Michael Italicus and Heliocentrism

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POST-COPERNICAN sensibilities among modern historians have led occasionally to extraordinary claims regarding the prevalence of sun-centered planetary ideas in pre-Renaissance times.[1] One scholar has even reported the appearance of a heliocentric conception in twelfth-century Byzantium,[2] whose scientific culture was notably more conservative than that of Islam or Western Europe in astronomical matters.[3] The hypothesis of Aristarchus of Samos, that the earth circles the sun as fixed center, is supposed by P. Wirth[4] to have been assumed in a panegyric delivered by Michael Italicus on the occasion of the coronation of Manuel I in 1143.[5] If Wirth is correct, we have a remarkable situation in which the heliocentric hypothesis is not only employed, but is used without explanation or apology in an address meant to honor and even flatter the new emperor. Italicus[6] had taught philosophy, as well as rhetoric and medicine, and was described as "imitator of Plato and the second Plato" in a compliment by his contemporary, Theodore Prodromus. But there is no

[1] Such *e.g.* as those put forward by G. V. Schiaparelli, *I precursori di Copernico nell' antichità* (Milan 1873), and B. L. van der Waerden, *Die Astronomie der Pythagoreer* (= *Verh.Nederl.Akad.Wetensch.*, Afd.Nat. I.20.1 [1951]). *Cf.* nn.7–10 *infra*.

[2] P. WIRTH, "Zur Kenntnis heliosatellitisicher Planetartheorien im griechischen Mittelalter," *HZ* 212 (1971) 363–66 (hereafter 'Wirth'). This article is noted, in the most comprehensive recent summary of Byzantine science, by H. Hunger, *Die hochsprachliche profane Literatur der Byzantiner* II (Munich 1978) 242 n.30.

[3] See *e.g.* K. Vogel, "Byzantine Science," *CMH* IV.2 (1967) 264–305, and M. V. Anastos, "The History of Byzantine Science. Report on the Dumbarton Oaks Symposium of 1961," *DOP* 16 (1962) 409–11, esp. 410, where O. Neugebauer is reported to have concluded "that some among them [Byzantine scholars], though not distinguished for originality, were respectable astronomers." (Neugebauer's paper in this symposium seems never to have been published.)

[4] Wirth (363, 366) refers explicitly to Aristarchus. For Aristarchus' hypothesis see Archim. *Aren.* 1.4–7 (*Opera omnia* II, ed. J. L. Heiberg [Leipzig 1913] 218); Plut. *Mor.* 923A, 1006C; 891A (=Aët. 2.24.8, *Dox.Graec.* p.355); Sext. Emp. 10.174. The passage from Archimides is translated and discussed by T. L. Heath, *Aristarchus of Samos* (Oxford 1913) 301–10. O. Neugebauer, "Archimedes and Aristarchus," *Isis* 34 (1942–43) 6, proposed a new interpretation of Archimedes' account, whereby Aristarchus has all the other planets as well as the earth in orbit about the sun.

[5] This panegyric is no. 44 in P. Gautier, ed., *Michel Italikos: Lettres et discours* (Paris 1972). On the date of the panegyric see Wirth 364 and Gautier 276 n.1.

[6] For information about Italicus the authors are indebted principally to Gautier 5, 14–28. *Cf.* Wirth 364 and n.4.

heliocentrism in Plato, nor can we say that Italicus was a thoroughgoing follower of Plato or any single philosophical system; it was his own view, in fact, that philosophy was inferior to rhetoric. He would seem best described as a humanist, and his philosophical learning need not have been especially deep or broad, given the very general sense of the label 'philosopher' in the Middle Byzantine period.

Aristarchus, whose hypothesis was transmitted pre-eminently by Archimedes and Plutarch, is the only certain heliocentrist in the history of Greek astronomy. His predecessors Philolaus, Hicetas, and the Italian Pythagoreans in general all held the view that the earth moves along with the other planets but closest to the center, which is occupied by fire. This is a pyrocentric rather than heliocentric cosmology;[7] it has been convincingly argued that it was in no way mathematical, and was proposed less to account for the phenomena than for religio-philosophical reasons.[8] We do find scholarly claims that Heraclides of Pontus maintained either a heliocentric motion for earth or a heliocentric motion for Venus and Mercury; but the first of these two claims is no longer generally accepted,[9] and the second has been seriously undermined and will be fully refuted in a study now being prepared by one of the authors of this article.[10] The obvious questions that arise are: How widely was Aristarchus' heliocentric idea known? Was the idea advocated by anyone in twelfth-century Byzantium? If a reference to heliocentrism is actually present in Italicus' panegyric, is this the first evidence to appear that indicates an awareness of Aristarchus' idea during that era?

We are unconvinced by Wirth's interpretation of the relevant section of the encomium composed by Michael Italicus, and suggest that

[7] On Philolaus see K. von Fritz, *RE* Suppl. 13 (1973) 467–74 *s.v.* "Philolaos," and *Dictionary of Scientific Biography* 10 (1974) 589–91 *s.v.* "Philolaus of Crotona." On Hicetas see E. Wellmann, *RE* 8 (1913) 1597 *s.v.* "Hiketas (4)," and D. R. Dicks, *DSB* 6 (1972) 381 *s.v.* "Hicetas of Syracuse." See also Arist. *Cael.* 293a15–b15.

[8] W. Burkert, *Lore and Science in Ancient Pythagoreanism* (Cambridge [Mass.] 1972) 339, 348; *cf.* Arist. (*supra* n.7).

[9] H. B. Gottschalk, *Heraclides of Pontus* (Oxford 1980) 58–69, in reviewing the relevant Greek sources, effectively marshals the evidence against the view that Heraclides assigned a heliocentric motion to the earth.

[10] The attribution of the more limited heliocentrism of sun-Mercury-Venus to Heraclides, solely on the basis of a passage in Chalcidius' commentary (109–12) on the *Timaeus*, has been questioned by A. Pannekoek, "The Astronomical System of Herakleides," *Meded.Nederl.Akad.Wetensch.* B.55 (1952) 33–41; G. Evans, "The Astronomy of Heracleides Ponticus," *CQ* N.S. 20 (1970) 102–11; O. Neugebauer, "On the Allegedly Heliocentric Theory of Venus by Heraclides Ponticus," *AJP* 93 (1972) 600f. B. Eastwood is now reviewing both the full text and context of Chalcidius 109–12, as well as the manuscript diagrams for these sections; he will argue that there is no basis for attributing to Heraclides a heliocentric motion for Mercury or Venus.

examination of the form and content of the text indicates instead the absence here of heliocentrism or any other theory of circum-solar planetary motion. The Greek text follows, with a translation and commentary on salient points.[11]

(1) οὕτως ἀνέκαθεν ἐκ βασιλέων βασιλεῖς ἐφεξῆς τὸ γένος ὑμῶν ἀποτίκτειν εἴωθε, μὴ παρυβρίζοντος τέρατος. (2) καὶ τίς οὐκ οἶδε τὸν πάππον τὸν σὸν καὶ τὸν πρὸ τούτου καθ' αἷμα τούτῳ προσήκοντα, τὰ μεγάλα παρὰ πᾶσιν ὀνόματα, τοὺς θαυμαστοὺς αὐτοκράτορας; (3) ὁ γὰρ πατὴρ ἐπιλάμψας αὐτοῖς ὥσπερ ἥλιος, ἀμαυροὺς φωστῆρας πάντας ἀπέδειξε· καὶ καθάπερ τινὲς τῶν φιλοσόφων φασὶ τὸν ἥλιον μέσον τὸ κέντρον τῶν πλανωμένων πηξάμενον ἅμα καὶ τὰς ἀνωτέρας καὶ τὰς περιπεζίους σφαίρας εὐτονίας ἀποπληροῦν, οὕτως ἐκεῖνος ἤρκεσε καὶ τοῖς ἄνω γένους πρὸς δόξαν καὶ τοῖς μετ' ἐκεῖνον πρὸς ἄκραν εὐδαιμονίας. (4) καὶ ἵνα τῶν ἡλιακῶν παραδειγμάτων μὴ ἀποσταίημεν, ταῖς συμμέτροις μὲν ἀποστάσεσιν οἷά τινα φωστῆρά σε προσγειότερον ἀμυδροτέροις κατέλαμπε φέγγεσιν· ἐπεὶ δὲ κατὰ διάμετρον γέγονεν ἡ ἀπόστασις, ἐκεῖνος μέν, φεῦ τοῦ πάθους, ἦλθεν ἐπὶ δυσμάς, σὺ δέ, ἀλλ' ὦ τῆς ἀντιρρόπου τοῦ πάθους ἀγαλλιάσεως, ἐξ ἀνατολῶν ἡμῖν ἀνεφάνης ὡς ἄλλος φωστήρ.

(1) So from of old it has been the custom of your family, if you will pardon the conceit, to breed kings from kings without interruption.[12] (2) Indeed, who does not know of your grandfather and of his predecessor and blood relative, names great among all men, revered emperors?[13] (3) Still, your father[14] shone forth upon them

[11] For ease of reference we have numbered the sentences. The Greek text is that of Gautier (*supra* n.5) 278f, whose edition of Italicus' letters and speeches did not appear until after the publication of Wirth's article. Wirth's text of the excerpt, which he edited himself (*cf.* 364 n.5), is derived from one (**C** = *Bononiensis* 2412) of the two MSS. on which Gautier's edition of the speech is based. The two texts differ only in matters of punctuation; but one of these is crucial to syntax and meaning, and Gautier is obviously correct in placing a comma immediately after ἀποσταίημεν (sentence 4) rather than, with Wirth, between προσγειότερον and ἀμυδροτέροις. We have ourselves examined a photograph of the relevant passage in **C**.

[12] This is indeed a conceit. Isaac I, the first Comnenus to occupy the throne, was the uncle, not the father, of the next, Alexius I. Furthermore, over twenty years intervened between the end of Isaac's reign (1057–1059) and the beginning of Alexius' (1081–1118).

[13] The grandfather is Alexius I (1081–1118); his predecessor and blood relative (viz., uncle), Isaac I (1057–59). The reference to blood (καθ' αἷμα), which is of little or no semantic value, serves to make Italicus' metaphor appear less strained.

[14] John II (1118–1143).

> and, as the sun does to all the luminaries, took away their brightness; and just as in the view of certain learned men the sun has centered itself in the middle of the planets and simultaneously fills both the higher spheres and those below with proper tension, so did he match his ancestors in glory and his descendants in attaining the acme of prosperity. (4) To draw upon the sun for further illustration, when in proximity, he shone with fainter rays upon you as though you were some luminary nearer the horizon; but when the two of you stood at opposite ends of the heavens, then he—alas, what woe!—dropped below the horizon, while you—oh, what joy to counterpoise our woe!—appeared to us from the East[15] like another luminary.

In the solar conceit of the first part of sentence (3), the orator assumes the vantage of someone observing the heavens at sunrise. The astronomical comparisons, with their attendant images, that run from here to the end of the passage are especially appropriate in an oration addressed to Manuel I, an urbane and cultivated man with an interest in astronomy and astrology.[16] The focus of Manuel's interest was on the latter, in which he was an avid believer, employing astrology for political and military decisions and renouncing it only at the end of his life. About a decade after he assumed the throne Manuel wrote a defense of astrology against the position of an unknown monk, in which Manuel not only supported the utility and legality of astrology but also argued that it was approved by Scripture and the Church Fathers. To this tract Michael Glycas replied with an attack in which he spoke of the paralogisms of the emperor's reasoning. Sometime later Glycas was denounced, imprisoned, and blinded, possibly for his temerity in criticizing the emperor's apologia.[17] In any case, we should remember that an interest in astrology does not indicate an interest in unorthodox cosmology, since the cosmological assumptions of astrology are thoroughly conservative.

The character of twelfth-century astronomical knowledge was not advanced. With little of significance before the eleventh century, Michael Psellus and an anonymous quadrivium (containing nothing Aristarchan) offer the most noteworthy writings on cosmology and

[15] "From the East" may be an historical allusion to the fact that Manuel I was proclaimed emperor in his father's camp in the Taurus Mountains, on the eastern borders of the empire. *Cf.* Gautier (*supra* n.5) 279 n.12.

[16] The solar imagery of the speech actually begins earlier, at 277 Gautier. On Manuel I, see S. Runciman, *Byzantine Civilisation* (London 1933) 178–90, and *CMH* IV.1 (1966) 226, IV.2 (1967) 12, 219, 250f, 273f, 298.

[17] *Cf. CCAG* V.1 (Brussels 1904) 106–08. Manuel's defense and Glycas' refutation appear on 108–40.

non-mathematical astronomy during a period that in fact witnessed a decline of interest in astronomy.[18] Furthermore, the most appropriate astronomical references for a general audience would probably have been drawn from a hexameral tract, such as Saint Basil's, and never from a scientific work.[19] If we wish a sampling of the more learned, yet still general, astronomical knowledge of the time, the summary of physical questions by Symeon Seth and the *Omnifaria Doctrina* of Psellus offer good examples. Neither of these suggests any alternative to the traditional Ptolemaic ordering of planets, in which the sun is placed between Venus and Mars.[20] The initial astronomical reference in Michael Italicus' passage offers no more than the commonplace that the sun is brighter than all other luminaries and therefore diminishes their brightness. This is the case for the planets whether they shine with their own light or simply reflect it from the sun, and both opinions on this matter are reported by Symeon Seth, among others.[21]

Italicus proceeds in the second part of sentence (3) to set up a formal simile, in which the sun corresponds to Manuel's father, John, "the higher spheres" to John's ancestors Alexius I and Isaac I, and "those [spheres] below" to John's descendants, Manuel I and, by prophetic implication, those Comneni who will reign after him and continue the dynasty. Italicus is thus conceiving a cosmos in which the sun and the planets revolve about the earth and in which there is the same number of planetary spheres between the earth and the sun as there is beyond the sun. This geocentric explication of Italicus' astronomy is recommended by two obvious considerations. First, it brings the astronomical analogue of the simile into harmony with its historical analogue, which involves generations *after* as well as before John II; a heliocentric explication, inasmuch as the sun corresponds to John, would leave his descendants dangling awkwardly without a parallel in the astronomical analogue. Second, it appropriately accounts for the statement that the sun "has centered itself in the middle of the planets."

[18] See A. Tihon, "L'astronomie byzantine (du V^{e} au XV^{e} siècle)," *Byzantion* 51 (1981) 603–24, esp. 610–12. For the poverty of philosophical interests during the twelfth century *cf.* K. Oehler, "Aristotle in Byzantium," *GRBS* 5 (1964) 133–46, esp. 144f.

[19] See C. Mango, *Byzantium* (New York 1980) 166.

[20] For Symeon Seth, see Migne, *PG* 122.784–809, a work often attributed to Psellus. Psellus' work precedes it at 687–784; 748 (§100) lists the planets in the Ptolemaic order.

[21] Migne, *PG* 122.804 (§24). Symeon Seth reports that some ancients held that the sun illuminated all the planets, while others said that the planets must have their own lights, because Mercury and Venus, always below the sun, never show phases like the moon and there is no reason to assume the outer planets to be different.

In setting forth the simile Italicus begins by referring to "the view of certain learned men" that the sun is central among the planets. There is no good reason to imagine this to be a heliocentric image, for the reference is to a commonplace in the history of planetary orderings among the Greeks. The seven planets, proceeding from the moon to Saturn, have two well-known orders of considerable antiquity. Ptolemy prefers what he calls "the order assumed by the older [astronomers] ... putting the sun in the middle."[22] His reference is further explained by a contemporary, Theon of Smyrna, in discussing various orderings of the planets, beginning with the Pythagoreans, who place the orbits of the moon, Mercury, and Venus between the earth and the sun's orbit, and those of Mars, Jupiter, and Saturn beyond that of the sun. They do so, Theon explains, because they think the sun's orbit the most magisterial and, as it were, the heart of the universe; they want it, therefore, to be in the middle of the planets (*μέσον εἶναι βουλόμενοι τὸν τοῦ ἡλίου* [sc. *κύκλον*] *τῶν πλανωμένων*).[23] Perhaps most germane for Italicus would be Proclus' commentary on Plato's *Timaeus*, the most widely used commentary on that text. When he discusses Plato's planetary astronomy, Proclus attributes to "the mathematicians" the ordering of the sun "in the middle of the seven planets" (*μέσον τῶν ἑπτὰ πλανήτων*).[24] Italicus thus has more than ample basis for speaking of "certain learned men," while not saying that all learned men hold this position: for a well-known alternative locates the sun immediately beyond the moon, with all other planets beyond the sun.[25]

With regard to the Greek phrase translated as "the sun has centered itself in the middle of the planets," we find no lexical justification for assigning to the aorist middle participle *πηξάμενον* an intransitive meaning, as does Wirth (365 n.6) on the basis of a vague reference to LSJ *s.v.* *πήγνυμι*. This entry indicates in fact that the intransitive uses of this verb are strictly confined to passive and

[22] Ptol. *Alm.* 9.1 (J. L. Heiberg, ed., II [Leipzig 1903] 206f); tr. G. J. Toomer, *Ptolemy's Almagest* (London/New York 1984) 419f.

[23] *Expositio rerum mathematicarum ad legendum Platonem utilium* 3.15 (E. Hiller, ed. [Leipzig 1878] 138).

[24] E. Diehl, ed., III (Leipzig 1906) 62; tr. and annot. A. J. Festugière, *Commentaire sur le Timée* IV (Paris 1968) 85.

[25] This position was supported by the Platonist Iamblichus, according to Proclus (*supra* n.24: Diehl 65/Festugière 90), and is mentioned by Ptolemy (*supra* n.22). Theon of Smyrna (*supra* n.23: Hiller 143) attributes the view to "the mathematicians." Labelled the Egyptian system, this order is attributed to Plato by Macrobius, *Comm. Somn.Scip.* 1.19.2 (J. Willis, ed. [Leipzig 1970] 73); *cf.* O. Neugebauer, *A History of Ancient Mathematical Astronomy* II (Berlin/New York 1975) 690–93, and Toomer (*supra* n.22) 419 n.1.

perfect active forms. In our interpretation τὸ κέντρον is the object of πηξάμενον.

The statement that the sun "simultaneously fills both the higher spheres and those below with proper tension (εὐτονία)" is Stoic in origin and character, referring to the power that in Stoic cosmology holds the planets in their orbits. The notion originated with Cleanthes, who found in fire the active tonic force that works through the sun's rays to establish and maintain this harmony of motion; thus Cleanthes refers to the sun as the *hegemonikon* of the cosmos.[26] Among the authorities available to Italicus, we need only recall that Theon of Smyrna reports the Pythagorean view that the sun is both heart and ruler of the universe, while Proclus says that the sun is supposed by "the mathematicians" to "hold together" the two triads of planets on either side.[27] The "prosperity" or "happiness" (εὐδαιμονία) of the Comneni, with which Italicus ends the simile, was regarded as the *summum bonum* by all Greek philosophical schools, Stoics included.[28]

Continuing the comparison, Italicus moves in sentence (4) from a cosmic frame of reference to the perspective of an earthly observer looking at the heavens. The panegyric's "further illustration" is simply a change in vantage point to allow the fullest exploitation of the flattering solar image. There are no grounds here for the assumption that the text retains a cosmic viewpoint and shifts from its former ordering of planets to a heliosatellitic pattern.[29] The "fainter rays" may be a metaphorical allusion to the fact that Manuel I, the youngest of John II's four sons (all of whom were alive until at least the year before their father's death), was unexpectedly appointed as his successor by John on his deathbed. At any rate the astronomical situation imagined at the beginning of sentence (4) is no more specific than that of the sun and a planet close together at the horizon, in which case the solar rays are reddened by atmospheric refraction and lose the sheer brightness they have when the sun is high above

[26] See D. Hahm, *The Origins of Stoic Cosmology* (Columbus 1977) 150, 153–56. On Cleanthes see also L. Bloos, *Probleme der stoischen Physik* (Hamburg 1973) 65f. For a more summary treatment, M. Lapidge, "Stoic Cosmology," *The Stoics*, ed. J. Rist (Berkeley 1978) 161–85, esp. 169.

[27] *Supra* n.24: Diehl 62/Festugière 85. *Cf.* Proclus' remarks about Julian 'the Theurgist' (Diehl 63/Festugière 87).

[28] See *e.g.* Pl. *Symp.* 204E2–205A4; Arist. *Eth.Nic.* 1097a15–b21; [Pl.] *Def.* 412D10–E1; Chrysippus fr.16 (*SVF* III 6); and L. Edelstein, *The Meaning of Stoicism* (Cambridge [Mass.] 1966).

[29] Wirth (365) makes this assumption, recognizing as he does so that such a contradiction of cosmic patterns (whether the first is geocentric or heliocentric) is not a happy situation.

the horizon. The orator does not specify whether he has sunrise or sunset in mind. Perhaps it is the former, since the conceit ends with sunset, when the sun's departure in the West permits another luminary to become highly visible on the eastern horizon. If Italicus is thinking of a single planet throughout the sentence, Mars is the likely choice, since it is the brightest of the planets that can appear at one time "in proximity" to the sun and at another in the "opposite end of the heavens."

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