

Heraclitus and the Moon: The New Fragments in *P.Oxy.* 3710

WALTER BURKERT

The editio maior of Heraclitus by Miroslav Marcovich¹ will remain a model and a thesaurus of scholarship for a long time, especially since there is little hope that the amount of evidence preserved in ancient literature will substantially increase. Still, two remarkable additions have come to light from papyri in recent years, the quotation of B 94 = 52 M. and B 3 = 57 M. in the Derveni papyrus,² which takes the attestation of these texts with one stroke back to the 5th century B.C., and especially the totally new and surprising texts contained in the learned commentary on Book 20 of the *Odyssey* which was published in 1986 as Oxyrhynchus Papyrus 3710 by Michael W. Haslam, with rich and thoughtful notes.³ It was Martin West who called attention to these fragments in 1987;⁴ they appeared too late to be included in the new editions of Heraclitus by Diano, Conche and Robinson.⁵ Immediately after West, Mouraviev proposed an alternative reading and interpretation.⁶ It may still appear that the precious new sayings of Heraclitus are either obscure or trivial or both. Another approach to achieve a better understanding may well be tried.

The commentary on the *Odyssey* preserved in Oxyrhynchus Papyrus 3710 is astonishingly rich in quotations. The passage concerned is *Odyssey* 20. 156, with the mention of a "festival" which turns out to be a festival of

¹ *Heraclitus. Greek Text with a Short Commentary* by M. Marcovich, editio maior (Merida 1967; rev. Italian ed., Florence 1978).

² K. Tsantsanoglou and G. M. Parássoglou, "Heraclitus in the Derveni Papyrus," in A. Brancacci et al. (edd.), *Aristoxenica, Menandrea, Fragmenta Philosophica* (Florence 1988) 125–33, which supersedes the earlier treatments since W. Burkert, *Atti del Symposium Heracliteum 1981* (Rome 1983) 37–42. See further A. Lebedev, "Heraclitus in P. Derveni," *ZPE* 79 (1989) 39–47.

³ *The Oxyrhynchus Papyri* LIII, ed. with translations and notes by M. W. Haslam (Oxford 1986). Haslam repeatedly refers to remarks and evidence adduced by Edgar Lobel.

⁴ M. L. West, "A New Fragment of Heraclitus," *ZPE* 67 (1987) 16.

⁵ C. Diano and G. Serre, *Eraclio. I frammenti e le testimonianze* (Milan 1980); *Héraclite. Fragments*, ed. by M. Conche (Paris 1986); *Heraclitus. A Text and Translation with a Commentary*, ed. by T. M. Robinson (Toronto 1987).

⁶ S. N. Mouraviev, "P.OXY. LIII 3710: Les nouveaux fragments d'Héraclite," *ZPE* 71 (1988) 32–34; see also J. Barnes, *Phronesis* 32 (1987) 264 f.

Apollo (20. 278, 21. 258). Aristonicus, quoted in abbreviated form, identifies this festival as that of the new moon (*numenia*), and identifies Apollo as Helios. Aristonicus evidently was thinking of the verse τοῦ μὲν φθίνοντος μηνός, τοῦ δ' ἴσταμένοιο, which occurs twice to indicate the return of Odysseus (14. 162, 19. 307). Incidentally, Wilamowitz had come to similar conclusions.⁷ The commentator goes on to state that solar eclipses occur at *numeniai*, quoting Aristarchus of Samos, who apparently quoted Thales: ἔφη τε ὁ μὲν Θαλῆς ὅτι ἐκλείπειν τὸν ἥλιον σελήνης ἐπίπροσθεν αὐτῶι γενομένης, σημειούμε[νος τοὺς ὅρους] τῆς ἡμέρας ἐν ᾗ ποιεῖται τὴν ἔγλειψιν ("Thales said, 'The sun has an eclipse if the moon gets in front of it, and he indicated the limits of the day in which the sun has an eclipse'.")⁸ This day, we are told, is called either τριακάς or νουμηνία. There follows, asyndetically, Ἡράκλειτος with a sentence in Ionic dialect; it is unclear whether this still comes from Aristarchus. At any rate a commentator on the Heraclitus text is introduced subsequently, a certain Diodorus,⁹ who goes to some length to explain the celestial phenomena at the moon's disappearance. But the last three lines of the column are badly preserved, and 14 complete lines at least are lost from the top of the next column; it is not before the 7th line preserved that a continuous text begins to emerge again.¹⁰ Here the commentator adds another sentence of Heraclitus, stressing as it seems that "he says what is consistent."¹¹

The two sentences of Heraclitus attested in this way, as singled out by Martin West, are:

(II 43–47) συνιόντων τῶν μηνῶν ἡμέρας ἐξ ὅτου φαίνεται προτέρην νουμηνίην δευτέρην ἄλλοτ' ἐλάσσονας μεταβάλλεται, ἄλλοτε πλεῦνας.

⁷ U. v. Wilamowitz-Moellendorf, *Homerische Untersuchungen* (Berlin 1884) 54; cf. Chr. Auffahrt, *Der drohende Untergang* (Berlin 1991) 403–10.

⁸ For the supplement, cf. Hdt. 1. 74 οὐρον προθέμενος. This is a new and very important testimony for Thales. That Thales discovered the true nature of solar eclipses, through the interposition of the moon, is in fact the tradition of Theophrastus (Aet. 2. 24. 1 = Diels-Kranz 11 A 17a) and Eudemus (fr. 145 Wehrli = Diels-Kranz 11 A 17; cf. 11 A 3: "prediction" has intruded into the text in Eudemus fr. 143 = 11 A 5 and fr. 144 = 11 A 1 §23), rivalling the more popular tradition that Thales "predicted" an eclipse (Hdt. 1. 74), which he could not possibly have done; see O. Neugebauer, *The Exact Sciences in Antiquity*² (Providence 1957) 119, 142 f. Aristarchus the astronomer knows this and makes astronomical sense, tacitly correcting Herodotus, whose word οὐρος he recalls.

⁹ Probably Diodorus no. 53 Pauly-Wissowa (Lobel in Haslam), who wrote on astronomy in the 1st cent. B.C.; one Diodorus wrote Περὶ Ἀναξιμανδρου (D.L. 8. 70); hardly to be corrected to Diodotus, who explained Heraclitus (D.L. 9. 12, 15).

¹⁰ It may be that another quotation of Heraclitus occurs in lines 54–56: μεις ὅταν τὴν ἐκ τῶν [. . .] πρώτως π[ο]σῆσ[η]ται ν[ο]υ[μ]ηνίην . . . ; cf. next note.

¹¹ Πά[λι]ν λέγειν τὰκό[λουθα]. In the following sentence we have μεις as masculine (φαινόμενος), but in lines 11 ff. the commentator goes on using a feminine (φαινομένη, sc. σελήνη); this clearly marks the distinction between quotation and commentary.

(III 7–11) μεις τρ[ιταῖος] φαινόμενος ἕκκαιδ[ε]κάτη πασσέληνος φαίνεται ἐν ἡμέρ[ησι] τεσσαρεσκαίδεκα· ἀπολιμπάνει τὸ[ν] ὑπόμετρον ἐν ἡμέρῃσι γ'.¹²

The word ὑπόμετρος is new, and there seems to be no further attestation of a “first” and a “second” new moon. Thus West suggested ἐξ ὅτου φαίνεται προτέρη νουμηνίη <ε> δευτέρην, “from the appearance of one new moon to the next,” i.e. in the course of a month; Mouraviev tried ἡμέρας ἐξ[ῆς] γ' οὐ φαίνεται, and takes προτέρη, νουμηνίην and δευτέρην as three successive days, “la veille (de la néoménie), à la néoménie, le lendemain.”¹³ This means introducing, against astronomical facts, a fixed number of days, while the following text clearly insists on irregularity, and postulating an improbable name for the last day of a month, “the day before (*sc.* the new moon)”; no doubt προτέρη should be in opposition to δευτέρη.

It may be helpful to reflect briefly on the astronomical facts behind the philological problems. The average length of a synodic month is given as 29.53059 days by modern handbooks; normal Greek calendars, especially the Attic calendar, which we know best, used to alternate between months of 29—a “hollow month”—and of 30 days; in Athens this seems to have been the rule since Solon.¹⁴ In earlier times one probably relied on observation of the new moon. But it turns out to be very complicated to predict on which day the new moon will be visible for the first time: the 30th, the 31st, or even the 32nd or the 29th evening? It depends not only on the moon's distance from the sun but also on the angle between ecliptic and horizon, and of course on weather conditions.¹⁵

We know practically nothing about the calendar of Ephesus at the time of Heraclitus. But encountering the terms “first” and “second *noumenie*” in the new text, we may suppose that this refers just to the phenomena described: The appearance of the new moon on the 30th day—corresponding to a “hollow month” in Athens—would be the “first *noumenie*,” and the appearance on the 31st day the “second *noumenie*.”¹⁶

¹² Mouraviev prefers τρ[ίτη] in III 7; in III 9 the scribe originally wrote γίνεται and corrected to φαίνεται; Mouraviev prefers γίνεται.

¹³ Following Haslam (108). One would rather expect the word order γ' ἐξ[ῆς].

¹⁴ F. K. Ginzel, *Handbuch der mathematischen und technischen Chronologie* II (Leipzig 1911) 315–30; A. E. Samuel, *Greek and Roman Chronology* (Munich 1972) 14 f., 59–61; cf. also J. A. Walsh, “The Omitted Date in the Athenian Hollow Month,” *ZPE* 41 (1981) 107–24.

¹⁵ The irregularities are described by Geminus (9. 13–15). For the very complicated Babylonian methods of computation, see Neugebauer (above, note 8) §47 and *A History of Ancient Mathematical Astronomy* I (Berlin 1975) 533–40.

¹⁶ Cf. Haslam 108: “the προτέρη νουμηνίη and the δευτέρη (νουμηνίη) might be two successive days.”

This makes it possible to understand the first sentence of Heraclitus without a change—taking into consideration the Greek use of the accusative of time;¹⁷ there is even a distinctive Heraclitean rhythm:

συνιόντων τῶν μηνῶν
 ἡμέρας ἐξ ὅτου φαίνεται
 προτέρην νομηνίην δευτέρην
 ἄλλοτ' ἐλάσσονας μεταβάλλεται,
 ἄλλοτε πλεῦνας.

As the months meet,
 days since it (*sc.* the moon) makes its appearance—
 at the first *noumenie*, (or) at the second¹⁸—
 sometimes it changes fewer (*sc.* days),
 sometimes more.

In the second sentence, ὑπόμετρον can be understood in contrast to the well-attested ἐπίμετρον, “surplus,” “excess”;¹⁹ it thus should mean “rest” by subtraction.²⁰ An appearance of the moon “on the third day” would be equivalent to the “second *noumenie*.”

μῆς τριταῖος φαινόμενος
 ἑκκαίδεκάτη πασσέληνος φαίνεται
 ἐν ἡμέρησι τεσσαρεσκαίδεκα·
 ἀπολιμπάνει τὸν ὑπόμετρον
 ἐν ἡμέρησι τρισκαίδεκα.

The moon, appearing on the third day,
 appears as a full moon²¹ on the 16th,
 within fourteen days;
 it leaves²² the rest (to change)
 in thirteen days.

The calculation seems to be that the moon needs 14 days to become full; this leads from the “second *noumenie*” (third day after disappearance, i.e. second day of the month) to the 16th, and this leaves 13 days (16th to 29th) for the rest. This is explained at length in the commentary.²³

¹⁷ R. Kühner and B. Gerth, *Ausführliche Grammatik der griechischen Sprache* II.1 (Hannover 1898) 314 f.; cf. e.g. Hdt. 4. 181. 3 (τὸ ὕδωρ) τὸν μὲν ὄρθρον γίνεται χλιαρόν . . . , or 6. 127 τοῦτον τὸν χρόνον, or 2. 2. 2 τὴν ὥρην.

¹⁸ For “expressive asyndeton,” see A. Debrunner, *Griechische Grammatik* II (Munich 1950) 701; typical for Heraclitus, see especially B 67 = 77 M.

¹⁹ As suggested by Lobel in Haslam (109). Theophr. *CP* 4. 13. 7, Theocr. 12. 26 and further Hellenistic sources.

²⁰ “Le démesuré par défaut,” Mouraviev; not commented upon by West.

²¹ The form πασσέληνος is also attested in Arist. *APo.* 93a37, *PA* 680a32.

²² West has the tempting suggestion ἀποκιμπλάνει. But ὑπόμετρον may be especially fitted to ἀπολιμπάνω.

²³ Εἰ γὰρ ἐν ἡμέραις ἰδ' πασσέληνος ἦν, ἀρξαμένη φαίνεσθαι τῆι γ' (τ[η]ιγ Pap.) κατὰ τὴν νομηνίαν δῆλον ὡς οὐκ [ἐ]φαίνετ' αὐτοῖ[ς] οὐψω, ἴν' ἐπε[ῖ] ν[ῦ]ν πρώτως τῆι

Trivial arithmetic? It appears surprising indeed that Heraclitus the σκοτεινός should be concerned with counting days of the month. Nothing “deep” and obscure, allusive and pregnant. It may still be in the tradition of Thales, Anaximander, Xenophanes and indeed of Phocus of Samos, Cleostratus of Tenedos and Mandrolytus of Priene, who all seem to have written handbooks on what has been called “calendric astronomy.”²⁴ We may be inclined to dissociate Heraclitus all too much from these surroundings. Hardly a trace has been left of those Ionian books before or at the time of Heraclitus. But we may well compare two texts on the same subject, one considerably earlier, one later:

The following commands are issued by Marduk to the Moon at the creation of the world in the Babylonian epic *Enuma Elish*: “At the beginning of the month, to glow over the land, you shine with horns to mark out six days; on the seventh day the crown is half. The fifteenth day shall always be the mid-point, the half of each month. When Shamash [the Sun-God] looks at you from the horizon,²⁵ gradually shed your visibility and begin to wane. Always bring the day of disappearance close to the path of Shamash, and on the thirtieth day, the [year] is always equalized . . .”²⁶

From the other side comes the text in Philo’s book, *On the Creation of the Universe according to Moses*. Philo states that the “perfect number” 28 governs the period of the moon: “For the moon increases from its first appearance as a crescent to a half moon in 7 days, then in another 7 days it becomes a full moon, and again it comes back the same way, completing the double course, from full moon to half moon in another 7 days, and from this to crescent in the same number of days. From these the number mentioned [i.e. 28] has become complete.”

Philo, praising the order of the universe, is in fact cheating: He simply disregards those irregularities with which everyday calendars had been struggling all the time. This no less than the naive description in *Enuma Elish* brings out the emphasis of Heraclitus: Heraclitus insists that there is change, irregularity, but not irregularity alone; there is number too, the number seven evidently and its multiples that play a role—this is not at all

νοημηνία φαινομ[έν]η κατ[ὰ] τὴν ιδ' ἔστιν πασσέληνο[ς] ἔ[μ]πλε[ω]ς, τῆι γ' φαινομένη πρώτως κ[ατ]ὰ τὴν ιζ' πασσέληνος γίν[η]ται διὰ ιδ' ἡμερῶν: “If full moon was attained in 14 days, the moon which began to shine on the 3rd clearly did not shine for them at *noumenia*, not yet, so that, since now appearing first at the *noumenia* (i.e. 1st day) it becomes full moon at the 14th, if it appears first on the 3rd day, it should become full moon on the 16th, with a difference of 14 days.”

²⁴ Diels-Kranz nos. 5, 6, 11 A 19.

²⁵ I.e. the sun rises before the moon sets.

²⁶ *Enuma Elish* 5. 15–22, translated in S. Dalley, *Myths from Mesopotamia* (Oxford 1991) 256; in the last verse quoted, the translation “year” is questionable; rather “(the position of) sun is equalized, is repeated.” Cf. J. Bottéro, S. N. Kramer, *Lorsque les dieux faisaient l'homme* (Paris 1989): “Pour qu'en trentième, derechef, Tu te trouveras en conjonction avec Shamash.”

new.²⁷ What is specifically Heraclitean is that both should be in view, the change and the *logos*. This will lead directly to the famous saying on the river: The same river, but new waters all the time; unceasing change, and still identity.²⁸ Or, in other words, there is a *logos*, but the *logos* is hidden and will only appear to him who knows how to perceive identity in difference.

Given the astronomical interests of Heraclitus as illustrated by the new text, one might have another look at further astronomical fragments of Heraclitus and be more inclined to find astronomical sense in them. There is, first, B 120 = 62 M., quoted by Strabo and hence of unquestionable authenticity: ἡοῦς καὶ ἑσπέρας τέρματα ἢ ἄρκτος καὶ ἀντίον τῆς ἄρκτου οὐρός αἰθρίου Διός ("Limits of morning and evening: the Bear, and opposite the Bear, (the) boundary of bright Zeus").²⁹ Morning and evening change from day to day, but there are "limits" which stop their drifting apart or coming together, and these are in fact the limits or "measures" of the sun's course, one in the North, and one opposite. For, "if there were no sun, as for the other stars, it would be night."³⁰ Strabo may not have been that wrong in understanding the Bear to stand for the "arctic circle," though it should rather be the tropics which are in view. We do not know whether Heraclitus was familiar with this concept of the tropics; he definitely chose not to use technical terminology in this sentence. What matters is that there is constant change, and there are limits to change, which are, in this case, the "measures" of Helios. One may still take notice of the fact that girdles of that kind have been marked out in Babylonian astronomy, and there is especially the section of Enlil the Storm God adjoining the equator;³¹ Enlil would equal Zeus.

Another fragment of Heraclitus should be considered afresh in the new perspective, B 126a = 118 M.; it was judged a fake by Diels and has therefore been almost completely neglected since; only Conche in his recent edition has made an attempt to vindicate the text.³² It comes from a learned

²⁷ The association of the number 7, the moon and menstruation may well be prehistorical; the ancient evidence was collected by W. H. Roscher, "Die enneadischen und hebdomadischen Fristen und Wochen der ältesten Griechen," *Abhandlungen der Königl. Sächsischen Gesellschaft der Wissenschaften* 21.4 (Leipzig 1903); "Die Sieben- und Neunzahl im Kultus und Mythos der Griechen," *ibid.* 24.1 (Leipzig 1904).

²⁸ For the reconstruction and interpretation of B 12 = 40 M. see, besides Marcovich, G. S. Kirk, *Heraclitus. The Cosmic Fragments* (Cambridge 1954) 373–78.

²⁹ Cf. also Conche (above, note 5) 195–97.

³⁰ B 99 = 60 M.; cf. B 94 = 52 M.

³¹ Rather complicated in detail; see *Reallexikon der Assyriologie* II 386–88. For Zeus Aithrios, see H. Schwabl in Pauly–Wissowa X A (1972) 263.

³² Diels on 126a and Marcovich 589 f.; not treated in Kirk, Kahn, Diano–Serre, Robinson. See Conche (above, note 5) no. 54, pp. 209 f. Two Bears are mentioned here, as against one in B 120, but this hardly suffices for athetesis. B 120 indicates the direction; for B 126a it is remarkable that the "sign" is found twice.

source which should be basically credible, Anatolius;³³ it reads: κατὰ λόγον δὲ ὥρέων συμβάλλεται ἑβδομάς κατὰ σελήνην, διαιρεῖται δὲ κατὰ τὰς ἄρκτους, ἀθανάτου μνήμης σημείω. Diels read σημείω and made this putative dual—which is indeed impossible by linguistic standards—one of his arguments for condemnation. The evident correction was printed by Conche.³⁴ “Corresponding with the *logos* of the seasons, the number seven is put together in the (changes of) the moon, it is divided in the Bears, by a sign of undying memory.” The concept of “sign” will immediately remind us of the famous sentence about the god who does not speak nor conceal but “gives a sign,” σημαίνει (B 93 = 14 M.). And it makes sense. The constellations are not eternal for Heraclitus, nor is the moon, but there is a *logos* which endures,³⁵ a *logos* in which the number seven seems to be important; this is indicated by the constellations of the Bears, while the seasons indicate the number four, and both we find combined in the changes of the moon. The seasons in turn are governed by Helios, who has his “measures” and “limits”: It is Helios who makes the changes of the seasons appear, as Plutarch writes with reference to Heraclitus; there may be more in his text which goes back to Heraclitus than just the words ὥραι αἰ πάντα φέρουσι.³⁶

The new fragments remain puzzling in their way. Some will find that such a treatment of calendaric astronomy makes Heraclitus appear more “Pythagorean” than Heraclitean. Others will come forth with other interpretations. The “Delian diver” (D.L. 9. 12) is not in danger of losing his job.

Universität Zürich

³³ On Anatolius, see also R. Kassel, *Kleine Schriften* (Berlin 1991) 207–14.

³⁴ Translated, “pour signe de l’immortelle mémoire.”

³⁵ I must confess I prefer to take ἐόντος αἰ together in B 1 = 1 M.; but this problem, indicated already by Aristotle (*Rhet.* 1407b14), cannot be discussed here.

³⁶ B 100 = 64 M.