by *stoicheion* is ‘something into which compound things can be analysed’ (305^b17–18).⁵⁹ In the *Cratylus* compound names are analysed into their primary names, and so to call these latter the *stoicheia* of the former would be a typical, or ‘ordinary’, use of the term. Occasional uses of *stoicheia*, qualified by *ὠσπερεί*,

⁵⁸ C. D. C. Reeve, *Plato's Cratylus: Translated, with an Introduction and Notes* (Indianapolis and Cambridge, 1998).

⁵⁹ Cf. Aquinas: ‘every one intends to mean by “element” something such as has been described, no matter what the field, for example, in corporal speech, and in demonstrations, in which the principles are called “elements” that are not resolved into other principles’ (‘Aquinas’ Exposition of Aristotle’s Treatise on the Heavens’, trans. by Father Pierre Conway and F. R. Larcher (unpublished but circulated in photocopied form; New York, 1963–4), bk. 3, Lec 8, Sct 600, p. 3–27).

On the Use of Stoicheion in the Sense of 'Element' 389

can be found in later Greek authors, and again on these occasions there is no need to think that the term must be understood as being metaphorically derived from the alphabetic, nor for that matter any other, sense of *stoicheion*. Plutarch, for instance, says that hope of reward and fear of punishment are 'the elements, as it were' (*ὡσπερὲ στοιχεῖα*) of virtue (*De liberis educandis* 12 c 12). He means, surely, that these things are the primary constituents of virtue—there is certainly no need to interpret what he means according to the analogy of letters of the alphabet (cf. Iambl. *Comm. math.* 22. 13; *Myst.* 1. 4. 21).

Does this mean that Plato in the *Cratylus* is drawing on the core meaning of *stoicheion* as identified by Aristotle in *Metaphysics* Delta? Yes and no. Consider again that the core meaning of *stoicheion*, stated fully, is 'primary constituent, into which other things may be analysed, and which is not itself analysable into things different in form'. Plato calls the primary names *stoicheia* at 422 A–B because the primary names do not admit of analysis into names that are more primary. But even if analysis cannot retrieve further, more basic, *names*, it remains possible to analyse the primary names into other things that are different in form. Indeed, Plato proceeds in the *Cratylus* to do just that; he analyses the names into the primary sounds, the syllables and their *stoicheia*, i.e. *stoicheia* in the alphabetic sense (424 B–E). So there appears to be a lack of fit between such *stoicheia* and the core meaning of the term. But arguably it would be out of place, in an enquiry into the primary names, to proceed all the way down to letters or phonemes. In order to analyse the correctness of these primary names, a different sort of investigation is called for; and this investigation does indeed involve examining the *stoicheia* of the primary names. By identifying the primary names as *stoicheia*, on the grounds that further analysis will not produce further names, Socrates is perhaps operating with a general notion of *stoicheion* that lacks the stricter sense that Aristotle later gives it, namely, that it should be indivisible into things different in form. This notion is general enough to be applied to a wide variety of things, just in case these things are simple and constitute some complex item.⁶⁰ But in any case it is nevertheless clear that the term is being used with, and depends upon, reference to the core meaning of *stoicheion*; the way it is used in the *Cratylus* may lack precision, but this does not render it metaphorical.

⁶⁰ Cf. n. 13.

Now how does the *Cratylus* aid our understanding of *Theaetetus* 201 E? What I would suggest is that the expression *οἶονπερὶ στοιχεῖα* in the *Theaetetus* ought to be understood along the lines of *ὡσπερὶ στοιχεῖα*; in other words, it is an indication that Socrates is drawing on the core sense of *stoicheion*. Hence the use of *stoicheia* in the ‘dream’ theory ought to be readily understandable without presuming an appeal to metaphor. This suggestion, however, faces an immediate problem, namely, Socrates’ claim at 202 E that the elemental sense of *stoicheion* is based on an alphabetic model. But let us consider Theaetetus’ reaction to Socrates’ claim. Theaetetus agrees, apparently after some hesitation, that the author of the dream theory had the alphabetic sense of *stoicheion* in mind as the model of the *stoicheia* of the theory. Now it may well be significant that Theaetetus seems to hesitate before agreeing with Socrates on the derivation of *stoicheion*. Prior to 202 E, Socrates says that the things composed of *stoicheia* are complexes (*συγκείμενα*), and a few lines later he refers to these complexes as *syllabai* or ‘syllables’ (202 B). As we have seen, Aristotle in the *Protrepticus* claims that the Platonists commonly call compounds of elements *syllabai*. This use of *syllabē*, I argued in Section 2, is a metaphorical derivation from the use of the term in alphabetic or generally linguistic contexts. But at 202 E it seems that Socrates has to clarify to Theaetetus his intention to consider the terms *stoicheia* and *syllabai* in their alphabetic senses. Perhaps this is simply because Socrates initially expresses his intention rather obscurely. But, on the other hand, it may imply that before 202 E they had been using these terms in some other sense, or at least that Theaetetus had understood *stoicheion* and *syllabē* in some sense other than their alphabetic senses. If this were the case, then it would follow that the ‘dream’ theory as presented at 201 E to 202 C is readily understandable if *stoicheion* and *syllabē* are taken simply to have the rather general senses of ‘constituent’ and ‘that which is constituted’; in other words, senses that are independent of the alphabetic sense.

This may seem rather a lot to hang on an apparent hesitation. But in any case Theaetetus’ agreement regarding the derivation of *stoicheion* is certainly not enough to establish that the elemental sense is derived from the alphabetic sense. This is, after all, a Platonic dialogue, not a treatise; as in the *Timaeus*, Socrates may simply be playing on the fact that *stoicheia* has this ambiguity, that it has the meaning both of constituents, generally speaking, and of

On the Use of Stoicheion in the Sense of 'Element' 391

phonemes or letters. By 204 A Socrates seems consciously to depart from his alphabetic model, as he emphasizes that what he has said about *stoicheia* and *syllabai* holds both for γράμματα and for 'all other things'. The argument from this point on would appear to concern the relationship of parts to wholes considered generally, i.e. without special reference to the peculiar characteristics of alphabetic *stoicheia*.⁶¹ But why focus on an alphabetic model in the first place? A reason why he does so may be available at 206 B. Here Socrates states that it is by examining those *stoicheia*, and *syllabai*, of which we have experience that we can draw conclusions about the general class of *stoicheia*. In other words, Socrates fastens onto the familiar alphabetic sense of *stoicheion* in order more effectively to highlight certain, and to Socrates' mind unsatisfactory, features of the *stoicheia* of the 'dream' theory (202 E–204 A). The latter evidently involves the use of *stoicheion* with reference to things with which we are less familiar. But that does not mean that the use of *stoicheia* in this sense is an unfamiliar use.

At least two points emerge from this discussion of the *Theaetetus*. Firstly, it seems unlikely that, without the evidence of Eudemus' report, anyone would have identified this passage at *Theaet.* 201 E as the first use of *stoicheion* in the elemental sense. On the other hand, it must be conceded that it is very difficult to establish conclusively from the evidence of the *Theaetetus* itself that *stoicheion* is already commonly used in the sense of 'element'. This is because at *Theaet.* 201 E and onwards it is very difficult to say with certainty when, or even whether, Socrates is using *stoicheion* in the elemental sense.⁶² It seems best to think that the sense that Socrates has in mind throughout is that of the core meaning of the term.⁶³ There is a core, or general, meaning of the term *stoicheion*, which is the basic sense of 'primary constituent', and there are certain uses of this term that are 'ordinary' or familiar, and one of these is the alphabetic sense. Nevertheless, on the basis of Aristotle's evidence, and also that of the *Timaeus* and the *Sophist*, it seems clear that the elemental sense of *stoicheion* is also an 'ordinary' sense, and moreover it is a sense that is already available for use by Plato. In the

⁶¹ Cf. D. Gallop, 'Plato and the Alphabet', *Philosophical Review*, 72/3 (1963), 364–76 at 373.

⁶² Diels, *Elementum* 19, and Lagercrantz, *Elementum*, 17, suggest that at 201 E and thenceforward *stoicheion* has a double sense, of both 'letter' and 'basic material'.

⁶³ Cf. Campbell's sober assessment of 201 E and the subsequent passages, *Theaetetus*, 213 n. 1.

Theaetetus and *Timaeus* Plato turns to the alphabetic sense of *stoicheion* in order to clarify certain points about the sort of things that his contemporaries identify as the *stoicheia* of nature and natural things. It may be that the elemental sense is not as familiar as the alphabetic sense and perhaps not even as familiar as the geometric sense; but it is an 'ordinary', as opposed to a metaphorical, sense none the less.

It is not, however, that any use of *stoicheion* other than the alphabetic, geometric, or elemental senses must be deemed metaphorical. If what is called a *stoicheion* is the primary constituent of something, then that use of *stoicheion* is not metaphorical. So, for instance, the use of *stoicheia* at *Crat.* 422 A is not metaphorical. This point, I think, also answers a question raised earlier, regarding the use of *stoicheion* by Plato's contemporaries Isocrates and Xenophon in the sense of 'elementary rules' or parts of a particular discourse. Such uses are not metaphorical, because they are based upon the core meaning of the term *stoicheion*. Admittedly, one might not think of a set of rules or the fundamental branches of a discipline as 'constituents' of that discipline, in the way, for instance, that phonemes constitute syllables. But what these uses do suggest is the organization of *stoicheia* into an order, or a comprehensible whole. The core sense of *stoicheion*, then, is that of a basic part of a whole.⁶⁴

University College, Oxford

BIBLIOGRAPHY

- Ackrill, J. L., *Aristotle's Categories and De Interpretatione: Translation with Notes* (Oxford, 1963).
- Aquinas, St Thomas, *Commentary on the Metaphysics of Aristotle*, trans. by J. P. Rowan (Chicago, 1964).
- 'Aquinas' Exposition of Aristotle's Treatise on the Heavens', trans. by Father Pierre Conway and F. R. Larcher (unpublished but circulated in photocopied form; New York, 1963–4).
- Bostock, D., *Plato's Theaetetus [Theaetetus]* (Oxford, 1988).
- Brandwood, L., 'Stylometry and Chronology' ['Stylometry'], in R. Kraut (ed.), *The Cambridge Companion to Plato* (Cambridge, 1992), 90–120.
- Burkert, W., 'Stoicheion', *Philologus*, 103 (1959), 167–97.

⁶⁴ Indeed, it is sometimes thought that *stoicheion* literally means a member of a series or 'one of a row', from *στοίχος*, a row; see Diels, *Elementum*, 58; cf. McDowell, *Theaetetus*, 239.

On the Use of Stoicheion in the Sense of 'Element' 393

- Burnet, J., *Early Greek Philosophy* [EGP], 4th edn. (London, 1930).
- Burnyeat, M., *The Theaetetus of Plato* [*Theaetetus*] (Indianapolis, 1990).
- Bury, R. G., *Plato*, vii. *Timaeus* (London and Cambridge, Mass., 1929).
- Campbell, L., *The Theaetetus of Plato: A Revised Text with English Notes* [*Theaetetus*] (Oxford, 1883).
- Charlton, W., *Aristotle's Physics Books I and II, Translated with an Introduction and Notes* (Oxford, 1970).
- Cornford, F., *Plato's Theory of Knowledge* [PTK] (London, 1935).
- Crubellier, M., 'Metaphysics Λ 4', in M. Frede and D. Charles (eds.), *Aristotle's Metaphysics Lambda* (Oxford, 2000), 137–60.
- Diels, H., *Elementum* (Leipzig, 1899).
- Düring, I., *Aristotle's Protrepticus: An Attempt at Reconstruction* [*Protrepticus*] (*Studia Graeca et Latina Gothoborgensia*, 12; Göteborg, 1961).
- Furley, D., *The Greek Cosmologists*, i. *The Formation of the Atomic Theory and its Earliest Critics* (Cambridge, 1987).
- Gallop, D., 'Plato and the Alphabet', *Philosophical Review*, 72/3 (1963), 364–76.
- Guthrie, W. K. C., *A History of Greek Philosophy*, v. *The Later Plato and the Academy* (Cambridge, 1978).
- Heath, T. L., *Mathematics in Aristotle* (Oxford, 1949).
- Joachim, H. H., *Aristotle: On Coming-to-Be and Passing-Away. A Revised Text with Introduction and Commentary* (Oxford, 1926).
- Kahn, C. H., *Anaximander and the Origins of Greek Cosmology* [*Anaximander*] (New York, 1960).
- Kirwan, C., *Aristotle: Metaphysics Books Γ , Δ , and E. Translated with an Introduction and Notes*, 2nd edn. (Oxford, 1993).
- Koller, H., 'Stoicheion', *Glotta*, 34 (1955), 161–74.
- Lagercrantz, O., *Elementum* (Uppsala, 1911).
- Lee, H. D. P. (trans.), *Plato: Timaeus* (Harmondsworth, 1965).
- Lohmann, J., *Musiké und Logos: Aufsätze zur griechischen Philosophie und Musiktheorie* (Stuttgart, 1970).
- Lumpe, A., 'Der Begriff "Element" im Altertum', *Archiv für Begriffsgeschichte*, 7 (1962), 285–93.
- McDowell, J., *Plato's Theaetetus* [*Theaetetus*] (Oxford, 1973).
- Owen, G. E. L., 'The Place of the *Timaeus* in Plato's Dialogues', *Classical Quarterly*, NS 3 (1953), 79–95.
- Reeve, C. D. C., *Plato's Cratylus: Translated, with an Introduction and Notes* (Indianapolis and Cambridge, 1998).
- Ross, W. D., *Aristotle's Metaphysics: A Revised Text with Introduction and Commentary* [*Metaphysics*] (2 vols.; Oxford, 1924).
- *Aristotle's Physics: A Revised Text with Introduction and Commentary* (Oxford, 1936).

- Ryle, G., 'Letters and Syllables in Plato', *Philosophical Review*, 69 (1960), 431–51.
- 'Logical Atomism in Plato's *Theaetetus*', *Phronesis*, 35 (1990), 21–46.
- Schwabe, W., '“Mischung” und “Element” im Griechischen bis Platon', *Archiv für Begriffsgeschichte*, suppl. 3 (1980).
- Sedley, D., *The Midwife of Platonism: Text and Subtext in Plato's Theaetetus* (Oxford, 2004).
- Shields, C., *Order in Multiplicity: Homonymy in the Philosophy of Aristotle* [*Homonymy*] (Oxford, 1999).
- Skemp, J. B., *Plato's Statesman: A Translation of the Politicus of Plato with Introductory Essays and Footnotes* (London, 1952).
- Taylor, A. E., *A Commentary on Plato's Timaeus* [*Timaeus*] (Oxford, 1928).
- Vlastos, G., *Plato's Universe* (Oxford, 1975).
- Vollgraff, W., 'Elementum', *Mnemosyne*², 4 (1949), 89–115.
- Wehrli, F., *Eudemos von Rhodos*, 2nd edn. (Die Schule des Aristoteles, 8; Basel, 1969).