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The *Anonymus arithmologicus* and its Philosophical Background

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1 Early studies in the Anonymus

An anonymous Neopythagorean treatise devoted to the marvellous properties of the first ten numbers (henceforth *Anonymus*) undoubtedly belongs to the most influential but understudied pseudo-Pythagorean works. Not only was it the originator of the genre of arithmological writings which were compiled till the end of Antiquity, it also has left numerous traces in philosophical, theological and encyclopaedic literature in Greek and Latin. Having been a subject of intensive research, since the early 1930s the remains of the *Anonymus* have not attracted special attention, and so a concise overview of earlier studies seems timely.

As is often the case, initially the issue was only dealt with tangentially. When Alfred Schmekel discussed in his influential book on Middle Stoicism a trend of Neopythagoreanism that combined Platonism with Stoicism, he leaned towards seeing its origin in what he considered Posidonius' commentary on Plato's *Timaeus* as used by Sextus Empiricus¹. To reconstruct the relevant part of the commentary he compared four texts on the wonderful properties of numbers, namely, Varro (in Censorinus and Aulus Gellius), Macrobius, Theon of Smyrna and Philo of Alexandria. Printed in parallel columns, they clearly showed traces of common origin, and because two of them, Macrobius and Theon, mentioned Plato's *Timaeus*, Schmekel identified this source with Posidonius' commentary on this dialogue to which Sextus Empiricus allegedly referred².

* I would like to thank Constantinos Macris, Joel Kalvesmaki and Federico Petrucci for their helpful suggestions on an earlier version of this article and Tobin Auber for improving my English.

1 A. Schmekel (1892: 403ff.). Schmekel relied on Sext. Emp. *Adv. phys.* 2.281f., *Adv. math.* 4.2 – 9 and especially *Adv. math.* 7.92f.

2 Φησὶν ὁ Ποσειδώνιος τὸν Πλάτωνος Τίμαιον ἐξηγοῦμενος (*Adv. math.* 7.93 = F 85 Edelstein & Kidd); cf. Theon. 103.16 – 104.1 Heller = F 291 Edelstein & Kidd. A. Schmekel (1892: 424f.).

Schmekel has not yet used the word ‘arithmology’ that first appeared in its normative meaning in Armand Delatte’s 1915 book on the Pythagorean literature³. According to Delatte, arithmology was created by the ancient Pythagoreans, whereas the direct source of the later arithmological lore was “un grand Recueil d’époque alexandrine, qui fut utilisé par une foule d’auteurs de la décadence”, among them Philo, Aetius, Sextus Empiricus, Theon, Hippolytus, and Macrobius. Having dated this “Recueil” in the third-second centuries BC⁴, Delatte refrained from analysing it, being more interested in the preserved arithmological texts, some of which he was the first to publish, while others he studied in detail.

The next and decisive step was taken by Frank Robbins⁵, who employed the same method of parallel columns as Schmekel, albeit in a more general and efficient way. To begin with, he collected and systematically analysed a wide range of relevant sources, namely, Varro, Philo, Moderatus, Nicomachus, Theon, Sextus Empiricus, Anatolius, Ps.-Iamblichus’ *Theology of Arithmetic*, Calcidius, Macrobius, Hierocles of Alexandria, Martianus Capella, Favonius Eulogius, and John Lydus. He then persuasively demonstrated that Posidonius was not the original source of arithmology. According to Robbins, the Stoic only quoted this source which is to be identified with Delatte’s Hellenistic arithmological collection and dated shortly before Posidonius, in the last part of the second century BC⁶. This Pythagorean arithmology consisted of an introduction and ten chapters dealing with the numbers of the decad; this structure is fully preserved in Anatolius’ short work *On Decad* and Ps.-Iamblichus’ *Theology of Arithmetic* and is presupposed in most other arithmological works⁷. The original Pythagorean treatise, though widely read and quoted in all later arithmologies, has been lost; neither its title, nor the name of its author are known. At the end of his second paper on the topic, Robbins published a diagram demonstrating the dependence of the arithmological writings studied by him on the *Urquelle* S. He divided all such sources into two families, the Philonian and the Theonian, the privileged witnesses of the first being Philo and Lydus (the latter very close to but not directly dependent on Philo), as they preserved the richest textual material from the original treatise, as well as Anatolius and Martianus Capella. The second, Theonian

3 A. Delatte (1915: 139). He mentioned Schmekel only once, in a footnote, denying the identification of Posidonius with the source of Pythagorean arithmology.

4 A. Delatte (1915: 139, 140 and n. 1, 232f., 253 and n. 2).

5 F.E. Robbins (1920) and (1921). See also *Id.* (1931).

6 F.E. Robbins (1921: 97f.).

7 F.E. Robbins (1920: 320).

family, included Varro, Theon, Nicomachus and Ps.-Iamblichus and was regarded by Robbins as being dependent on Posidonius as an intermediary source.

Simultaneously with Robbins, Karl Reinhardt published his famous book on Posidonius, where he scorned Schmekel's idea that the Stoic wrote a special commentary on the *Timaeus* and suggested another solution: the Pythagorean part of Sextus Empiricus' exposé of theories of criterion (*Adv. math.* 7.92 – 108) comes from Posidonius' work *On the Criterion* and presents not so much Pythagorean as his own views⁸. The two theories concerning the origin of Sextus' accounts of Pythagorean number philosophy were debated during most of the previous century⁹; both still have followers, though Schmekel's theory is now more widely rejected as being outdated than Reinhardt's¹⁰.

The last significant contribution to the study of the common ancestor of arithmology as a genre was made by Karl Staehle in his doctoral dissertation which aimed to give the most precise picture of Philo's lost treatise *Περὶ ἀριθμῶν*¹¹. Because Philo makes several references to *Περὶ ἀριθμῶν* as his most detailed exposition of arithmological subjects (e.g., *De opif. mundi*, 52; *De vit. Mos.*, 2.115), Staehle related to this treatise all of the arithmological passages to be found in Philo's oeuvre, in the first hand in *De opificio mundi*, and published them. In the chapters devoted to the first ten numbers, Staehle organized material into individual topics, such as the concept that the Monad is the beginning of number (5a), equal in its nature to God and *nous* (4a-c, h), which generates all the other numbers but is not generated in itself (5e), and that the Dyad 'flows' from the Monad (8) and is the first even number (9), and so on. Each numbered topic was accompanied by an extensive collection of parallels from the authors considered by Delatte and Robbins, among them the Aristotelian commentators Alexander, Asclepius, and Syrianus. In his introduction, Staehle pointed to the Early Academy – and not the Pythagorean school, as was usual before and after him – as the real birth place of arithmology and to Plato, Speusippus, and Xenocrates as its creators¹². The arithmological

8 K. Reinhardt (1921: 414ff., 416 n. 4, 419f.).

9 See below, n. 58. The last serious but unsuccessful attempts to revive Schmekel's thesis were made by W. Burkert (1972: 54ff.) and J. Mansfeld (1971: chap. 6). Cf. below, n. 30, 33.

10 Though D. Sedley (1992: 30ff.) follows Reinhardt's thesis, he does not even mention arithmology.

11 K. Staehle (1931).

12 K. Staehle (1931: 4–7).

compilation on which Philo relied belonged to the Platonic tradition and was written at the turn of the second and first centuries BC, a period when interest in Pythagoreanism arose again and many Neopythagorean apocrypha appeared¹³. Relying heavily on Robbins, Staehle disagreed with him on several important issues. Thus, he believed that Robbins overestimated Posidonius' role in transmission of the arithmological tradition – though the Stoic used the original arithmological source in his lost *On the Criterion*, Posidonius' presence in Sextus Empiricus is limited only to *Adv. math.* 7.92 – 93¹⁴. Staehle also disputed Robbins' division of the sources into two families, as well as his idea that the *Anonymus* circulated in different versions and abridgements¹⁵.

Some of Staehle's particular conclusions, such as Lydus' reliance on Philo, were rightly challenged¹⁶, yet on the whole his study of Philo's arithmology and its source was accepted and endorsed by subsequent scholarship¹⁷. But as Philonian scholars focused on the usage of arithmology as Philo's exegetical tool, the study of its principal source has not been further advanced. The *Anonymus* ceased to attract scholars' attention and no special studies of this text appeared. In Holger Thesleff's collection of the pseudo-Pythagorean writings, 'arithmology', though present in the subject index¹⁸, refers to the arithmological passages or fragments from the other works ascribed to Pythagoras and the Pythagoreans; the *Anonymus* itself is not even mentioned. David Runia in his commentary on Philo's *De opificio mundi* offered the most judicious and helpful analysis of arithmological parallels to Philo, starting from late Hellenism. He, however, questioned Staehle's method of reconstruction of Περὶ ἀριθμῶν as being "totally flawed" (though Staehle did *not* attempt to reconstruct this work) and hypothesized that Philo brought over his material from several already existing arithmological collections¹⁹. In his recent book on

13 K. Staehle (1931: 15–16).

14 K. Staehle (1931: 13–15). Stoic influence on this source predates Posidonius.

15 K. Staehle (1931: 17–18). *Cf.*, however: J. Mansfeld (1971: 172ff.).

16 P. Boyancé (1963: 91f.); W. Burkert (1972: 249 n. 51); C.A. Huffman (1993: 334–339); see already 44 B 20 DK. – D.T. Runia (2001: 298f., 303) returns to Staehle's position concerning Lydus, without sufficient ground, in my view.

17 P. Boyancé (1963: 83f.); A.Y. Collins (1984: 1256f.); H.R. Moehring (1995); R.A. Kraft (2009: 217–236, "Philo's treatment of the number seven in *On Creation*"); R.M. Berchman (2013); B. Wyss (2013).

18 H. Thesleff (1965), Index IX, 1: Mathematics in general, arithmology.

19 He criticized Robbins (and thus Staehle) for "excessive use of the method of the *Einquellenhypothese*": D.T. Runia (2001: 27–28, *cf.* 264). "Arithmological handbooks" (191). On this, see below, 346.

number symbolism in Platonism and early Christianity, Joel Kalvesmaki examines several important Neopythagorean texts of the first century BC, yet passes over the *Anonymus* in silence, in fact returning to Schmekel's view: "The tradition of handbooks of number symbolism began possibly with Posidonius"²⁰. This is an obvious step backward, because by the end of the previous century at the latest it became clear that no evidence of Posidonius' commentary on the *Timaeus* exists and that the fact that Sextus Empiricus' citation of Posidonius is adjacent to Neopythagorean number doctrines cannot prove the Stoic's role as the transmitter, let alone the originator of arithmology²¹.

2 *The remains of the Anonymus*

The revival of interest in the Pythagorean pseudepigrapha provides an opportunity to go beyond Thesleff's collection and highlight the crucial role of the *Anonymus* in the formation of the arithmological genre. But first we have to delineate the limits of our knowledge. The popularity of the treatise allowed it to produce copious offspring, yet none of those who directly or indirectly made use of this nameless and untitled work felt obliged to explicitly refer to it or to quote from it literally. Consequently, whereas most of the *Anonymus*' topics are reconstructable, there is very little that can be legitimately presented as a fragment of this work. The longest paraphrases – surely, with additional material due to Philo's verbosity – are preserved in his lost work *On Numbers*, many fragments of which are contained in his other writings. The seven occupies the most space, the four is covered more briefly, the six still more briefly, while eight and nine are just touched upon. In cases when there are textual parallels between Philo and Lydus we can come closer to the original text, but since Lydus' catalogue-like treatment, on the one hand, is much denser than Philo's, and on the other, it covers many topics which Philo omits, the possibilities to reconstruct the text, and not just some thoughts echoed in Lydus, are very limited. Varro's fragments deal with several selected numbers, mostly with seven. Anatolius presents a complete but very short arithmology, his longest chapter, on the number seven, taking

20 J. Kalvesmaki (2013: 9 n. 4). This view is wrongly ascribed to Robbins.

21 *Adv. Math.* 7.93 = F 85 E-K. See e.g. L. Edelstein & I.G. Kidd (ed.) (1989² [1972¹]: 337ff.); A.A. Long (2013: 145): "I. G. Kidd (in his commentary on Posidonius) has convincingly shown that there is no reason to extend Posidonius' presence in Sextus' text beyond that single statement". Cf. above, n. 9 and below, n. 58.

up only three pages as compared to forty paragraphs in Philo's *De opificio mundi*. Extracts from Nicomachus' lost *Theology of Arithmetic*, as preserved in Ps.-Iamblichus' homonymous treatise, are textually further away from the *Anonymus* and contain many late layers (and this is even more so, of course, in the summary of Nicomachus' *Theology of Arithmetic* provided in Photius' *Myriobiblos*, codex 187). To a large extent this also applies to Theon's text. Given all this, it is reasonable to focus on the content and principal concepts of the *Anonymus*, as well as on its intellectual provenance and immediate influence.

The first question to ask is whether originally there was only one such treatise or several. Indeed, the existence of Neopythagorean apocrypha with similar or identical doctrines is well attested, yet the writings themselves were different. To postulate two anonymous arithmological 'hand-books' one would need to show differences between them, which has not been done. As any ancient author could and did use the *Anonymus* for his own use without acknowledging his debt to it, what would be the grounds for the production of another *Anonymus*? Theophrastus' doxographical compendium went through the stage of an anonymous handbook, the so-called *Vetusta placita*, but all the subsequent versions had real (Aetius) or made-up (Plutarch) authors. All other pseudo-Pythagorean arithmological writings have their 'authors' too²². Against a purely theoretical possibility that the *Anonymus* was not alone speaks the uniqueness of this writing which, besides its doctrines, is visible in a peculiar sequence of its chapters and sections and exact textual parallels to be found in various texts dependent on it. To adduce just one example, let us compare two early borrowings from the *Anonymus* – Varro's *Hebdomades* as quoted by Aulus Gellius (book 3.10) and Philo's *De opificio*:

Varro	Philo
	Moon's cycle is 4 weeks $\times$ 7 days = 28, which is equal to the sum of its parts (101)
Seven stars of the Great Bear (10.2)	Seven heavenly circles (112)
Seven stars of Pleiades (10.2)	Seven planets (113)

22 Archytas (21.1f.); Lysis (114.13f.); Megillos (115.15f.); Opsimos (140.27f.); Philolaus (see below, 376); Proros (154.20f.); Pythagoras (164.1f.); Telauges (189.10f.). The pseudo-Pythagorean texts are quoted, if not otherwise indicated, by page and line of H. Thesleff's edition (1965).

Seven planets (10.2)	Seven stars of the Great Bear (114)
Seven heavenly circles (10.3)	Seven stars of Pleiades (115)
Equinoxes occur in the 7th month (10.4)	Equinoxes occur in the 7th month (116)
Moon's cycle is 4 weeks $\times$ 7 days = 28, which is equal to the sum of its parts (10.6)	
The formation of flesh in a woman's womb occurs in 7 days (10.7)	The formation of flesh in a woman's womb occurs in 7 days (124)

A block of five identical astronomical items (Aul. Gell. 3.10.2 – 4) has a slightly different arrangement in Philo (*De opif.* 112–116); as follows from his other work, where the sequence is planets – Great Bear – Pleiades – phases of the Moon (*De spec. leg.* 2, 58), the Moon also belonged to this block, but has been removed to another place (101)²³. In Gellius' condensed exposition of Varro an embryological item immediately follows astronomical ones, while in Philo it comes a bit later (124).

In view of these considerations we can safely assume that the *Einquellenhypothese* explains the origin of the arithmological genre from the *Anonymus* as successfully as the origin of doxography from Theophrastus' Φυσικῶν δόξαι²⁴.

3 Arithmology as a genre

Some theoretical explication is needed regarding the notion of the arithmological genre which is an abstraction based on a natural grouping of similar writings²⁵. What are the acceptable limits of similarity which would allow us to establish boundaries of arithmology that are neither too blurred nor too rigid? We can define arithmology as a literary genre of popular philosophy, originated in the framework of Neopythagoreanism, that systematized various speculations on the generation, properties and extra-mathematical significance of the first ten numbers in their relations

²³ Cf. *De leg.* 1, 8: planets – Great Bear – phases of the Moon.

²⁴ See L. Zhmud (2012b).

²⁵ For more detail on the origin of arithmology as a genre, see L. Zhmud (2016: 312–315).

to each other²⁶. This definition is exclusive, not inclusive. Not every speculation on any individual significant number up to ten, say, three, four or seven, can be taken as arithmology but only one in which a complete system of the first ten numbers is observable or detectable. In such a system, every number from one to ten acquires its meaning as a member of the arithmetical progression: two is the first female number, three is the first male number, five (or six) is the number of marriage, seven is the maiden-number and so on. In any arithmological text, either short or long, we find a close mutual relationship between the numbers of the decad; the same pattern is presupposed in arithmological fragments and extracts, even if they deal with individual numbers²⁷.

What remains beyond the boundaries of arithmology is a vast and diffuse field of *number symbolism* that deals with individual significant numbers – three, seven or nine – which are conceived neither as generated nor as mutually related²⁸. Number symbolism is a universal phenomenon going back to preliterate times. In Greek culture it is amply documented as early as Homer and Hesiod, in religion, especially the cult of Apollo, and later in early Greek philosophy and medicine. Not only the ancient Pythagoreans with their reputation as chief proponents of number symbolism but also such perfectly rational philosophers as Aristotle and Theophrastus revealed a predilection for some traditionally significant numbers such as three and seven²⁹. Therefore, we cannot relate to arithmology passages or works where such individual numbers are highlighted, praised or extolled, but are not arranged in a system of mutually related numbers of the decad, be it Solon's elegy on the seven-year ages of man's life (fr. 24 West), Hippo's embryological calendar based on numbers seven and three (38 A 16), or the Hellenistic pseudo-Hippocratic treatise *On the Sevens*³⁰.

Building on these considerations, the dating of the *Anonymus* as the first specimen of arithmology can be narrowed down to half a century.

26 Cf. the original definition of arithmology by A. Delatte (1915: 139).

27 As e.g. Proros' Περὶ τῆς ἑβδομάδος (154.19f.), on which see C. Macris (2012: 1698f.). J. Mansfeld (1971: 169 n. 59) suggested a common source of Philo and Proros that we can identify with the *Anonymus*.

28 For the relationship between number symbolism and arithmology, see L. Zhmud (2019a).

29 W.H. Roscher (1906: 97f.); L. Zhmud (2019a: 26, 28, 31f.).

30 W.H. Roscher (1913). J. Mansfeld (1971: chap. 6) dated *On the Sevens*, chap. 1–11 after Posidonius (cf. below, n. 33) and referred it to the arithmological genre. The reverse chronological order seems more plausible (L. Zhmud [2016: 314 and n. 13]), so that the tract should be dated in the late second century BC at the latest.

The first secure traces of this work are to be found in the *Vetusta placita* (Aët. 1.3.8) dated in the mid-first century BC (it probably comes from the school of Posidonius, the last philosopher mentioned in it) and in two writings of Varro (116–28 BC), *Tubero*, or *De origine humana* (published ca 40 BC) and *Hebdomades*, or *De imaginibus* (published 39 BC)³¹; Varro also used the *Vetusta placita*. Thus, the middle of the first century BC can be regarded as *terminus ante quem*. On the other hand, Varro's older contemporary Posidonius and the treatise *On the Sevens* quoted by the *Anonymus* do not reveal the influence of arithmology in the sense defined above; their discussions of the number seven belong to the traditional framework of number symbolism. Therefore, the period around 100–90 BC can be taken as a convenient *terminus post quem* for the *Anonymus*. To be sure, Posidonius was acquainted with new developments in pseudo-Pythagorean literature, as he was willing to infer on Pythagoras' doctrine on the soul from the writings of his students and followers³². But our arithmological treatise, as it seems, has not reached him yet or has not left traces in his oeuvre³³. Nor is there any secure evidence of its earlier existence.

4 Platonic-Academic number philosophy and the perfect ten³⁴

Theoretical foundation of arithmology was laid down in the Early Academy. As Aristotle noted, while criticizing the Platonists: “Mathematics has come to be identical with philosophy for modern thinkers, though they say that it should be studied for the sake of other things” (*Met.* 992a33, transl. W. D. Ross). This philosophy is presented only to a certain extent in

31 H.M. Dahlmann (1935: 1178). See Aul. Gell. 1.20 (the cube of three equals to the Moon's circle, i.e. 27), 3.10 (on the hebdomad, see above, 342), 14.3 – 7 (quotations from Solon and Ps.-Hippocrates); Cens. DN 9.1 (“opinio Pythagorica” on gestation in seven or ten months); Serv. *Ad Verg. Ecl.* 8,75 (number three is perfect, it comprises the beginning, middle and end; this is mentioned already by Aristotle, *Phys.* 268a10–20, cf. K. Staehle (1931: N° 17, 18a-b). For more on Varro's arithmology, see J. Mansfeld (1971: ch. 6); R.E.A. Palmer (1970: 19ff.).

32 Posid. F 151, 165 Edelstein & Kidd; L. Zhmud (2019b: 136ff.).

33 Cf. J. Mansfeld (1971: ch. 6): Posidonius in his *Comments* on the *Timaeus* developed the Early Academic arithmology; *On the Sevens* depends on Posidonius; the *Anonymus* revised and completed Posidonius' arithmology and used *On the Sevens*; Varro first (in *Imagines*) used Posidonius but later (in *Atticus*) adduced the *Anonymus*.

34 For this section, see already L. Zhmud (2012a: 404ff., 425f.); (2013); (2016: 335ff.).

Plato's dialogues, especially in his *Timaeus*³⁵. More often than not scholars reconstruct it from Aristotle's reports and criticisms of the unwritten doctrines of Plato and from a few fragments of Speusippus and Xenocrates on this account.

Plato was the first to separate incorporeal things such as numbers and geometric principles (points, lines, planes, solids) from the sensible world and to attach an ontological status to them. This transformed τὰ μαθηματικά into independent entities which, similar to physical objects, can be generated. According to the Academic doctrine, ontological priority resides with that which can exist without another. Solids are less substance than planes, planes than lines, lines than points, and points than units³⁶, since "a unit is substance without position, while a point is substance with position", which is to say that the latter contains an additional property³⁷. Thus, units, i.e. numbers, are by nature first³⁸. Respectively, the line is derived from the point (or produced by a moving point, Arist. *De an.* 409a3–7), the plane from the line, and the solid from the plane, and this derivation sequence is closely connected to the first four numbers³⁹. Speusippus, for example, associated the point with one, the line with two, the plane with three, and the pyramid with four (see below, 350). Aristotle attributed to Plato the derivation of line, plane, and solid "after numbers" or even from numbers; different schemes of generation of magnitudes are also attested to Speusippus and Xenocrates⁴⁰. Yet numbers, according to Plato, were not the ultimate level of reality, they themselves derive from the pair of the highest principles, the Monad and the Indefinite

35 For evidence on Plato's number philosophy provided in his dialogues, see L. Tarán (1981: 13ff.).

36 Arist. *Met.* 1002a4–12, 1017b6–21, 1018b37 – 1019a4; *De bono*, fr. 2 Ross.

37 Arist. *APo* 87a34f., cf. *Met.* 982a26–28. A point as a monad having position is an Academic formula.

38 Alex. *In Met.* 55.20 – 27 = Arist. *De bono*, test. and fr. 2 Ross.

39 That a line is produced by a moving point, as Aristotle reports while criticizing Xenocrates (*De an.* 409a3–7), or by a flowing point, as in Eratosthenes' *Platonicus* (Sext. *Emp. Adv. Math.* 3.22 – 28, cf. Theon. 83.2 – 84.6), is part of the Platonic-Academic derivation of magnitudes, not of ancient Pythagoreanism (pace A.J. Festugière [1954: 37 n. 1]; M. Isnardi Parente [1992: 159ff.]; N. Vinet [2010]). See e.g. H. Cherniss (1944: 396f.); L. Tarán (1981: 362f. [F 52]); K. Geus (2002: 156f.); F.M. Petrucci (2012: 391 n. 291). Cf. below, n. 73.

40 Plato: Arist. *De an.* 404b19–24; Speusippus: F 28 *ad fin.*, 51–52, 65 Tarán; Xenocrates: F 99–100, 117, 195 Isnardi Parente. See also Theophr. *Met.* 6a23 – b16 = Speus. fr. 59 Tarán = Xenocr. fr. 100 Isnardi Parente.

Dyad⁴¹. From these two principles, ten ideal numbers, or Forms-Numbers, are derived, such as Twoness, Threeness, etc.; their generation serves as a model for the generation of all other numbers. When Aristotle refers to the theory of the ten archetypal numbers, he obviously has Plato in mind⁴², and at *Phys.* 206b27–33 he directly names Plato (μέχρι γὰρ δεκάδος ποιεῖ τὸν ἀριθμόν). This is why the decad was counted in the Academy as the perfect, or complete number⁴³.

The doctrine on the decad as τέλειος ἀριθμός was fully formulated in Speusippus' lost treatise *On Pythagorean Numbers*. The first part of the book dealt with different kinds of the so-called figurate numbers (linear, plane, solid, etc.), continuous and discontinuous proportions, and the five regular solids⁴⁴. The second part, better known to us thanks to a two-page quotation from it in the pseudo-Iamblichean *Theologoumena arithmeticae* (fr. 28 Tarán), was devoted to the marvellous properties of the decad:

Ten is a perfect number, and it is both right and according to Nature that we Greeks and all men arrive at this number in all kinds of ways when we count, though we make no effort to do so; for it has many special properties which a number thus perfect ought to have, while there are many characteristics which, while not special to it, are necessary to its perfection (transl. I. Bulmer-Thomas).

The most conspicuous feature of Speusippus' exposition is that he focuses not on the correspondences between numbers and things but on numbers and geometric magnitudes and the interconnections between them. Such an emphasis is perfectly understandable insofar as numbers constitute the first layer of beings for Speusippus, with geometric magnitudes coming

41 The evidence, mostly from Aristotle, is conveniently collected in K. Gaiser (1968²: 474ff., n. 22–34). See also W. Burkert (1972: 21f.); J. Dillon (2003: 18f.).

42 *Met.* 1073a17–22; 1084a12 – b2: πειρῶνται δ' ὡς τοῦ μέχρι τῆς δεκάδος τελείου ὄντος ἀριθμοῦ (a31); 1088b10–11. On Plato's teaching on the decad, see e.g.: J.M. Dillon (1996²: 19ff.); M. Erler (2007: 427f.).

43 To be sure, in Plato's dialogues τέλειος ἀριθμός refers either to the so-called nuptial number or to the great year (*Resp.* 546b-d; *Tim.* 39d3–4). In mathematics, a perfect number is equal to the sum of all its divisors, e.g. $6 = 1+2+3$, but this meaning is not attested before Euclid (*El.* 7, def. 22; 9, 36).

44 Most of these things go back to Pythagorean mathematics. If the title of the work is Speusippean, which is not certain, it most probably referred to mathematical material used in this work (L. Tarán [1981: 263]).

after them⁴⁵. He does not seem to be primarily motivated by traditional number symbolism: the numbers three, seven, or nine do not interest him as such, and the other numbers interest him only insofar as they add up to ten. Thus, playing with the sides, angles, and edges of different plane and solid figures, he adds six to four in order to get ten on several occasions. The decad is perfect not because it corresponds to a natural phenomenon, but because it comprises all the other numbers:

Furthermore, all the ratios are in 10... and so are the linear and plane and solid numbers. For 1 is a point, 2 is a line, 3 is a triangle and 4 is a pyramid; all these are elements and principles of the magnitudes like to them. In these numbers (1, 2, 3, 4) is seen the first of progressions... and they have 10 for their sum. The primary elements in plane and solid figures are point, line, triangle, pyramid, they contain the number ten and are limited by it (transl. I. Bulmer-Thomas).

Speusippus' second most important number is four; he tirelessly connects it with the ten, being very enthusiastic about the transformation of the tetrad into the decad: $1 + 2 + 3 + 4 = 10$ (fr. 28 Tarán). In the late Hellenistic filiations of Platonic number philosophy the fact that the sum of the first four numbers makes up ten acquires special significance (see below, 360).

We know from Aristotle that the Academics (Plato, Speusippus or Xenocrates?) matched various types of cognitive activity with the first four numbers: $\nu\omicron\zeta$ is one, $\epsilon\pi\iota\sigma\tau\acute{\eta}\mu\eta$ is two, $\delta\acute{o}\xi\alpha$ is three (the number of the plane), and $\alpha\acute{\iota}\sigma\theta\eta\sigma\iota\varsigma$ is four (the number of the solid)⁴⁶. Xenocrates identified $\nu\omicron\zeta$ with $\tau\acute{o}$ $\epsilon\nu$ and with god, Speusippus also identified $\nu\omicron\zeta$ with god⁴⁷. The doctrine that the dyad is the first female number and the triad the first male number seems to originate with Xenocrates, who assigned such predicates as $\acute{\alpha}\rho\rho\epsilon\nu$ - $\theta\eta\lambda\upsilon$ and $\pi\epsilon\rho\iota\tau\tau\acute{o}\nu$ -($\acute{\alpha}\rho\tau\iota\omicron\nu$) to his first principles Μονάς and Δυάς ⁴⁸.

45 He rejected the theory of Forms and replaced the ideal numbers with mathematical ones (Arist. *Met.* 1083a23 = Speus. fr. 34 Tarán; 1075b37f. = fr. 30; 1080b11f. = fr. 33).

46 Arist. *De an.* 404b18–24 = Arist. *On Philosophy*, fr. 11 Ross. Cf. R.D. Hicks (1907: 222) (Plato); M. Isnardi Parente (1971) (Speusippus); L. Tarán (1981: 459f.) (Xenocrates). The latter seems the most plausible candidate.

47 Xenocr. fr. 213 Isnardi Parente, cf. Pl. *Tim.* 47e; Speus. fr. 58 Tarán. See M. Baltes & H. Dörrie (1990: 192ff.); J.M. Dillon (1996²: 99ff.).

48 Aët. 1.7.30 = fr. 213 Isnardi Parente; J.M. Dillon (1996²: 102ff.). – In the 'Pythagorean' table of opposites (Arist. *Met.* 986a24–26), which has a clear Aca-

All these ideas have been absorbed and creatively reworked by the author of the *Anonymus*, who put them in a framework of the treatise of ten chapters devoted to each number of the decad. But Speusippus' deliberate focus on relations between the first ten numbers and geometric magnitudes was too radical and refined to be directly followed in a popular philosophical genre. The originator of arithmology took a considerable step backwards by incorporating number symbolism into the conceptual scheme created in the Early Academy. What we observe in arithmological texts is, as it were, Speusippus 'lite': they are not so heavily, metaphysically loaded and contain much entertaining material about numbers (see above, 346). In the *Anonymus* each chapter was organized according to the Platonic division of the world into νοητά and αἰσθητά⁴⁹. In the realm of νοητά that always comes first, the arithmologist treated specific features of each number and all its possible connections with the others numbers of the decad (sometimes also outside of the decad), with plane and solid figures and harmonic intervals. As for realm of αἰσθητά, Speusippus' treatise had very little to offer: though he called the decad the divine model of the cosmos⁵⁰, no other references to the extra-mathematical world are to be found in the only preserved fragment. Therefore, the arithmologist had to turn here to the much older and richer tradition of number symbolism with its favourite numbers three and seven.

5 The Anonymus and kindred Neopythagorean writings

The most obvious shortcoming of previous research on the *Anonymus* is that it was considered isolated from the main body of the Neopythagorean apocrypha which began to spread in the first century BC, most probably from Alexandria⁵¹. The bulk of this literature is constituted by Doricized treatises with titles and bearing the names of various known, unknown and fictional Pythagoreans. There is a group of non-Doric texts that constitutes an exception to this pattern and is akin to the *Anonymus* in several

demic origin (L. Zhmud [2012a: 434f., 449f.]) we also find περιττὸν-ἄρτιον and ἄρρεν-θηλυ.

49 K. Staehle (1931: 10f.). See, e.g., ἐν μὲν οὖν τοῖς νοητοῖς τὸ ἀκίνητον καὶ ἀπαθὲς ἐπιδείκνυται ἑβδομάς, ἐν δὲ τοῖς αἰσθητοῖς μεγάλην καὶ συνεκτικωτάτην δύναμιν (Phil. *De opif. mundi*, 101).

50 Παράδειγμα παντελέστατον τῷ τοῦ παντὸς ποιητῇ θεῷ προεκκειμένην (fr. 28 Tarán).

51 E. Zeller (1919–1923: vol. III.2, 113f.); L. Zhmud (2019c: 85 with n. 71).

important respects⁵². In terms of form, these anonymous and mostly titleless works are doxographical or, in a wider sense, historiographical. In content, they expound specific doctrines similar or identical to the *Anonymus*, which are either derived from their common source, as for example, on the Monad and Indefinite Dyad, or directly borrowed from the *Anonymus*, as for example, on the tetractys.

The earliest of these writings, the *Pythagorean Notes* (D. L. 8.25 – 33), a titleless and anonymous doxography transmitted by Alexander Polyhistor (ca 100 – ca 35 BC), seems to be prior to the *Anonymus* or at least not dependent on it. Πυθαγορικά ὑπομνήματα is not a proper title, but a designation used for a specific type of writings, often mentioned in a Pythagorean context⁵³; though referring several times to the authority of an unnamed Pythagoras (δογματίζει, φησί, but καλοῦσι 8.7), these notes lack a proper author⁵⁴. The *Anonymus Photii* is a Neopythagorean bio-doxography summarized by Photius from an anonymous βίος Πυθαγόρου, probably, of the late first century BC – early first century AD⁵⁵. Here, Pythagoras' biography occupies only two out of 23 paragraphs, whereas doxography presents the teaching of the Pythagorean school as similar to that of Plato and Aristotle, who figure as the ninth and tenth *diadochos* of Pythagoras (235.5 – 7). Besides direct borrowings from the *Anonymus*, this text reveals a marked interest in number symbolism⁵⁶. Finally, this group includes four anonymous accounts of 'Pythagorean' number philosophy in Sextus Empiricus, belonging to two kindred but different versions⁵⁷. They derive from first-century BC sources⁵⁸, based, in turn, on the Neopythagorean

52 Cf. W. Burkert (1972: 53ff., 57ff.).

53 See C. Macris (2002: 102–103).

54 A.A. Long (2013); A. Laks (2013).

55 Phot. 438b – 441b = 237.4 – 242.9 Thesleff. Bibliography: C. Macris (2018: 752f.). On dating, see L. Zhmud (2012a: 72 n. 48). W. Theiler (1965: 207ff.) has demonstrated many important parallels between the *Anonymus Photii*, Philo, and Sextus Empiricus' sources on Pythagoreanism, yet his attribution of this work to Eudorus is not shared any more.

56 Borrowings: e.g. tetractys (237.23 – 238.1), see below, 362. Numbers: 3 ways to improve a man, 12 colours, 7 tastes, 5 senses, 12 zones in heaven, 4 causes, 4 seasons, the Sun is 100 or 30 times larger than the Earth, 4 elements, 8 cognitive faculties, 3 elements of learning, 3 meanings of the word 'heaven'.

57 1) *Adv. math.* 4.2 – 10 treats more briefly and with some variations the same subject as *Adv. Math.* 7.94 – 109; 2) *PH* 3.152 – 157 is a short variant of *Adv. math.* 10.249 – 284. See below, 358.

58 M. Isnardi Parente (1992: 146, 150–152, 157 and n. 49). H. Tarrant (1981) derived the account in *Adv. math.* 7 from Antiochus of Ascalon via Aenesidemus, D.

pseudepigrapha. Sextus regularly refers to the Pythagoreans⁵⁹ and only once to Pythagoras himself (10.261, *cf.* also 9.366). Our earliest witness for the *Anonymus*, Varro, also speaks of the Pythagoreans⁶⁰. This common tendency to avoid Pythagoras as an author is understandable if we recall that by the first century BC it was widely believed that he did not leave anything in writing⁶¹, so that the Neopythagorean pseudepigrapha were attributed either to his students, or to further unspecified “Pythagoreans”, in which case they remained anonymous.

Another important salient feature of the *Anonymus* and the group of pseudo-Pythagorean texts akin to it is Stoicized Platonism, in which the originally Platonic and Early Academic theories and ideas are modified under the influence of Stoicism. A crucial link between these two schools and emerging Neopythagoreanism was Antiochus of Ascalon (*ca* 135/130 – *ca* 68 BC), who taught for some time in Alexandria⁶². Antiochus definitively turned from the sceptical New Academy to the Old Academy that included, in his view, not only Speusippus, Xenocrates and other Platonists but also Aristotle and his students (Cic. *De fin.* 5.7), fusing this kind of Platonism with contemporary Stoicism⁶³. The next move, decisive for Neopythagoreanism, was to conceive ‘Pythagoras’ as one of Plato’s principal teachers (thus returning to the view of Aristotle and the Peripatetics⁶⁴), for Socrates could not account for the dogmatic part of Platonism. Among the (admittedly, scanty) evidence for this is Antiochus’ opinion that Pythagoras originated Plato’s bipartite (originally tripartite) division of the soul into rational and irrational, the latter including the affections (πάθη)⁶⁵. Antiochus’ coeval Posidonius also shared this opinion⁶⁶, but since

Sedley (1992) from Posidonius via Aenesidemus, while W. Theiler (1965: 208f.) related *Adv. math.* 10.248 – 283 to Eudorus (*cf.* above, n. 55).

59 Πυθαγορικοί, Πυθαγορικῶν παῖδες, οἱ περὶ Πυθαγόραν, οἱ ἀπὸ τοῦ Πυθαγόρου, ἡ τοιαύτη τῶν Πυθαγορικῶν στάσις.

60 See above, 349 n. 31. See also K. Stachle (1931: 11f.).

61 D. L. 8.6 (Sosicrates of Rhodes); Posid. fr. 151 Edelstein & Kidd; Philod. *De piet.* B 24, p. 66 Gomperz (from Stoic doxography of the second century BC); see L. Zhmud (2019b: 134f.).

62 W. Görler (1994: 942f.).

63 See L. Gerson (2005); G.E. Karamanolis (2006: 44–84, 331–336); D. Sedley (ed.) (2012).

64 L. Zhmud (2012a: 436ff., 452ff.).

65 Cic. *Tusc.* 4.10. For its Antiochean provenance, see M. Bonazzi (2007: 121f.); *cf.* H. Tarrant (1985: 129 n. 9).

66 Galen. *De plac. Hipp. et Plat.* 4.7.40 = F 165, l. 166f. Edelstein & Kidd. Under the view common to Pythagoras and Plato obviously the tripartition of the soul is meant (F 142–143, 146 Edelstein & Kidd).

he inferred Pythagoras' view on *πάθη* in the soul from the writings of the Pythagoreans (F 151 Edelstein & Kidd), which is to say, from the Neopythagorean apocrypha, he obviously reacted to them rather than influenced them. (The tripartition of the soul has been ascribed to Pythagoras in the *Pythagorean Notes*⁶⁷ and in many other pseudo-Pythagorean writings⁶⁸.)

What is lacking in Posidonius is Antiochus' new biographical perspective called to reinforce the doctrinal link between Plato and Pythagoreanism: Plato came to Italy and Sicily in order to meet the Pythagoreans and to appropriate their dogmata, about which Socrates had not even wanted to hear; he became acquainted with Archytas, Echecrates, and Timaeus of Locri, got access to Philolaus' book, learned all the Pythagorean teaching, first of all their *mathēmata* and the doctrine of the soul, and made it more argumentative; out of love for Socrates, however, he ascribed this Pythagorean *sapientia* to his teacher⁶⁹. In such a framework it was easier to interpret – not necessarily by Antiochus himself – a Platonic pair of principles, the Monad and the Indefinite Dyad, as a Pythagorean teaching, the more so as the precedent for this could be found in Aristotle and Theophrastus⁷⁰.

Stoic elements are most visible in the *Pythagorean Notes* that combine a Platonic system of principles, the Monad and the Indefinite Dyad (D. L. 8.25), with a largely Stoic body of cosmological and physical doctrines (see above, n. 54). The doctrine of the Monad and the Indefinite Dyad is attested also in the *Anonymus Photii* and Sextus Empiricus; its formulation leaves no doubt that it derives from the common Stoically coloured source⁷¹. What is further peculiar to this group is that Plato's dualistic

67 D. L. 8.29. Here it looks rather peculiar, see A.A. Long (2013: 155f.); A. Laks (2013: 375).

68 Examples: W. Burkert (1972: 74); P.A. Vander Waerdt (1985: 392). See also: ἀρχεῖ μὲν γὰρ τὸ λόγον ἔχον τὰς ψυχὰς, ἀρχεται δὲ τὸ ἄλογον, κρατοῦντι δὲ τῶν παθέων ἀμφοτέρω (Ps.-Archyt. *De leg.*, 33.15 – 16); Stob. 1.49.34.

69 Cic. *Resp.* 1.15 – 16; *Tusc.* 1.39: *Platonem ferunt... didicisse Pythagorea omnia; De fin.* 5.86 – 87 (= M. Baltes & H. Dörrie [1992: 250–256, 526–536]). See G. Tsouni (2012: 136f.). Cf. Ὅτι τὴν μὲν θεωρητικὴν καὶ φυσικὴν Πλάτωνά φασι παρὰ τῶν ἐν Ἰταλίᾳ Πυθαγορείων ἐκμαθεῖν, τὴν δὲ ἠθικὴν μάλιστα παρὰ Σωκράτους (*Anon. Phot.* 238.17 – 19).

70 Alex. *In Met.* 55.20 = Arist. *De bono*, fr. 2 Ross; Theophr. *Met.* 11a27ff. See above, 355 n. 64.

71 *Anon. Phot.* 237.17 – 23, 238.8 – 11; Sext. Emp. *PH* 3.153 – 154; *Adv. math.* 10.261 – 262, 270–278. ὅτι ἡ μὲν μονὰς κατὰ τὴν ἰσότητά καὶ τὸ μέτρον λαμβάνεται, ἡ δὲ δυὰς καθ' ὑπερβολὴν καὶ ἔλλειπιν (*Anon. Phot.* 237.19 – 23). οὐκοῦν ἡ μὲν ἰσότης

theory of the opposite principles is subjected to the monistic interpretation that conceives the Monad as the principal *arche* (active cause) producing the Indefinite Dyad⁷². The *Pythagorean Notes* put it as follows:

The principle of all things is the Monad. Arising from the Monad the Indefinite Dyad serves as matter for the Monad, which is its cause (*αἰτία*). From the Monad and the Indefinite Dyad arise numbers, from numbers points, from points lines, from lines plane figures, from plane figures, solids, from solids, sensible bodies, the elements of which are fire, air, earth, and water (D. L. 8.25).

The basis of this theory is the Platonic derivation of *νοητά* (lines–planes–solids) and *αἰσθητά* from the Monad and the Indefinite Dyad (the four elements at the end are Stoic). There were different ways to explain this, one of them was that the point is a unit with position, a line is generated by the moving point and a plane by the moving line⁷³. Under the influence of Stoic metaphysics that identified two principles, *τὸ ποιοῦν* and *τὸ πάσχον*, with God (or divine *logos*) and matter⁷⁴ – note that this was Antiochus' doctrine as well⁷⁵ – Platonic derivation was transformed into a doctrine of the active and divine Monad generating the passive material Dyad, which in differing versions became a cornerstone of Middle Platonism. The arithmologist expounds this doctrine as follows: the Monad is likened to god and *nous* (4a-c, h in K. Staehle [1931]); the Dyad is generated by the 'flow' (*ρύσις*) of the Monad (8); the Dyad is associated with matter (11). The same theory of the Monad as *ἀρχὴ πάντων* from which points, lines, planes and solids arise is stated in the *Anonymus Photii* (238.8 – 11); the Dyad, though not directly generated from the Monad, is pushed into the background. In Sextus' source the Monad, active cause, added to itself

τῷ ἐνὶ ὑπάγεται..., ἡ δὲ ἀνισότης ἐν ὑπεροχῇ τε καὶ ἐλλείψει βλέπεται... ἀλλὰ καὶ ἡ ὑπεροχὴ καὶ ἡ ἐλλειψις κατὰ τὸν τῆς ἀορίστου δυάδος λόγον τέτακται (*Adv. Math.* 10.275 – 276). For Stoicism in the *Anonymus Photii* and Sextus' source, see K. Reinhardt (1953: 763–768); W. Theiler (1965: 207ff.).

72 On this monistic tendency, see A.J. Festugière (1954: 36f.); M. Isnardi Parente (1992: 150f.); L. Zhmud (2016: 320 with n. 33).

73 Arist. *De an.* 409a3–7, see above, n. 39. It remains disputed whom this dynamic theory belongs to, but Speusippus (fr. 52 Tarán with comm.) seems to be a better candidate than Xenocrates (fr. 195 Isnardi Parente with comm.). Cf. Pl. *Leg.* 894a2–4.

74 Cf. Stoic doxography in Diogenes Laertius: Δοκεῖ δ' αὐτοῖς ἀρχὰς εἶναι τῶν ὅλων δύο, τὸ ποιοῦν καὶ τὸ πάσχον. τὸ μὲν οὖν πάσχον εἶναι τὴν ἄποιον οὐσίαν τὴν ὕλην, τὸ δὲ ποιοῦν τὸν ἐν αὐτῇ λόγον τὸν θεόν (7.134 = *SVF* 2.300).

75 Cic. *Acad.* 1.24; W. Görler (1994: 950).

produces the Indefinite Dyad, passive matter⁷⁶. A corollary of this theory is the statement that the Monad differs from the numerical one, which is to be found in the *Anonymus*, the *Anonymus Photii* and in Sextus' exposé⁷⁷.

All evidence suggests that in the first quarter of the first century BC this system must have already been formed⁷⁸, for it precedes the *Anonymus* and is attested in one of the earliest Neopythagorean pseudepigrapha, the *Pythagorean Notes*, which is not dependent on the *Anonymus*. Another Middle Platonic/Neopythagorean doctrine of principles, known from Eudorus of Alexandria (fl. ca 25 BC), posited a third, supreme principle, the One-*arche*, above the Monad (or One-*stoicheion*) and the Indefinite Dyad, and therefore was a refinement of this system⁷⁹. If these considerations are correct, then the *Anonymus* can be seen as an early offshoot of the newly developed Middle Platonic and Neopythagorean number metaphysics, with a more narrow focus on speculations about the first ten numbers. In view of the kinship of these two currents of thought, one more general and one more specific, they have to be carefully distinguished. The second always implies the first, but not vice versa⁸⁰.

6 The *Anonymus* and the *Vetusta placita*

The importance of the *Anonymus* for Neopythagorean doxography is confirmed by the fact that the section on Pythagoras' principles in the *Vetusta placita* (Aët. 1.3.8, cf. 1.7.18 on what is god) is consistently arithmological and seems to be almost entirely taken from this work. Pythagoras was understandably absent from Theophrastus' Φυσικῶν δόξαι, for he was not viewed as a *physikos*. As nothing certain was known about his physical teaching, sporadic attempts were made to invent it for him. The third-century BC pseudepigraph known as *tripartitum* included Παιδευτικόν,

76 PH 3.153; Adv. math. 10.261. 277. Cf. Πυθαγόρας τοίνυν ἀρχὴν τῶν ὅλων ἀγέννητον ἀπεφίνατο τὴν μονάδα, γεννητὴν δὲ τὴν δυάδα καὶ πάντας τοὺς ἄλλους ἀριθμοὺς (Hippol. Philos. 6.23.1, cf. 1.2.6. 9, 4.43.5, 4.51.4). See W. Theiler (1964: 103f.); M. Isnardi Parente (1992: 147ff., 150).

77 Lydus. De mens. 2.6 (= K. Staehle [1931: N° 2]); Anon. Phot. 237.17 – 19; Sext. Emp. Adv. Math. 10.262.

78 Cf. E. Zeller (1919–1923: vol. I, 464ff.; vol. III.2, 108).

79 Eudorus ap. Simpl. In Phys., 181.10 – 30. For a similar system, see Ps.-Archytas' On Principles (19.5 – 20.17) and Ps.-Timaeus (206.5 – 17). See Ph. Merlan (1970²: 84ff.); J. Mansfeld (1988: 96–100); M. Bonazzi (2013); B. Centrone (2014: 321ff.); A. Ulacco (2017: 22ff.).

80 Cf. B. Centrone (2015).

Πολιτικόν, Φυσικόν⁸¹; to be sure, no physical views are preserved from this text. The second-century BC compiler of the Stoic theological doxography attributed to Pythagoras an idea that our soul is a part of the divine world-soul⁸², which is echoed in the *Pythagorean Notes* and in Sextus Empiricus⁸³. It is only in the first century BC, when the role of Plato's teacher was assigned to Pythagoras, and the Pythagoreans started to be seriously regarded as physical philosophers (this is what one of Sextus Empiricus' sources repeatedly stresses)⁸⁴ that a recently created system, Neopythagoreanism, has been successfully and inextricably linked to his name. The decision of the compiler of the *Vetusta placita* to use the *Anonymus* as an authoritative source of Pythagoras' principles does not look self-evident, for our text did not aim to expose *Pythagoras' philosophy*. Yet no other authoritative source seemed to be available at this time, which would have better corresponded to the compiler's idea of what Pythagoras' philosophy should look like; other arithmological texts were either ascribed to his followers⁸⁵ or too concise, as with the section on principles in the *Pythagorean Notes* (D. L. 8.25). On the contrary, Pythagoras' section in the chapter Περὶ ἀρχῶν is much longer than any other and contains, besides two sets of principles, far more arithmology than one would expect.

Indeed, one set of principles that goes back ultimately to Aristotle comprises numbers and proportions, which Pythagoras also calls 'harmonies'. The elements, called 'geometricals', are composed out of both of them⁸⁶. Another set consists of the Monad and the Indefinite Dyad, which tend, respectively, to τὸ ποιητικὸν αἴτιον καὶ εἰδικόν, ὅπερ ἐστὶ νοῦς ὁ θεός, and to τὸ παθητικόν τε καὶ ὑλικόν, ὅπερ ἐστὶν ὁ ὁρατὸς κόσμος⁸⁷. This kind of Stoicized Platonism is familiar to us from other Neopythagorean sources. But unlike them, no attempt is made here to relate numbers to the Monad

81 D. L. 8.6. 9. 15 = 170.17 – 172.7 Thesleff; L. Zhmud (2019c: 79f.).

82 Cic. *ND* 1.27 – 28. See L. Zhmud (2019b: 135f.).

83 Soul is "a detachment (ἀπόσπασμα) of aether, both the hot and the cold (...) it is immortal since that from which it is detached is immortal" (D. L. 8.28, cf. 7.143). Sext. Emp. *Adv. math.* 9.127.

84 *Adv. Math.* 1.303, 9.64, 10.45. 248. 250. 255.

85 See above, 346 n. 22. The *Hieros Logos* in Doric prose (p. 164–166 Thesleff) bearing Pythagoras' name appeared much later and depends on the *Anonymus*. See A. Delatte (1915: 191ff.); I. Hadot (2004: 69ff.), and the contribution of Adrien Lecerf to this volume.

86 H. Diels (1879) [= *Doxographi Graeci*, henceforth *Dox.*], 281a2–6, cf. Aët. 1.10.2. See W. Burkert (1972: 58 n. 28).

87 *Dox.*, 281a6–12. Cf. Cic. *Acad.* 2.118: *Pythagorei ex numeris et mathematicorum initiis proficisci volunt omnia*.

and the Indefinite Dyad or to derive numbers from them. This is because in the chapter *Περὶ ἀρχῶν* the compiler did not feel obliged to go beyond the principles, so he omitted both the generation of the Indefinite Dyad from the Monad and further point–line–plane–solid derivation, characteristic for the texts under discussion⁸⁸. What follows and comprises the bulk of the section is arithmology, every element of which is attested in the writings dependent on the *Anonymus*:

The nature of the number is the decad⁸⁹. For all the Greeks, all barbarians count up to ten and when they have reached that they revert to the monad⁹⁰. And the power of ten in turn, he says, resides in the four and in the tetrad <...> For example, if one posits one and adds two and three and four to these, then one will complete the number ten. So that the number is in ten by the monad [i.e. the unit], but in four by its power⁹¹. And that is why the Pythagoreans proclaimed, thinking that the tetrad is the greatest oath,
No, by the man who bequeathed the tetractys to our soul
which has the fount and root of everlasting nature.
And our soul, he says, is composed out of the tetrad⁹². For it is from intellect, knowledge, opinion and perception, that every art and every science comes and that we ourselves are rational⁹³.

The rest (*Dox.* 282a16–283a9) explains in which way the first four numbers are related to our cognitive faculties that make up the soul: νοῦς is one, ἐπιστήμη (knowledge) is two, δόξα is three, and αἴσθησις is four (this part has been left out). This Early Academic idea is known to us from Aristotle's *On the Soul*; it was also discussed in his *On Philosophy* (see

88 Cf. Philo. *De opif. mundi* 49; Lydus. *De mens.* 4.64.

89 Cf. ἡ μέντοι δεκάς πάντα περαίνει τὸν ἀριθμόν, ἐμπεριέχουσα πᾶσαν φύσιν ἐντὸς αὐτῆς (Theon. 106.8 – 9); καλεῖται <δὲ> ἡ δεκάς κράτος καὶ παντέλεια, ἐπεὶ πάντα περαίνει τὸν ἀριθμόν περιέχουσα πᾶσαν φύσιν ἐντὸς ἑαυτῆς... (Anat. 15.13 – 14).

90 See K. Staehle (1931), N° 86–87; πάντα μὲν γὰρ τὸν ἀριθμόν εἰς δεκάδα ἤγαγον, ἐπειδὴ ὑπὲρ δεκάδα οὐδεὶς ἐστὶν ἀριθμός, ἐν τῇ αὐξήσει πάλιν ἡμῶν ὑποστρεφόντων ἐπὶ μονάδα καὶ δυάδα καὶ τοὺς ἐξῆς (Theon. 99.17f.).

91 See A. Delatte (1915: 256f.); K. Staehle (1931), N° 23, e.g. ὁ γὰρ ἐντελεχεῖα δεκάς, τοῦτο τετράς, ὡς ἔοικε, δυνάμει εἰ γοῦν οἱ ἀπὸ μονάδος ἄχρι τετράδος ἐξῆς συντεθεῖεν ἀριθμοί, δεκάδα γεννήσουσιν (Philo. *De opif. mundi* 47); Theon. 99.20f.; Hierocl. *In Aur. Carm.* 20.14; Lyd. *De mens.* 2.9 *ad fin.*

92 Οὐ μόνον δὲ τὸν τοῦ σώματος ἐπέχει λόγον ἐν ἀριθμοῖς τετράς, ἀλλὰ καὶ τὸν τῆς ψυχῆς (Anat. 8.15, cf. Sext. Emp. *Adv. math.* 4.3. 5.8); ψυχὰ ἀνθρώπου, ὡς Πυθαγόρας ἔφη, ἐστὶ τετράγωνον εὐθυγώνιον (Lyd. *De mens.* 2.9).

93 *Dox.* 281a12 – 282a16, transl. A. Laks & G.W. Most, slightly modified.

above, n. 46). As the parallels show, this likening was also employed in the *Anonymus*⁹⁴, but the following explanations of how our critical faculties correspond to the first four numbers do not come from the same source. They are too academic for a popular genre and not similar to the usual arithmological explanations.

7 *The pseudo-Pythagorean oath and tetractys*

The Pythagorean oath containing the tetractys, this kernel of Neopythagorean wisdom⁹⁵, was probably the most popular and thus influential piece of the *Anonymus*, which left traces in dozens of writings of the Imperial period⁹⁶:

Οὐ, μὰ τὸν ἀμετέρῃ ψυχᾷ παραδόντα τετρακτύν
παγὰν ἀενάου φύσεως ρίζωμά τ' ἔχουσιν.

No, by the man who bequeathed the tetractys to our soul,
which has the fount and root of everlasting nature⁹⁷.

The Pythagoreans swear by Pythagoras because he forbade them to swear by the gods (D. L. 8.22; Iamb. *VP* 47, 150). This motif comes from the earlier pseudo-Pythagorean literature: at the beginning of his treatise *Φυσικόν* (cf. above, n. 81) Pythagoras swears not by the gods but by air and water and incidentally in the same negative form as in this oath⁹⁸. Pythagoras' name also does not appear in the oath, because the Pythagoreans were not allowed to call him by name and referred to him as 'that man' (ἐκεῖνος ὁ ἀνὴρ), a motif known from Apollonius of Tyana (first century AD), the first Neopythagorean biographer of Pythagoras (Iamb. *VP* 88,

94 Νοῦς ἐπιστήμη δόξα αἴσθησις. νοῦς μὲν ὡς μονὰς ἐν οὐσίᾳ, κτλ. (Theon. 98.4f.); Lyd. *De mens.* 2.9; Hierocl. *In Aur. Carm.* 20.18. Cf. Ps.-Archyt. *De intell.* 38.19 – 24.

95 On the Neopythagorean origin of the tetractys, see L. Zhmud (2012a: 301ff.). Cf. W. Burkert (1972: 72). For more bibliography on the tetractys, see C. Macris (2018: 826, 831–832, 1096–1097).

96 The most important evidence is collected in A. Nauck (1884: 216f., 229f.); A. Delatte (1915: 249ff.). They discuss also variations of the text.

97 Ps.-Plut. 877A = Aët. 1.3.8a. This was the original form of the oath (A. Nauck [1884: 216, 229]; A. Delatte [1915: 249f.]).

98 Οὐ μὰ τὸν ἀέρα τὸν ἀναπνέω, οὐ μὰ τὸ ὕδωρ τὸ πίνω, οὐ κοτ' οἶσω ψόγον περὶ τοῦ λόγου τοῦδε (D. L. 8.6). Cf. Diod. Sic. 10.9.1, also from the *tripartitum*, see S. Schorn (2018: 223f.).

150, 255). The proverbial *Αὐτὸς ἔφα* (D. L. 8.46), first attested in Cicero (*ND* 1.10), belongs to the same Neopythagorean milieu as the oath and reflects a belief, widespread since the first century BC, that all the ancient Pythagoreans spoke and wrote Doric⁹⁹. Though it is possible that the arithmologist borrowed the oath from a Doricized pseudepigraph, it would be difficult to say what kind of source it was and why it has not left any other traces. Doric arithmological treatises we know of, such as Megillos' *Περὶ ἀριθμῶν* (115.15f.) or Pythagoras' *Hieros logos* or *Λόγος περὶ θεῶν* (164.1ff.), are much later than the *Anonymus* and dependent on it. More plausible, therefore, is that the oath appeared first in the *Anonymus* as a 'quotation', with the Doric dialect underlining its authenticity. Delatte hypothesized Timaeus of Tauromenium as the earliest source of the oath¹⁰⁰, but this is related to his tendency to consider many apocrypha as authentic Pythagorean texts. In justice to his acumen it should be said that the next source he indicated was our arithmological treatise. Indeed, the content of the oath is clearly arithmological and its vocabulary belongs to the first century BC¹⁰¹. Long after its first appearance the oath occurred predominantly if not exclusively in the arithmological writings or passages directly or indirectly related to the *Anonymus*, so that the latter can justifiably be regarded as its ultimate source. Robbins suggested that the oath, with its doctrinal environment, formed an introduction to the *Anonymus*¹⁰². It is much more likely, however, that it belonged to the chapter on the number four, for this was its usual place in the arithmological writings, for example, in Philo, Nicomachus, Anatolius, Lydus, etc.

The idea that the first four numbers make up ten was inspired by Speusippus (see above, 351), yet the doctrine of the tetractys has been formed in the early first century BC. After the *Vetusta placita*, it occurs in a condensed and slightly confused form in the *Anonymus Photii*: καὶ τὰ ὄντα πάντα ἀριθμοὺς προσηγόρευον (*sc.* the Pythagoreans), ὁ δὲ ἀριθμὸς συμπληροῦται τοῖς δέκα, ὁ δὲ δέκα σύνθεσις τῶν τεσσάρων κατὰ τὸ ἐξῆς

99 See L. Zhmud (2019c: 83f.).

100 A. Delatte (1915: 253).

101 Τετρακτὺς occurs first in the oath, further at *Anon. Phot.* 238.1 and Sext. Emp. *Adv. Math.* 4.2 – 3, 7.94. 98. 100; φύσις ἀένναος is first attested in Posidonius, in a context different from that of the oath (fr. 239 Edelstein & Kidd); πηγὴ καὶ ρίζα figure once in plural in the Hippocratic corpus (*De flat.* 7 *ad fin.*: ὅπου αἱ πηγαὶ καὶ αἱ ρίζαι τοῦ αἵματός εἰσι), but all the subsequent occurrences begin with Philo (*De congr. erud.* 120; *Heres* 116). See e.g. Ps.-Plut. *De lib. educ.* 4A; Theon. 18.2; Julian the Methodist (*ca* 150 AD) *ap.* Galen. *Adv. Julian.* 18, 273.1 Kühn.

102 F.E. Robbins (1920: 314).

ἀριθμούντων ἡμῶν, καὶ διὰ τοῦτο τὸν ἀριθμὸν πάντα τετρακτὸν ἔλεγον (237.25 – 238.1). The original sense of the last words was not that any number was called ‘tetractys’, but that the tetrad was called the number of ‘all’, as the parallel in Philo shows: καλεῖται δ’ ἡ τετράς καὶ ‘πᾶς’, ὅτι τοὺς ἅχρι δεκάδος καὶ αὐτὴν δεκάδα περιέχει δυνάμει (*De plant.* 123)¹⁰³. Further Philo specifies that the decad is ‘all’ in actuality, whereas the tetrad is ‘all’ potentially (*ibid.*, 125). At *De opif. mundi*, 47–52 he sets forth in detail the doctrine of the τέλειος τετράς, beginning as follows:

But the heaven in its turn was ordered with a perfect number, the four. You would not go astray in affirming that it is the principle and source (ἀφορμὴν καὶ πηγὴν) of the all-perfect number ten; for what the ten is in actuality, the four, it would seem, is potentially. If the numbers from the unit to the four are added up, they will produce the ten. It forms the boundary for the infinitude of numbers, which wind around it like a turning post and turn back¹⁰⁴.

Philo does not use the word τετρακτὺς, preferring τετράς to it, which creates confusion, because τετράς denotes the number four, and τετρακτὺς a set of four numbers or items¹⁰⁵. Other authors also do not distinguish between τετράς and τετρακτὺς or use them interchangeably¹⁰⁶. Since this feature is already observed in the *Vetusta placita* passage¹⁰⁷, one can suppose that the arithmologist himself used these words interchangeably.

Interpretation of the first line of the oath does not cause much difficulty: it is Pythagoras who is meant here, and the variant ψυχᾷ is clearly preferable to κεφαλᾷ (first in Sext. Emp. *Adv. math.* 7.94, though ψυχᾷ in 4.2) and γενεᾷ (first in Nicom. *ap. Theol. arith.* 22.21), for it is our soul that is related to the tetrad in the arithmological texts (see above, n. 92). φύσις ἀέναντος in the second line has to be understood as the decad, for

103 See A. Delatte (1915: 254).

104 *De opif. mundi*, 47, transl. D. Runia. See also *ibid.* 97–98; *De plant.* 123–125; *De vita Mosi* II, 115; *In Gen.* III, 12; K. Staehle (1931), N° 23.

105 Τετρακτὸν δὲ (λέγοντες) ἀριθμὸν τινα, ὃς ἐκ τεσσάρων τῶν πρώτων ἀριθμῶν συγκείμενος τὸν τελειότατον ἀπὴρτιζεν, ὥσπερ τὸν δέκα (Sext. Emp. *Adv. math.* 7.94). ἡ μὲν οὖν προειρημένη τετρακτὺς <αὕτη>, κατ’ ἐπισύνθεσιν τῶν πρώτων ἀποτελουμένη ἀριθμῶν (Theon. 94.10 – 11).

106 As A. Delatte (1915: 256) noted: “Chose curieuse, le mot τετράς, qui devrait être réservé au nombre 4..., est fréquemment employé pour représenter l’ensemble des 4 premiers nombres”. See also I. Hadot (2004: 64f.); H.S. Schibli (2002: 277 n. 18).

107 *Dox.* 282.6f.: ὡς μεγίστου ὄρκου ὄντος τῆς τετράδος, but τετρακτὺς in the oath itself.

the latter was considered to be the ‘nature of the number’ or to comprise the whole nature of numbers, as was thought already in the Academy¹⁰⁸. “For under the ‘everlasting nature’”, reports Nicomachus, “they meant the decad, since it is, as it were, the eternal and ageless nature of all things and kinds of thing”¹⁰⁹. According to Theon, the ratios of all the concords are in “tetractys of the decad” and the decad constitutes the tetractys (τὴν μὲν γὰρ τετρακτὸν συνέστησεν ἡ δεκάς, 93.17 – 19) that was venerated by the Pythagoreans, for it seems to embrace the nature of all things (καὶ δοκεῖ τὴν τῶν ὅλων φύσιν συνέχειν, 94.4). Thus, the decad as φύσις ἀέναος belongs to the realm of numbers and is the eternal numerical pattern of the universe.

A variation in the second line of the oath, ῥιζώματ’ instead of ῥιζωμά τ’, changed its meaning to “fount containing the roots of everlasting nature”, which prompted more ‘physical’ interpretation of φύσις ἀέναος: ῥιζώματα were understood not only as the four numbers, but also as the four physical elements. The link between the tetractys and the four elements (στοιχεῖα, not ῥιζώματα!) had already been presented in the *Anonymus*, as follows, for example, from Philo: “The four elements, out of which this universe was constructed, flowed forth, as from a source, from the four in the realm of numbers”¹¹⁰. The oath, however, was not yet directly involved here, as it is the case in Hippolytus’ *Refutatio*, who viewed Pythagoras, i.e. Neopythagoreanism, as a source of many heretical doctrines he fought against and thus preserved a wealth of arithmological material¹¹¹. Hippolytus’ source in the sixth book identifies the oath with the “harmony of the four elements”, for the tetractys is the principle of physical and solid bodies, just as the monad of intelligible ones¹¹². Mansfeld suggested that

108 Εἶναι δὲ τὴν φύσιν τοῦ ἀριθμοῦ δεκάδα (*Dox.* 281a12–13), see also above, n. 89. ἐπειδὴ τέλειον ἡ δεκάς εἶναι δοκεῖ καὶ πᾶσαν περιεληφέναι τὴν τῶν ἀριθμῶν φύσιν (*Arist. Met.* 986a8–9). Speusippus called the decad φυσικωτάτην (fr. 28.10 Tarán).

109 Ἀέναον γὰρ φύσιν τὴν δεκάδα ἡνίττοντο τὴν οἰονεῖ αἰδίων καὶ αἰώνιον τῶν ὅλων φύσιν καὶ εἰδὼν ὑπάρχουσαν (*Theol. arith.* 23.1 – 2). Cf. καλεῖται <δὲ> ἡ δεκάς κράτος καὶ παντέλεια, ἐπεὶ πάντα περαίνει τὸν ἀριθμὸν περιέχουσα πᾶσαν φύσιν ἐντὸς ἑαυτῆς (*Anat.* 15.13 – 14).

110 *De opif. mundi* 52, transl. D. Runia, cf. *Lyd. De mens.* 4.64. For further parallels, see K. Staehle (1931), N° 27.

111 J. Mansfeld (1992: 170, 179f., 187).

112 *Ref.* 6.23.4. Elsewhere Hippolytus, quoting the oath, does not adduce this interpretation (1.2.9 – 10, 4.51.7 – 8, 6.34.1), but in the account of ‘Egyptian’ number philosophy he derives the four elements from the number four (4.43.8). Cf. τετρακτύς Πυθαγορικὸς ὄρκος, ἡγουν τῶν τεσσάρων στοιχείων σημαίνων (Hesych.).

Hippolytus “interprets the ῥιζώματα of the Pythagorean oath as pertaining to the four elements of (Empedocles’) physics”¹¹³. Indeed, in the next book Hippolytus quotes Empedocles’ verse τέσσαρα τῶν πάντων ῥιζώματα πρῶτον ἄκουε (*Ref.* 7.29.4 = 31 B 6), but three lines earlier he says that, according to Empedocles, there were six elements, not four, so that this parallel does not seem convincing¹¹⁴. To be sure, in the excerpt from Nicomachus preserved in the *Theology of Arithmetic* the oath itself is seemingly attributed to Empedocles:

τοιαύτης δὲ οὔσης ἐπώμνυον δι’ αὐτῆς τὸν Πυθαγόραν οἱ ἄνδρες, θαυμάζοντες δηλονότι καὶ ἀνευφημοῦντες ἐπὶ τῇ εὐρέσει, καθά που καὶ Ἐμπεδοκλῆς· ‘οὔ, μὰ τὸν ἀμετέρα γενεᾷ παραδόντα τετρακτύν./ παγὰν ἀενάου φύσεως ῥιζώματ’ ἔχουσιν.’ ἀέναον γὰρ φύσιν τὴν δεκάδα ἡνίττοντο τὴν οἶονεῖ αἰδῖον καὶ αἰώνιον τῶν ὅλων φύσιν καὶ εἰδῶν ὑπάρχουσιν (*Theol. arith.* 22.18 – 23.2).

As Delatte correctly explained, however, καθά που καὶ Ἐμπεδοκλῆς refers not to the following oath – for it is written in Doric and attributed to the Pythagoreans (ἐπώμνυον, ἡνίττοντο) – but to the preceding θαυμάζοντες καὶ ἀνευφημοῦντες: similarly to the Pythagoreans, Empedocles admired Pythagoras in his famous verses ἦν δέ τις ἐν κείνοισιν ἀνὴρ περιώσια εἰδώς..., cited by Nicomachus¹¹⁵. ῥιζώματα twice occurring in Nicomachus’ text (*Theol. arith.* 21.2 – 3, 23.4 – 6) refers to the first four numbers, not to the elements.

8 The most generative six

The *Anonymus* attached to the number six an important role in the period of human gestation. The six is “the most generative number” (γεννητικώτατος)¹¹⁶, because, explains Philo in the remaining fragments of the *Questions on Genesis*, it is the first number that is both male and female, being a product of even (2) and odd (3). This is why among the

113 J. Mansfeld (1992: 180).

114 There is even less ground for assuming that ῥιζώματα belongs to the original version of the oath, which would have alluded thereby to Empedoclean physics, as in O. Primavesi (2016: 13f.).

115 31 B 129 DK = Porph. VP 30 = Iambl. VP 15. A. Delatte (1915: 252).

116 Phil. *De opif. mundi*, 13; Lyd. *De mens.* 2.11.

ancients some called it ‘marriage’ and others ‘harmony’¹¹⁷. The Armenian translation of the *Questions* preserved a fuller picture of Philo’s arithmological speculations. At 3.38 he presents two other important numbers, 35 and 45, the first consisting of the proportion 6, 8, 9, 12 (in sum they make 35), the second of the proportions 6, 9, 12, 18 (in sum they make 45). Relation of 35 and 45 to gestation is partly clarified later in the same work: 45 is a productive number, for it contains all three basic proportions, the arithmetic, the geometric, and the harmonic, and in the same number of days the embryo of nine-month babies is formed in the womb, whereas in the case of seven-month babies it takes, as they say, 35 days¹¹⁸. Indeed, if we multiply 35 by 6 we get 210, the number of days in seven months, and multiplying 45 by 6 we get 270, the number of days in nine months. This should explain, why the six is γεννητικώτατος.

A passage from Varro in Censorinus helps to complete the picture of this generative arithmetic¹¹⁹. Varro describes two types of pregnancy “according to Pythagoras”: the seven-month, or 210 days, and the ten-month, or 274 days. The first is based on the number six, the second on the number seven. During a seven-month pregnancy the foetus proceeds through four stages (milky humor, blood, flesh, formed body), which correspond to 6, 8, 9 and 12 days and to the three basic concords, the octave (12:6), the fifth (9:6), and the fourth (8:6). (These four numbers form the Pythagorean ‘musical proportion’, 6:8=9:12, which combines the arithmetic and harmonic means)¹²⁰. When added, 6, 8, 9 and 12 produce 35 days, which multiplied by 6 makes 210. “And so not undeservedly six is the basis of conception” (11.4, transl. H. Parker). In the second pregnancy the body is fully formed in circa 40 days, which multiplied by 7 makes 280 days, i.e. nine months and ten days, but since the baby is born on the first day of the last week, the exact number of days is 274. The second scheme, unlike the first, is based on the number seven and does not match with that described by Philo. It is unclear, why Varro changed the usual pattern of two pregnancies in $35 \times 6 = 210$ and $45 \times 6 = 270$ days, which is preserved in

117 *In Gen.* 3.38a; Lyd. *De mens.* 2.11. Cf. ἐξ ἀρτίου καὶ περιττοῦ τῶν πρώτων, ἄρρενος καὶ θήλεος..., διὸ καὶ ἀρρενόθηλυν καὶ γάμος καὶ ἀρτιοπέρισσος καλεῖται (Anat. 10.13 – 16). For further parallels, see K. Staehle (1931), N° 36a.

118 *In Gen.* 4.27, p. 301–302, transl. R. Marcus.

119 *Cens. DN* 9 and 11, cf. Aul. Gell. 3.10.7 – 8. See H.N. Parker (1999).

120 The numbers 6, 8, 9, 12 first occur in ps-Platonic *Epinomis* (990d-991b), see A. Barker (2016: 271), but the corresponding ratios were known already to Hippasus (Aristox. fr. 90 = 18 A 12 DK).

the *Theology of Arithmetic* (51.4-25, most probably, from Nicomachus)¹²¹, Aristides Quintilianus, Proclus and other sources¹²². The *Pythagorean Notes*, which are not dependent on the *Anonymus*, briefly refer to a similar theory, where the foetus is formed in 40 days, an arithmetic mean between 35 and 45: “Solidifying first in forty days, the foetus has form, then according to the ratios of harmony, it is completed in seven, nine, or ten months at most, and is born”¹²³.

The whole topic is clearly too special and too developed to be invented by the arithmologist. Basic ideas of generative arithmetic were already attested in fifth-century BC philosophy, harmonics, and medicine, partly going back to the even earlier number symbolism of the number seven¹²⁴. Indeed, the early embryological calendars, i.e. calculations of the development of the foetus, were based on the number seven, not six, as is the case for example that of Empedocles. The embryo begins the articulation of the limbs from the 36th day (after the fifth hebdomad) and completes it by the 49th day (at the end of the seventh hebdomad); a woman can give birth to a viable child on the 7th or the 10th month (i.e. at the end of a full nine month period)¹²⁵, which complies with the traditional medical lore. Similar calculations are to be found in the Pythagorean Hippo: “The foetus, he said, was already mature in the seventh month, since the number seven has the greatest power over everything”¹²⁶. The Hippocratic treatise *On Fleshes* (late fifth – early fourth century BCE) offers a more developed scheme: children born at seven months and at nine months and ten days are both viable and have “a precise numerical relationship to seven-day periods”, the first counts exactly thirty seven-day periods ($3 \times 10 \times 7 = 210$) and the second forty seven-day periods ($4 \times 10 \times 7 = 280$). A child born at eight months never survives (19, transl. P. Porter). The Hippocratic *Regimen* relates the life and growth of the foetus to finding the correct attunement, which has

121 F.E. Robbins, in M.L. D’Ooge (ed.) (1926: 85, 87). Cf. S. Bucking (1992: 132ff.), who ascribes this passage to Anatolius.

122 *Theol. arith.* 51.4 – 25, cf. 63.7 – 18; Aristid. Quint. 3.18; Procl. *In Plat. Rem Publ.* II, 34.2 – 36.2 (Proclus appends his calculations to Empedocles 31 B 69 DK). Plut. *De an. in Tim.* 1018A gives only the first formula; Macrob. *In somn. Scip.* I.6.14 – 17 gives the first formula and alludes to the second. See A. Delatte (1922: 216f.) and (1930: 166f.); R.A.H. Waterfield (1988: 222f.); H.N. Parker (1999).

123 D. L. 8.29, transl. H. Parker; A.A. Long (2013: 152f.).

124 W.H. Roscher (1906).

125 31 A 75, 83, B 153a; A. E. Hanson (1987); H.N. Parker (1999: 522f.).

126 Cens. DN 7.2 = 38 A 16, transl. H. Parker.

concordant intervals: the fourth, the fifth, and the octave¹²⁷. Thus, both the combination of harmonics and embryology and the formulas for the seven-month and nine-months babies, though based on the hebdomad, are presented in the Hippocratic corpus. Still, they do not fully match with two exact formulas of 35 and 45 days multiplied by the generative 6, which are given by the *Anonymus*¹²⁸.

Luckily for us, not so long ago Holt Parker published a Hellenistic embryological calendar of a certain Damastes, a medical writer on pediatrics, who can be dated to the second century BC¹²⁹. It is in Damastes that we find for the first time the exact match to both formulas, and their best explanation, which makes him the most probable source of the *Anonymus*. Here is a passage on the seven-month babies:

The seven-month child becomes foam in 6 days, becomes blood in <another> 8, becomes flesh in another 9, takes shape in another 12. Women who are brought to this point complete the number 35. It moves in twice the number, 70, and when this number of days is done, it is born in three times the number, 210 (transl. H. Parker).

Thus, the numbers of the ‘musical proportion’, 6, 8, 9 and 12, correspond to four basic periods of foetus formation, then the sum of these numbers is multiplied by two and by three to make 210. The second scheme is 6, 9, 12 and 18, which sum, 45, is multiplied by two and by three to make 270. The only thing that the author of the *Anonymus* had to do was to replace two and three by six and present this subject in his own chapter on the most generative number. But this was a decisive step that transformed embryological calculations, partly empirically based but mostly fanciful, into a discourse on the power of the perfect number six.

127 *De victu* 1.8. A. Delatte (1930: 171) wrongly projects the late theories onto ancient Pythagoreanism. See W. Burkert (1972: 262f.); C.A. Huffman (1993: 152); H. Bartoš (2015: 151f.).

128 According to an extract from Nicomachus in the *Theology of Arithmetic*, Diocles of Carystus, the famous doctor of the late fourth century BC, said that the period of 210 days, i.e. seven months of thirty days, equals 35×6 (*Theol. ar.* 64.4 – 15 = Diocles fr. 46 van der Eijk). There are good grounds to believe that Diocles, who counted stages of foetus formation in seven-day weeks (fr. 45a-b, from Nicomachus and Macrobius), mentioned both the fifth week (35 days) and the period of 210 days, as the author *On Fleshes*, quoted next, did (*Theol. ar.* 64.13 – 15), but hardly attached any importance to the number six. See Ph.J. van der Eijk (2001, fr. 45–46 with comm.), and J. Mansfeld (1971: 163ff.).

129 H.N. Parker (1999).

9 *The number five and Aristotle's Against the Pythagoreans, fr. 13 Ross*

Six was not the only number of marriage – the arithmological tradition also attributed this function to five. If two is the first female number and three the first male number, then five is the nuptial number by addition (κατὰ σύνθεσιν), whereas six is by multiplication (κατὰ πολυπλασιασμόν). Usually ancient writers stuck to one of two versions¹³⁰, but in the *Anonymus* the two seem to have coexisted, as they did, for example, in Plutarch¹³¹, Nicomachus¹³², Anatolius¹³³, the *Theology of Arithmetic*¹³⁴, Martianus Capella¹³⁵, etc. Plutarch, the first to present the version with the number five, clearly preferred it to the version with the number six that occurs in his writing only once. To be sure, a Pythagorean number of marriage was already mentioned in Aristotle's *Metaphysics*¹³⁶, though he did not specify anywhere which number this was. In a passage from Alexander's commentary on the *Metaphysics*, however, which has been identified by Paul Wilpert as an Aristotelian fragment and included by W.D. Ross into his *Aristotelis fragmenta selecta*¹³⁷, this number appears as five:

γάμον δὲ ἔλεγον τὸν πέντε, ὅτι ὁ μὲν γάμος σύνοδος ἄρρενός ἐστι καὶ θήλεος, ἔστι δὲ κατ' αὐτοὺς ἄρρεν μὲν τὸ περιττὸν θήλυ δὲ τὸ ἄρτιον, πρῶτος δὲ οὗτος ἐξ ἄρτιου τοῦ δύο πρώτου καὶ πρώτου τοῦ τρία περιττοῦ τὴν γένεσιν ἔχει (*In Met.*, 39.8 – 12).

Accepting that this passage really derives from Aristotle's work *Against the Pythagoreans*, we do not just give preference to the five as the ancient

130 Five: Alex. Aphrod. *In Met.*, 39.8 – 13; Asclep. *In Met.* 36.16 – 20. – Six: Philo. *In Gen.* 3.38a; Clem. *Strom.* 5.14.93.5, 6.16.139.4; Arist. Quint. 3.6; Theon. 102.4 – 6; Lydus. *De mens.* 2.11; Syrian. *In Met.*, 104.25 – 27; Philop. *In Phys.* 389.1f.

131 Five: *Aet. Rom.* 264A, 288c-d; *De def. orac.* 429A; *De Is. et Osir.* 374A. – Six: *De an. procr.* 1018A.

132 Five: Ἀφροδίτη καὶ Γαμηλία καὶ Ἀνδρογονία (Phot. *Bibl.* 144a36). – Six: καὶ κυρίως αὕτη μᾶλλον Ἀφροδίτη ζυγία τε καὶ γαμηλία καὶ Ἀνδρογονία θεολογεῖται (*ibid.* 144b6).

133 Five: 9.22 – 23; six: 10.13 – 18.

134 Three: 19.20; five: 30.19; six: 43.5.

135 Five: 7.735, six: 7.736.

136 Οἱ δὲ Πυθαγόρειοι πρότερον περὶ τινων ὀλίγων, ὧν τοὺς λόγους εἰς τοὺς ἀριθμοὺς ἀνῆπτον, οἷον τί ἐστι καιρὸς ἢ τὸ δίκαιον ἢ γάμος (*Met.* 1078b22–23).

137 P. Wilpert (1940: 369–376); fr. 203 Rose³ = fr. 13 Ross = fr. 162 Gigon. It should be noted that while fr. 203 Rose³ takes 8 lines (40.26 – 41.2), fr. 13 Ross takes 3,5 pages (38.8 – 41.15).

Pythagorean number of marriage¹³⁸, though the identification of even numbers with the female principle, and of odd with the male, is first attested in Xenocrates (see above, 352). More importantly, we also need to radically change our entire historical perspective of arithmology. Indeed, what we have in the lines quoted above and on the whole in Alexander's treatment of the first ten numbers (38.10 – 39.17), is arithmology, and if this arithmology is the ancient Pythagorean one, then its theoretical foundations were not laid down in the Early Academy and it did not originate as a literary genre in the first century BC. In my previous paper on Greek arithmology I have expressed serious doubts regarding the authenticity of this fragment of Aristotle¹³⁹. Here I can adduce further arguments for my view. Πρὸς τοὺς Πυθαγορείους α' figures in the Hellenistic catalogue of Aristotle (D. L. 5.25), and had it contained fully fledged arithmology, it would have been the most important source for the author of the *Anonymus* and other writers. As a matter of fact, we see that practically every arithmological item in Alexander's passage, including that on the number five, has strong parallels with the writings dependent on the *Anonymus*¹⁴⁰, whereas nothing in the remains of the *Anonymus* suggests that its author, or for that matter anybody else in his era, was familiar with Aristotle's description of ancient Pythagorean arithmology.

Wilpert treated very cursorily, if at all, the content of the suggested Aristotelian fragment, especially its arithmological part, and what he said on this account does not always fit the facts¹⁴¹. Thus, in Aristotle's entire criticism of the Pythagoreans he never mentions the generation of numbers or magnitudes, for the obvious reason that this is a typically Platonic idea¹⁴². Aristotle regularly uses the language of generative arithmetic and

138 Thus e.g. W. Burkert (1972: 467 and n. 8).

139 L. Zhmud (2016: 343f.).

140 See e.g.: ὡς οὖν ἄρρενός τε τοῦ πρώτου καὶ θήλεος ὁμιλία τὰ πέντε γινόμενα γάμον οἱ Πυθαγόρειοι προσεῖπον (Plut. *De E ap. Delph.* 387f-388c); τοῦ δὲ περιττοῦ μάλιστα γαμήλιος ἢ πεντάς ἐστι· τὰ γὰρ τρία πρῶτος περιττὸς καὶ τὰ δύο πρῶτος ἄρτιος· ἐκ δὲ τούτων ὥσπερ ἄρρενος καὶ θήλεος ἢ πεντὰς μέμικται (Plut. *Aet. Rom.* 264A).

141 For reactions to various arguments of Wilpert, see also the useful notes in: W.E. Dooley (1989: 63ff.).

142 The only place where Aristotle speaks of generation of the αἰδίων ὄντων in relation to the Pythagoreans clearly shows that he had in mind a physical process: ὡς τοῦ ἐνὸς συσταθέντος, εἴτ' ἐξ ἐπιπέδων εἴτ' ἐκ χροιάς εἴτ' ἐκ σπέρματος εἴτ' ἐξ ὧν ἀποροῦσιν εἰπεῖν, εὐθὺς τὸ ἔγγιστα τοῦ ἀπείρου ὅτι εἴλκετο καὶ ἐπεραίνετο ὑπὸ τοῦ πέρατος (*Met.* 1091a13–18), as he himself concedes (1091a18–20). See J. Philip (1966).

geometry in respect to the Platonists, especially in *Metaphysics* M and N¹⁴³. In the alleged Aristotelian fragment, however, the term γεννᾶν is as manifest as in later arithmology: five τὴν γένεσιν ἔχει from two and three, two generates four, six and nine are generated by three, eight by four, and ten by five. According to Wilpert, this term is originally Pythagorean, but the only example from Aristotle he adduces, concerns not the Pythagoreans, but the number speculations of Plato¹⁴⁴. The parallel passage from Theon, adduced by Wilpert, is no less revealing: whereas in Theon Aristotle reports that the Pythagoreans considered the one both even and odd (ἀρτιοπέριττον), in Alexander the same idea is expressed through the language of generation¹⁴⁵. Further, Wilpert did not mention that Asclepius' commentary on the *Metaphysics* contains a passage almost identical to that of Alexander, only with several better readings used by M. Hayduck to improve Alexander's text¹⁴⁶. Nor was Wilpert aware that Delatte had published from two Byzantine manuscripts a short anonymous arithmological extract, for the most part coinciding with the relevant commentaries of Alexander and Asclepius, and argued that these three texts derive from an unknown arithmological archetype, perhaps an earlier commentary on Aristotle¹⁴⁷. Interestingly, right after the pertinent passage, Alexander quotes the Peripatetic Aspasius (ca 100–150 AD), who discussed Pythagorean number philosophy in his commentary on the *Metaphysics* (*In Met.* 41.26 – 28). Could arithmology also come from Aspasius? The authenticity of fr. 13 Ross, the astronomical part of which is no less problematic than the arithmological one¹⁴⁸, deserves a special treatment. In the framework of the present paper it suffices to conclude that the arithmology which is present in Alexander cannot belong to the pre-Aristotelian Pythagoreans. What Alexander says on the number seven only confirms this view.

143 E.g. *Met.* 1077a23–31, 1081a22–27, 1081b10–26, 1082b28–33, 1083a32–35, b4–11, 1084a2–7, 1085a 7-b 33, 1090b5–8, 1091a12, 1092a23–24, etc. See J. Annas (1976).

144 P. Wilpert (1940: 375). τὸ δὲ δυνάδα ποιῆσαι τὴν ἑτέραν φύσιν διὰ τὸ τοὺς ἀριθμοὺς ἔξω τῶν πρώτων εὐφυῶς ἐξ αὐτῆς γεννᾶσθαι ὥσπερ ἔκ τινος ἐκμαγείου (*Met.* 997b33 – 988a1).

145 Εἶναι γὰρ τὴν μονάδα ἅμα ἀρτιοπέριττον, ὃ ἐδείκνυε διὰ τοῦ γεννητικῆς αὐτὴν εἶναι καὶ τοῦ περιττοῦ καὶ τοῦ ἀρτίου ἀριθμοῦ· ἀρτίῳ μὲν γὰρ προστιθεμένη περιττὸν γεννᾷ, περιττῷ δὲ ἀρτίον (*In Met.*, 40.18 – 20). Cf. Theon. 22.5 – 9 = fr. 9 Ross.

146 P. Wilpert (1940: 375) notes that according to Asclepius (34.16f.) justice is five, not four, but this is the only difference between the two passages; from 34.21ff. Asclepius follows the same source as Alexander.

147 A. Delatte (1915: 167–171, at 170).

148 L. Zhmud (2012a: 343f.).

10 The ungenerated seven

By far the longest chapter in the *Anonymus* is assigned to the number seven: in Philo's *De opificio mundi* it takes up forty paragraphs (89–128), fifteen of which deal with mathematics (91–100, 106–110) and the rest with the corporeal world. Nature takes delight in the number seven, says Philo, listing seven phases of the Moon, seven heavenly circles, seven ages of man, seven external and seven internal parts of the body, etc.¹⁴⁹ The symbolism of the number seven has a very rich tradition¹⁵⁰, that was actively used by our arithmologist. Since, from the purely arithmetical point of view, the number seven was not a very rewarding topic, the arithmologist divided it into the one and the six, the two and the five and the four and the three and played with these pairs of numbers.

One specific feature of the seven noted by Speusippus, namely, that it is neither a factor nor a product (fr. 28, l. 30 Tarán), becomes very prominent in arithmological literature. For this reason, says Philo, the Pythagoreans liken seven to the motherless and ever-virgin Maiden (*Leg. alleg.* 1.15), i.e. Athena, who neither begets nor is begotten. Elsewhere Philo mistakenly ascribes this identification to the other philosophers, saying that the Pythagoreans liken the seven to the ruler of all (*De opif. mundi*, 100). The arithmological literature in its entirety, however, including Philo's 'cousin' Lydus¹⁵¹, contradicts this and relates the connection of the seven with Athena to the Pythagoreans¹⁵². The passages of Lydus and Philo on the seven as Athena are very close textually and both are full of confusions¹⁵³. Thus, while Lydus ascribes this idea to Philolaus – “Rightly, therefore, did Philolaus call the number seven ‘motherless’; for by nature it alone neither begets nor is begotten”¹⁵⁴ – Philo gives a different quote from Philolaus: “There is a ruler and leader of all, god, one, eternal, abiding, without motion, himself like to himself, different from all others”, which Lydus in the next sentence cites under the name of Onetor of Tarentum¹⁵⁵. This

149 *Leg. alleg.* I, 8–15; *De opif. mundi*, 101–126. For more details, see H.R. Moehring (1995: 200–205); D.T. Runia (2001: 301f.).

150 See above, 367 and L. Zhmud (2019a: 26ff.).

151 Ὅθεν καὶ οἱ Πυθαγόρειοι Ἀθηνᾶ τὴν ἐπτάδα ἀνατίθενται (*De mens.* 3.9).

152 K. Staehle (1931), N° 43a–43k. Philo's mistake is best explained by C.A. Huffman (1993: 337f.).

153 P. Boyancé (1963: 91ff.); M. Hooker (2017²: XXXIX ff.).

154 Ὅρθως οὖν ἀμήτορα τὸν ἐπτά ἀριθμὸν ὁ Φιλόλαος προσηγόρευσε, μόνος γὰρ οὔτε γεννᾶν οὔτε γεννᾶσθαι πέφυκε (2.12, cf. 3.19, transl. M. Hooker).

155 Ἔστι γὰρ ἡγεμὼν καὶ ἄρχων πάντων εἷς αἰὲν ὢν θεός, μόνιμος, ἀκίνητος, αὐτὸς ἑαυτῷ ὁμοίος, ἕτερος τῶν ἄλλων (Philo. *De opif. mundi*, 100 = Lydus. *De mens.*

Onetor has been identified by Thesleff with Onetas (Onatas) of Croton, the pseudo-Pythagorean author of *Περὶ θεοῦ καὶ θείου*, where he discussed and refuted monotheistic ideas¹⁵⁶. Huffman prefers another Onetor, also suggested by Thesleff, the author of *Περὶ ἀριθμητικῆς ἀναλογίας* mentioned in a scholium to Proclus, the fifth book of which considered seven-, eight- and nine-month babies¹⁵⁷. That such a treatise had existed before the *Anonymus* is highly unlikely, so Onetas remains a better option, for other attested Onetors do not suit either¹⁵⁸.

Lydus' quotation from Philolaus maintaining that the number seven is motherless, placed by Diels-Kranz among the spurious fragments (44 B 20), is regarded as being genuine by Burkert and Huffman, for it has a very close parallel in Aristotle fr. 13 Ross on Pythagorean arithmology: "Since seven neither generates any of the numbers in the decad nor is generated by any of them, they [the Pythagoreans] called it Athena... who is motherless and always virgin"¹⁵⁹. Does this Lydus' quote from Philolaus come from the *Anonymus*, and does Aristotle's fragment add to its authenticity? First, we have to bear in mind that Philolaus' genuine fragments contain no word of any number being generated or assigned to god. On the other hand, there is ample evidence that under his name a pseudo-Pythagorean arithmological treatise circulated, in which angles of the triangle and the square were dedicated to different gods and various numbers were associated with gods¹⁶⁰. As a matter of fact, Lydus adduces two more references of this kind to Philolaus: first, that the dyad is "a consort of Kronos"¹⁶¹, and secondly, that the decad is "receptive of the unlimited"¹⁶². It seems reasonable, then, to assume that the quote on the hebdomad in Lydus also comes from the pseudo-Philolaic treatise and not from the *Anonymus*, for such a treatise could not have been written before the *Anonymus* and cited by the latter. A study of the arithmological work

2.12, transl. C. Huffman). One of Lydus' manuscripts reads ὀνήτωρ instead of ὁ ῥήτωρ accepted by his editor Wünsch.

156 H. Thesleff (1965: 138–140).

157 Procl. *In Rem publ.* II, 378.23 = Onetor (*FGrHist* 1113 F 4).

158 See *FGrHist* 1113 F 1–3; M.-L. Lakmann (2017: 212f.).

159 Alex. Aphrod. *In Met.* 39.3ff. = Arist. fr. 13 Ross, transl. C. Huffman; W. Burkert (1972: 249 n. 52); C.A. Huffman (1993: 337f.).

160 On this, see e.g. C. Steel (2007: 218ff.): "Pseudo-Philolaus: an example of a geometrical theology".

161 Ὁρθῶς οὖν ὁ Φιλόλαος τὴν δυάδα Κρόνου σύνευνον εἶναι λέγει, ὃν κατὰ τὸ προφανὲς χρόνον ἂν τις εἴποι (4.64).

162 Ὁρθῶς οὖν αὐτὴν ὁ Φιλόλαος δεκάδα προσηγόρευσεν, ὡς δεκτικὴν τοῦ ἀπείρου, Ὁρφεὺς δὲ κλαδοῦχον, ἐξ ἧς ὡσεὶ κλάδοι τινὲς πάντες οἱ ἀριθμοὶ φύονται (1.15).

under Philolaus' name is a desideratum. Thesleff wrongly decided that Philolaus' doxography derives from the early Academic and Peripatetic sources, while his fragments, even if they are inauthentic, can be dated at least to the mid-fourth century BC¹⁶³. As a result of this, he did not distinguish a specific arithmological treatise of Philolaus, although there are plenty of reasons to assign to it such fragments as B 8, 11, 20a-c and 23, and testimonia A 10, 11, 12, 13 *ad fin.*, 14, as well as other materials.

Therefore, there are sufficient grounds to believe that the idea of the seven that οὔτε γεννᾷ οὔτε γέννᾶται has been ascribed to the Pythagoreans only after Speusippus and Aristotle and, accordingly, that Aristotle's fr. 13 Ross is not genuine.

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163 H. Thesleff (1965: 149). To be sure, he considered spurious Lyd. *De mens.* 2.12 (on the seven) and Lucian. *Pro laps. in salut.* 5 (on the tetractys).

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