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The Evidence for Astrology in Classical Greece

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There is scholarly consensus (not quite unanimity) that astrology did not take root in Greece until early in the third century BCE, or even somewhat later.¹ In this article I will display the main evidence which strongly suggests that this is mistaken.

It must first be admitted that there is little evidence for astrology in fifth- and fourth-century Greece, and what evidence there is often delicate and ambiguous. This is an important admission, because there is always a tendency for enthusiasts in any subject to want to trace their interests as far back in history as possible, to give them an aura of respectability. There is also, in the case of ancient Greece, the added attraction of storming the bastion of Apolline rationality, since that is how the 'golden age' of Greece (by which Athens is meant, really) is commonly portrayed. Ever since the nineteenth century the culture of classical Greece (which is how I shall refer for convenience to Greece of the fifth and fourth centuries, before the age of Alexander) has been implicitly portrayed as a pure and isolated phenomenon, impervious to influences from the Near East or Africa or Thrace. And so, ranged against the enthusiasts, are those scholars who refuse to admit from the outset that their favourite authors could possibly have dabbled in anything as murky as astrology. A judicious line needs to be walked between these two extremes.

It must also be admitted that the evidence for astrology in Greece before the third century falls short in the following respects: there are extant no early horoscopes, tactfully preserved by Providence on bits of ancient papyrus,² and there are no texts which state with absolute lack of ambiguity fundamental astrological beliefs, such as that our characters and future are determined to some extent by the positions of the planets at birth (but see A5 below). The evidence points mainly to an interest in star-worship and in the philosophical foundations of astrology, and to knowledge of some kind of prediction of the future by means of the stars. Although such crude, proto-astrological kinds of prediction should be distinguished from fully fledged astrology, I hope to provide enough

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cumulative evidence to make it at least highly likely that the consensus needs revision. Even knowledge of astrology, let alone its practice, was a rare phenomenon, limited to a very few individuals - but it was an existing phenomenon.

I scarcely need to argue nowadays that fifth-century Greece did not exist in a cultural vacuum. I am not thinking of extreme theses such as that of Bernal³ (who really does himself no favours by exaggerating every aspect of his thesis), but of more sober scholarly assessments of the philosophical links between Greece and the Near East.⁴ It has recently been trenchantly concluded that: 'Hellenistic writers ... were as a rule guilty not so much of fabricating connections between Greek philosophers and the East as of over-simplifying them.'⁵ And even aside from philosophical interest in eastern ideas, there is plenty of evidence for a great deal of general cultural, diplomatic, and political contact between Greeks and, especially, Persia in the years following the momentous Persian invasions of Greece in the first quarter of the fifth century.⁶ This establishes a general background plausibility that, along with others ideas and influences, the Greeks will have come across astrology, which had already been used for up to fifteen hundred years in the Near East. This does not, of course, in itself mean that the Greeks will have adopted the practice of astrology, and it tells us nothing about when they might have done so, but it is important to note that a great deal of Babylonian astronomical knowledge was put in the service of astrology.⁷ Since no scholar of early Greek astronomy now denies that the Greeks were indebted to their eastern neighbours, it is extremely likely that what we now separate into two branches, 'astronomy' and 'astrology', came to the Greeks as a single package.⁸ In Greek, the two words *astrologia* and *astronomia* are interchangeable, both meaning basically 'star-lore', though the latter has more of the connotation of expertise in the measurements related to the heavenly bodies.⁹

Finally, by way of prefatory remarks, I should add that there is little or nothing in what follows which clashes with even a conservative account of the development of Near Eastern astrology. For instance, if, as I claim, Philolaus knew of a twelfefold division of the zodiac in Greece around 430 BCE, that does not predate secure evidence for such knowledge in the Near East.¹⁰

In what follows I group the evidence as follows: (A) evidence for knowledge of eastern astrological practices; (B) evidence for approval of such practices; (C) evidence for theoretical research and speculation on

astrological matters; (D) evidence for a practical working knowledge of astrology. Further evidence might be available (though perhaps not as much as enthusiastic scholars such as Bidez have suggested), but I believe all such evidence would be subsidiary to the literary evidence I present. In each of these four sections, A-D, the pieces of evidence are presented in approximate chronological order.

A1. The scene can usefully be set by a fragment of Ctesias, a historian of the late fifth century BCE, who wrote, *inter alia*, a history of Persia, from which we have a fragment expressing admiration for the amazing accuracy with which a 'Chaldean' priest could predict the future; the priest is said to be an expert in 'astrology and divination'.¹¹ This is unequivocal evidence of interest in eastern astrology as early as the end of the fifth century. Also, it is perhaps worth pointing out that Ctesias was writing for a Greek audience; it was Greek fascination, at the end of the fifth century, with marvels in general, and (perhaps) astrology in particular, that Ctesias was targeting.

A2. We are told, but with no supporting detail at all, that Democritus of Abdera, the famous atomist philosopher of the end of the fifth century BCE, wrote a book *On the Sacred Texts of Babylon*, which may or may not be the same as another title attributed to him, *On the Chaldeans*.¹² He also wrote a book called *On Images or on Foreknowledge of the Future*, but this was certainly not astrological, since we know from elsewhere of Democritus' belief that the gods (who for him were no more than long-lived aggregates of atoms) could appear to us as images in sleep and foretell the future.

A3. The late biographer Diogenes Laertius (c. 200-250 CE), who wrote a series of *Lives of Eminent Philosophers*, reports in the course of his *Life of Socrates*: 'Aristotle tells us that a certain Magus came to Athens from Syria, and, among other dire prognostications, predicted that he would die a violent death.' Although attributed to Aristotle,¹³ this is perhaps not a trustworthy report; but it is worth noting that the Greeks commonly confused the 'Magi' and the 'Chaldeans' - the latter being the known astrologers.¹⁴

A4. There are traces of astrological lore in Plato's *Phaedrus* (early 4th c. BCE). He talks of the gods being divided into twelve groups (246e-

247a), and the souls of the unborn are said to take on the characters of the gods whose attendants they are (252c-d): 'Each man lives after the pattern of the god of whose chorus he was a member.' These ideas in Plato may, as Dodds says, be no more than 'imaginative decoration',¹⁵ but the point is that they probably reflect acquaintance with astrology. The attempt to deny this (as by Koster¹⁶) by arguing that Plato is no apostle of determinism, but allows the souls to be better or worse followers of their particular god (248a, c), is based on the mistaken equation of astrology with absolute determinism.

A5. In the great myth with which Plato concludes his *Republic*, he assigns colours to the planets which, it is argued, are lifted directly from Babylonian astrological texts.¹⁷ The myth is also shot through with more astrological knowledge than is usually recognised, because it is subtle. We need to consider the role of the three Fates in the myth. We first come across them at 617c, where we are told that they turn the cosmic spindle on which are located all the planets. They reappear at 620d-e where every soul, on the point of reincarnation back to earth, has to pass by the three Fates. Lachesis ('she who allots') gives the soul the guardian deity it has selected, to accompany it throughout its life. Clotho ('weaver') 'ratifies the destiny' the soul has chosen; Atropos ('the implacable') makes the web woven by Clotho 'fixed and unalterable' - she weaves the warp on to Clotho's woof.¹⁸ The phrase translated 'ratifies the destiny' is astrologically loaded: 'destiny' (*moira*) is the word that later (if it did not already) came to mean 'degree of the zodiac',¹⁹ and 'ratify' (*kuroun*) is cognate with the astrological word for a planet's rulership. Now we recall that the Fates are responsible for the rotation of the planets. It is clear that the reincarnated soul is having the planetary positions appropriate for its lifetime fixed at the moment of its birth or reincarnation. I would even suggest that Clotho is responsible for the zodiacal signs, and Atropos for the planets. Be that as it may, thinly disguised in allegorical language, we have here clear evidence of knowledge of horoscopic astrology in fourth-century Greece.²⁰

A6. There is a fragmentary story, preserved on a piece of papyrus salvaged from the wreckage caused in Pompeii and Herculaneum by the eruption of Vesuvius in 79 CE, that in his old age - even more or less on his death bed - Plato was instructed in 'Chaldean' lore by a visitor from the east.²¹ Plato died in 347.

A7. There is a particular passage within *Epinomis* (*Appendix to Laws*) which has had its text altered by scholars unwilling to accept the direction in which it inevitably leads. At 987c, according to all the oldest and best manuscripts, the author (who was probably a pupil of Plato from within the Academy, rather than Plato himself) wrote: 'There are three remaining heavenly bodies, of which one is particularly slow, and is sometimes referred to as "Sun".' Since it is the planet we now know as Saturn that is being talked about, the text has been altered to: '... sometimes referred to as "Cronus".' No surprises there - and of course at first sight calling Saturn 'Sun' is very strange. But in fact, as Cumont explains, the title 'Sun' for Saturn derives from the Near East and is based on doctrine which is purely astrological: in certain horoscopic situations, Saturn was allowed to stand in for the Sun.²²

A8. Aristotle's successor as head of the Lyceum, Theophrastus of Eresus (*floruit c. 330*), reported that the Chaldeans were capable of predicting the weather, the course of a person's life, and the manner of his death, from the heavens. We cannot tell from Proclus' account (*Commentary on Plato's Timaeus* 3.151.1-9 Diehl) whether he is expressing approval, or merely reporting as a neutral observer, so it is safest to classify this as a piece of A-evidence.

B1. In a neglected passage of *Timaeus* (40c-d), Plato writes: 'But as for the circular and couple dancing of these astral deities, and their retrogressions and progressions; as for which of them come into conjunction and opposition with one another, and in what order they pass in front of one another, and at what times any of them are hidden from our sight and then reappear to frighten those who are capable of calculation and to send them signs of the future - to describe all this without visible models would be labour spent in vain.' Now, if you compare this translation with any other, you will find that all the rest have a certain 'not': '... those who are not capable of calculation ...' This 'not' occurs in all the standard modern Greek editions of *Timaeus*, but it rests on little or no manuscript authority, and should certainly be omitted. With the 'not', Plato is sneering at superstitious astrology and accusing its practitioners of needing the rational art of calculation to correct their irrational tendencies; without it, however, Plato is clearly commending

and approving the ability to calculate the movements of the planets, and to forecast events by these means.²³

B2. The premise of *Epinomis* is that ‘astronomy’ is all the knowledge needed by the rulers of the ideal city Plato proposed in *Laws*. Given the close link made in this book between astronomy and arithmology, and given the explicit statement that *astronomia* derives from the east (986e-987b), it is very likely that ‘astronomy’ is being taken to include what we now would call ‘astrology’. In any case, given the essential link in the ancient world between astrology and worship of the planets as gods, the emphasis placed in this book (as, again, in the *Republic*) on the divinity of the planets is probably not insignificant.²⁴ Here, then, the author of *Epinomis* encourages his readers to value astrology/astronomy as the supreme science.

B3. The evidence about Eudoxus of Cnidos, a close colleague of Plato in the Academy, is hard to assess. On the one hand, Cicero tells us (*De Divinatione* 2.42.87) that while Eudoxus wrote about the Babylonians’ using astrology for predicting the course of a person’s life, he was dismissive of it. If this was as far as the evidence went, we would have to count this as a piece of A-evidence. But Eudoxus also drew on Babylonian astrology in a book called *Predictions of Bad Weather*. It seems safest to conclude, with Bidez, that Eudoxus ‘did not ignore Chaldean astrology; on the contrary, after having studied it, he retained as much of it as seemed to him rationally admissible or justified by experience’.²⁵ It is possible, of course, that Eudoxus actually developed the lore he gained from the east, in which case his work belongs as a piece of C-evidence; but unfortunately we know no more about this book of predictions.

C1. We are on safer ground²⁶ with the earliest piece of evidence about astrology in classical Greece - a series of testimonia about the Pythagorean philosopher Philolaus of Croton, who lived from approximately 470 to approximately 390 BCE.²⁷ In these testimonia we are told that Philolaus dedicated the angles of certain geometrical figures to certain gods. The Neoplatonist philosopher Proclus, of the fifth century CE, is our main source, especially in passages from his *Commentary on Euclid’s Elements*; but traces of the same idea occur earlier in Plutarch’s *On Isis and Osiris*, as well as later, in the *On*

Principles of Damascius of Syria.²⁸ Now, the information in each of these authors is slightly different; more in Proclus than in either Plutarch or Damascius, and different in detail too. This makes it unlikely that they are deriving their accounts from one another. Assuming, then, that there is a common source, there is little reason (apart from prejudice) not to think that the source is Philolaus himself. This is especially so since Plutarch explicitly attributes his account to Eudoxus, which takes the report to within a century of Philolaus' life.

According to Proclus, Philolaus said that 'the angle of the triangle' was sacred four male gods - Cronus, Hades, Ares, and Dionysus - while 'the angle of the square' was sacred to three female deities - Rhea, Demeter, and Hestia. Eudoxus (or, more likely, Plutarch) did not quite get the point, because in Plutarch's account (which is ascribed more generally to 'Pythagoreans', rather than to Philolaus in particular), three gods rule the triangle (Hades, Dionysus, Ares), while five goddesses rule the square (Rhea, Aphrodite, Demeter, Hestia, Hera). Both agree that Zeus rules the angle of the dodecahedron, and Damascius adds that the semicircle was sacred to the Dioscuri, Castor and Pollux. I say that Plutarch missed the point,²⁹ because the attribution of *four* deities to the angle of the triangle, and *three* to the angle of the square, is what is authentically astrological. Four triangles can be inscribed within the twelve signs of the zodiac (one for each element), and three squares (one for each quality).³⁰

C2. In the course of the curious arithmological passage of *Republic* on the so-called 'nuptial number' (546a ff), Plato envisages that the guardians of his ideal state will use arithmological (and probably astrological) knowledge to pick the auspicious times within a lifetime for conception to occur in such a way as to guarantee good offspring who will perpetuate the harmony of the state.³¹ If I am right that astrology as well as arithmology is involved (and the connections between the two run deep in the ancient world) this is at least a strong piece of B-evidence, since Plato is not just approving of astrological practices, but encouraging them. Even granted that Plato may never have envisaged his ideal state becoming a practical reality, it remains the case that anyone reading this passage would take from it the lesson that astrology/arithmology can impart benefits to one's life. But since we have every reason to think that, while based on tradition, the speculations

Plato displays in this passage are his own, I count this as a piece of C-evidence.

Finally we come to a single piece of D-evidence. I make no excuse for saving this till the end, because it is important that it is read against the background of all the rest of the evidence, which should leave anyone with an open mind with the impression that astrology was studied - even if only by a few individuals - in classical Greece. But if it was studied, it was also surely put into practice. It is not surprising that there should be a decline in the number of pieces of evidence as we move from A-evidence to D-evidence. General knowledge of and interest in astrology is bound to be more widespread than its practice - in classical Greece as now.

D1. At both *Life of Alcibiades* 17 and *Life of Nicias* 13, Plutarch preserves an anecdotal scrap about an *astronomos* called Meton, who lived towards the end of the fifth century BCE, but about whom we otherwise have little information. One of the few other pieces of information we do have about him, however, is that he introduced the Great Year of nineteen years to harmonise the lunar and solar cycles (19 solar years = 235 lunar months).³² Since this 19-year cycle had been known in Babylonia for some time, it is clear that Meton was aware of eastern 'star-lore'.³³ As we can judge from his appearance in Aristophanes' comic masterpiece *Birds* (produced in 414 BCE), Meton was a well-known figure in Athens. Anyway, the story that Plutarch preserves about him is that shortly before the disastrous Sicilian expedition which Athens undertook in 415 BCE, and which was a major contributory factor in her defeat in the Peloponnesian War, Meton faked insanity and burnt his house down, so that he could then plead for his son to stay in Athens and look after him, and not be sent to his death on the expedition. In the version in *Nicias* Plutarch has Meton forewarned either by a series of (non-astrological) omens, or simply by using his intelligence. In *Alcibiades*, however, he says that Meton 'was prompted either by calculations [*logismos*] or by the results of divination of some kind'. Meton, remember, was an *astronomos*; it is surely probable that he used astrology to predict the disastrous consequences of the Sicilian expedition.

Here, then, are fourteen pieces of evidence for knowledge of astrology in Greece in the fifth and fourth centuries BCE, from between roughly

440 to roughly 320. They vary in impressiveness, and in how crude or refined an astrology they presume, but the most striking ones, to my mind - because the hardest to deny - are A5, which establishes beyond reasonable doubt that Plato believed in the planets' role in individual destiny, and C1, because it throws working knowledge of astrology and speculation along astrological lines back to about 440 BCE. But B1 and D1 come a close second, for all that there is a slight mist of uncertainty in their case. Nevertheless, to repeat, the cumulative effect of these fourteen pieces of evidence is overwhelmingly powerful, and certainly enough to dispel slight mists. This cumulative effect is important because most of the scholarly books one reads refer to between one and three of these texts, but ignore the rest.

It is also worth noting that, even at this early stage, a wide spread of applications of astrology seems to be covered or implied. Not only had the Greeks, within the classical period, learnt at least the basics of astrology from their neighbours to the east, but they had had time to learn a variety of techniques. Of course, much - most - work towards the development and refinement of astrology in Greece still remained to be done, but it is an implication of the evidence I have presented that there is a considerable hidden history of classical Greek astrology, probably lost for ever now, and possibly stretching a few decades further back in time before 440.

References

1. The opening of an astrological school by the 'Chaldean' Berosus on the island of Cos in 280 BCE is often taken to herald the start of astrology in Greece. For general scholarly discussions, see A. Bouché-Leclercq, *L'astrologie grecque* (Paris, 1899), and O. Neugebauer, *A History of Ancient Mathematical Astronomy*, 3 vols. (Berlin, 1957). Neugebauer's main conclusions can be more accessibly found on p.188 of his *The Exact Sciences in Antiquity*, 2nd edn. (1957; repr. Dover, 1969). This consensus opinion is repeated in summary fashion by the most recent writer on the subject: T. Barton, *Ancient Astrology* (London, 1994), p.22. Even Champion, who recognises the importance of early Greek philosophy to astrology (*An Introduction to the History of Astrology*, London: Faculty of Astrological Studies, n.d., p.16), was in 1982 apparently unaware of the majority of the evidence presented here in this article. The main voice to challenge the consensus in recent years, since (as we will see) an important piece of evidence comes from within the Pythagorean school, is W. Burkert, *Lore and Science in Ancient Pythagoreanism* (Harvard University Press, 1972). It is also commonly stated, even by sympathetic scholars such as Lindsay,

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that the adoption by Greece of the eastern practice of astrology is symptomatic of her decline from classical greatness; see J. Lindsay, *The Origins of Astrology* (London, 1971), p.91.

2. The earliest extant Greek horoscope is portrayed on the stone monument at Nimrud Dagh, cast on the orders of Antiochus I of Commagene in 62 BCE. See Otto Neugebauer and H.B. van Hoesen, *Greek Horoscopes*, 61 (Philadelphia, American Philosophical Society, 1959), pp.14-16.

3. M. Bernal, *Black Athena: The Afroasiatic Roots of Classical Civilization* (New Brunswick, 1987).

4. The most important book in this regard is still M.L. West, *Early Greek Philosophy and the Orient* (Oxford University Press, 1971), but see also, for instance, P. Walcot, *Hesiod and the Near East* (University of Wales Press, 1966).

5. P. Kingsley, 'Meetings with Magi: Iranian Themes Among the Greeks, from Xanthus of Lydia to Plato's Academy', *Journal of the Royal Asiatic Society*, 3rd series, 5 (1995), pp.173-209, at p.187.

6. See, for instance, J. Hofstetter, *Die Griechen in Persien* (Berlin, 1978).

7. See F. Cumont, *Astrology and Religion Among the Greeks and Romans* (1912; repr. Dover, 1960), chapter 1; N.M. Swerdlow, *The Babylonian Theory of the Planets* (Princeton University Press, 1998) esp. chapter 1.

8. Here I deliberately take issue with Otto Neugebauer. Despite the influence of his *The Exact Sciences in Antiquity*, one of the ways it is flawed is in its assumption that Babylonian astronomy was a separate subject from Babylonian astrology. For recent useful discussions see Alexander Jones, 'Babylonian Astronomy and its Legacy', *Bulletin of the Canadian Society for Mesopotamian Studies*, 32 (1977), pp.11-16; 'Evidence for Babylonian Arithmetical Schemes in Greek Astronomy', in H.D. Galter (ed.), *Die Rolle der Astronomie in den Kulturen Mesopotamiens* (Graz, 1993), pp.77-94; 'On Babylonian Astronomy and its Greek Metamorphoses', in F. Jamil Ragep and Sally P. Ragep (eds.), *Tradition, Transmission, Transformation*, Leiden and New York: E.J. Brill, 1996; and Francesca Rochberg-Halton, 'Elements of the Babylonian Contribution to Hellenistic Astrology', *Journal of the American Oriental Society*, 108.1 (January-March 1988), pp.51-62.

9. The same lack of distinction between the words 'astrologer' and 'astronomer' applied in English until relatively recently. The OED remarks: 'Gradually,

though not completely before the seventeenth century, astrology and astronomy took their current senses.’

10. For an accessible, consensus-opinion account of eastern astrology, see Cumont, *op. cit.*, chapter 1; or S.J. Tester, *A History of Western Astrology* (Woodbridge: Boydell, 1987), pp.12 ff; or, most recently, M.R. Wright, *Cosmology in Antiquity* (London: Routledge, 1995), *passim*. It seems unlikely that the Greek Cleostratus, at the end of the sixth century, knew the zodiacal twelvefold division of the ecliptic, as the Roman writer Pliny recorded (*Natural History* 2.8), since that would push Greek knowledge of the zodiac back to about a century before we can be certain that the Mesopotamian zodiac had been developed.

11. *FGrH* 688F1. 23-5 Jacoby. The word ‘Chaldean’ was more or less synonymous with ‘astrologer’ for the Greeks.

12. Diels/Kranz, *Fragmente der Vorsokratiker* (Berlin, 1952), 68B298b and 299d.

13. Fragment 32 Rose.

14. On this Greek confusion, see Kingsley, *op. cit.* A similarly apocryphal story is preserved by Aulus Gellius, writing in the second century CE, about Chaldeans predicting victory for Euripides in competition (*Attic Nights* 15.20.2).

15. E.R. Dodds. *The Greeks and the Irrational* (University of California Press, 1971), p.261.

16. W.J.W. Koster, *Le Mythe de Platon, de Zarathoustra et des Chaldéens: Étude critique sur les relations intellectuelles entre Platon et l’Orient* (E.J.Brill, 1951), pp.11 ff.

17. See J. Bidez, *Eos, ou Platon et l’Orient* (Brussels, 1945), Appendix 1 (Bidez cites no cuneiform references). It is universally recognised that the Greeks had distinguished the planets from the fixed stars by the middle of the fifth century.

18. ‘Fixed and unalterable’ should not be taken too literally: Plato always allowed for the possibility of self-improvement.

19. The first *known* use of zodiacal degrees dates from 263 BCE. See A. Sachs, ‘Babylonian Horoscopes’, *Journal of Cuneiform Studies*, 6 (1952), pp.57-8. For a late (5th c. CE) use of *moira* to mean degree see Proclus, *Hypotoposis astronomicarum positionum* 3.52.4: ‘The next thing to consider is where the

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sun's apogee and perigee are - I mean, in what degree (*moira*) of the zodiac they are.'

20. J.H. Holden, by contrast, claims that the Greeks 'invented' horoscopes in the third or second centuries BCE: *A History of Horoscopic Astrology* (Tempe: American Federation of Astrologers, 1996).

21. *Index Herc*, Col. III.36-41.

22. Cumont, *op. cit.*, p.28. R. Campbell Thompson, *The Reports of the Magicians and Astrologers of Nineveh and Babylon in the British Museum*, (London: Luzac and Company 1900), vol. 1, no. 176; 'Saturn is the star of the Sun and the Sun is the star of the king.'

23. I am grateful to Peter Kingsley for first drawing my attention to this 'not' and its weak manuscript authority. In his edition of *Timaeus* (Macmillan, 1888) R.D. Archer-Hind writes (p.135): 'Although the negative rests on the authority of A alone, I have retained it ... [It] would very readily be omitted by a copyist living at a time when astrology had become prevalent.' Actually, even the manuscript A was not absolutely certain of this negative, perhaps because the form in which it occurs in the Greek is grammatically unusual - another indication that we have here a case of interpolation, not omission. None of the other editions of the text even try to justify their inclusion of the negative. A.E. Taylor perfectly summarises the prevalent scholarly attitude when he says, 'Timaeus has the complete disregard for astrology (its existence among Oriental peoples was of course known to him) which marks all the Greek astronomy of the best period' (*A Commentary on Plato's Timaeus* (Oxford, 1928), p.244). Note the prejudices implicit in his use of 'Oriental' and 'best'.

24. Also in *Timaeus* we find at 42b the idea that after death souls will return to a life of blessedness in the star to which they are akin. See also *Republic* 621b.

25. Bidez, *op. cit.*, p.30

26. I say that we are on safer ground, despite the fact that the only recent detailed commentary on Philolaus denies the authenticity of these testimonia: C. Huffman, *Philolaus of Croton: Pythagorean and Presocratic* (Cambridge University Press, 1993), pp.381-91. But see the reply of P. Kingsley in his review of this book, *Classical Review* n.s 14 (1994), pp.294-6. Kingsley's notes also contain references to a number of important studies relevant to the astrological interpretation of these testimonia.

27. There is an extraordinary magical rite preserved on a papyrus dating from the third or fourth centuries CE which clearly attributes astrological knowledge to the Pythagoreans, but since it is not certain whether the Pythagorean origin of the rite is as early as fifth or fourth centuries BCE, I have not included it in the main body of this article as evidence. Nevertheless, it may serve to support the authenticity of these testimonia, by the simple fact that Pythagoreanism and astrology were indubitably linked. The papyrus contains the text (7.795 ff. in K. Preisendanz's *Papyri Graecae Magicae* (Stuttgart, 1931)) of a rite to guarantee dream divination by inscribing with cinnabar on each of the twelve leaves of a laurel branch a sign of the zodiac and crowning yourself with it. The papyrus was found in Egypt and makes use of some Egyptian symbolism, but still attributes the spell to Pythagoras (and to Democritus, on whom see A2).

28. All the sources are written as 44A14 of Diels/Kranz, and both the Greek and a translation are given by Huffman, op. cit.

29. Plutarch also assigns the disruptive deity Typhon to the number 56, an awkward divisor of the zodiacal circle. I am grateful to Nick Campion for pointing out the controversy surrounding the number 56 at Stonehenge. Gerald Hawkins and John White (*Stonehenge Decoded*, (London, Fontana, 1970)), argued controversially that there were 56 post holes in the Aubrey Circle at Stonehenge because this was best number for predicting eclipses. For the contrary point of view see Clive Ruggles, *Astronomy in Prehistoric Britain and Ireland* (Yale University Press, 1999), p.40.

30. This practice is guaranteed for later classical astrology, at any rate, by Manilius, *Astronomica* 2.270 ff. Manilius wrote in Latin at the time of the emperor Augustus, in the last decades of BCE or the first decades of CE.

31. See further my notes on this complex passage in Plato, *Republic* (Oxford University Press, 1993), pp.432-4; and, in general, J. Adam, *The Nuptial Number of Plato* (1891; repr. Kairos/Thorsons, 1985).

32. Theophrastus, *On Signs* 4.

33. See e.g. J. Lindsay, op. cit., p.32. There is also, interestingly, a report (Columella, *On Agriculture* 9.14.12, written in the first century CE) that Meton knew how to measure the ecliptic in degrees. This of course fits in with the astrological context we have established for Philolaus. Also for Meton see David Pingree, 'Legacies in Astronomy and Celestial Omens, pp.132-3, in Stephanie Dalley (ed.), *The Legacy of Mesopotamia* (Oxford: Clarendon Press 1998).