

On the Chronology of the *Anonymous Commentary to Ptolemy's Tetrabiblos*: Analysis of the astronomical evidence¹

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Abstract

In this paper, a proposal is made that the *Anonymous Commentary to Ptolemy's Tetrabiblos* (Anon. in Ptol.) was composed not before 467 and not after 575 AD. In establishing the *terminus post quem* and the *terminus ante quem*, the Author relies on astronomical data provided by the Anonymous himself in his commentary to Ptolemy, *Tetrabiblos* (= Ptol. *Tetr.*) II.10 (p. 76, ll. 16-29 Wolf). In this passage, he reports that his master completely succeeded in interpreting the appearance of a celestial beam (δοκός) as a sign of a great loss of trunks, after which a naval battle took place where many ships were sunk; moreover, the master of the anonymous commentator predicted that the comet would remain visible until the end of Mercury's retrogradation, and so it happened. As will be seen below, it is possible to crosscheck all this data to obtain a precise date of the comet's appearance: 467 AD, one year before the naval battle of Cape Bon (468 AD). These years are also consistent with the dating that can be obtained from one of the horoscopes transmitted by the anonymous commentary (p. 98 Wolf), which corresponds to a birth that actually took place in Lower Egypt on 25 June 448 AD.

Keywords

Ptolemy; *Anonymous Commentary*; *Tetrabiblos*; Greek Astrology; Chronology.

The chronological problem

The date of writing of the *Anonymous Commentary on Ptolemy's Tetrabiblos* (Anon. in Ptol.)², edited by H. Wolf in 1559, has so far been a mystery to scholars. In the absence of a modern critical edition, the philological community has condemned this work to secular oblivion. As a result, its chronology is usually set over a wide range of three centuries: IV-VI³. Indeed, a reliable *terminus post quem* can be traced back to the beginning of the fourth century, since the Neoplatonist philosopher Porphyry is expressly mentioned by the anonymous commentator⁴. As for the *terminus ante quem* (sixth century), it relies on the assumption that this work cannot date from the Byzantine period due to the pagan allegiance of his author, who refers to the moon as a goddess⁵ and claims that the sun is the king of the universe⁶.

Only Giuseppe Bezza has so far tried to reduce that chronological range of Anon. in Ptol. to a narrower period, by suggesting that this work was composed between the end of the fifth and the beginning of the sixth century⁷. Unfortunately, his untimely death prevented him from developing this argument further, but we will soon see that the Italian scholar was correct. As for the present author, in order to establish the chronology of Anon. in Ptol. it is the aim of this paper just to rely on the astronomical evidence supplied by the anonymous commentator to the reader. In doing so, I intend to avoid assuming *a priori* estimations more or less subjectively based on literary style or philosophical allegiance.

The Horoscopes of Anon. in Ptol.

Therefore, in the first place, the available information will be reviewed regarding two sample horoscopes discussed by the Anonymous in his work. As I have extensively shown in another paper, the first horoscope examined by the anonymous commentator (H¹ = Figure: W 98; Commentary: W 167.18-169.5) can be accurately dated to 25 June 448 in Lower Egypt (mainly Alexandria), while the second seems to be a slightly modified version of the first horoscope, which has been adapted to the specific instance given by the Anonymous in that passage (H² = Figure: W 112; Commentary: W 114.20-33; 114.44-52)⁸.

Critical edition of the passage dealing with H¹ (Text I)

It is worthwhile providing the critical text of the passage where the Anonymous is studying the first nativity. This passage being a commentary to Ptol. *Tetr.* IV.10.13, it begins with an extensive προθεωρία, that is, a methodological and doctrinal introduction to the last chapter of the *Tetrabiblos*. Having dealt with the planets governing the seven Ages of Life (infancy, childhood, adolescence, youth, adulthood, maturity, old age), the Anonymous goes on to explain how the ruling planets (*chronocratores*) of other life stages, which are proper to a specific birth, are to be determined. In order to illustrate this method, the Anonymous relies on a concrete example, a nativity performed in the third climate (Lower Egypt, latitude 31° ca., i.e., Alexandria and its surrounding area)⁹. Here is the critical edition of this passage¹⁰.

CONSPECTUS SIGLORUM

U	Oxford, BL, Auctarium T.5.4	s. XIII ⁴ , ff. 126v-127r
K	Oxford, BL, Savile 12	s. XIV ¹ , f. 266r-v
D	Firenze, BML, plut. 28.20	s. XIV ¹⁻² , f. 240v-241r
M	Venezia, BM, Gr. 314	s. XIV ¹⁻² , ff. 175v-176r
A	Roma, B. Angelica, Gr. 74	s. XIV ² , ff. 88v-89r
R	Oxford, BL, Rawlinson G 124	s. XIV ²⁻³ , f. 95r-v
V	CV, BAV, Vatic. Gr. 1048	s. XIV ³⁻⁴ , ff. 103v-104r
P	Paris, BNF, Gr. 2507	a. 1370 ca., f. 30r
B	München, BBS, Gr. 59	a. 1550 ca., f. 306r
W	Editio princeps (H. Wolf)	1559, f. 168, ll. 9-36
Q	CV, BAV, Barb. Gr. 274	s. XVI ³ , f. 176r-v
O	D M A R V	uel omnes uel praeter citatos
φ	B W Q	
ω	U K O	
Ω	ω φ	

Anon. in Ptol. IV.10.13 (W 168.9-21)

Φέρε οὖν ἐπὶ ὑποδείγματος πάντα τὰ εἰρημένα 1 Well, come, let us illustrate everything that has
σαφηνίσωμεν. ὑποκείσθω τοίνυν τοιαύτη τις 2 been said with an example. Let us assume a certain
γένεσις. ἥλιος Καρκίνῳ μοίρα α' (ὁ μὲν ἥλιος τὴν 3 nativity, the following one: the Sun is in Cancer 1°
ἀκτῖνα πέμπων τοῖς προηγούμενοις μέρεσι 4 (by sending its rays to the preceding regions, the
κυριεύει τῶν χρόνων, τὴν δὲ τῶν χρόνων ἄφρῃ 5 Sun is regent of the times, but we will take the vital
οὐκ ἀπ' αὐτοῦ, ἀλλ' ἀπὸ τοῦ κέντρου ληψόμεθα 6 impulse of the times not from it, but from the angle;
ὡς νῦν ἡ μὲν Ἀφροδίτη ἀκτῖνα ἔπεμψε τῇ ζ' 7 since Venus has now sent its rays over Taurus 6°, I
μοίρα τοῦ Ταύρου, τὴν ἄφρῃ ἀπὸ τῆς ιθ' μοίρας 8 have made the vital impulse from the nineteenth
τοῦ ὠροσκόπου ἐποιησάμην), σελήνη Παρθένῳ 9 degree of the ascendant), the Moon is in Virgo 27°,
μοίρα κζ', Κρόνος ἐν Λέοντι μοίρα κς', Ζεὺς 10 Saturn in Leo 26°, Jupiter in Cancer 0°, 30 minutes,
Καρκίνῳ μοίρα ο' λεπτὰ λ', Ἄρης Ταύρῳ μοίρα 11 Mars in Taurus 20°, Venus in Leo 6°, Mercury in
κ', Ἀφροδίτη ἐν Λέοντι μοίρα ζ', Ἑρμῆς 12 Gemini 19°, the ascendant in Taurus 19° and the
Διδύμοις μοίρα ιθ', ὠροσκόπος Ταύρῳ μοίρα ιθ', 13 meridian culmination in Aquarius 3°.
μεσουράνημα Ὑδροχόῳ μοίρα γ'.

1 ἐπὶ om. **K** // 2 σαφηνίσωμεν **P O φ** : σαφηνίσομεν **U K** / ὑποκείσθω **P O B W** : ὑπόδειγμα ὑποκείσθω **U K Q** // 3 ἥλιος] ὁ μὲν ἥλιος **Q** / Καρκίνῳ] Αἰγοκέρωτος **Q** / μοίρα] μοίρας **W** / ὁ μὲν ἥλιος om. **Q** // 4 πέμπων **W^{mglat}** **Q** : om. **ω B** // 6 ληψόμεθα om. **A** // 8 μοίρα] μοίρας **W** / ἀπὸ] ὑπὸ **K** // 10 μοίρα] μοίρας **K W** // 10 ἐν om. **Q** / μοίρα] μοίρας **K W** // 11 μοίρα ο' λεπτὰ λ' **Q** : ο' λεπτὰ λ' **U** : ο' λ' **P O** : 0.30 **W^{mglat}** : ολ' **K B W^t** / μοίρα] μοίρας **K W** // 12 μοίρα] μοίρας **K W** / ζ'] κς' **Q** / Ἑρμῆς] Ἀφροδίτης **W** // 13 Διδύμοις **ω** : ἐν Ζυγῷ **φ** / μοίρα] μοίρας **K W** / ιθ' **B W^{mglat}** : θ' **P ω W^t** **Q** / μοίρα] μοίρας **K W** // 14 Ὑδροχόῳ **P U K D Q** : Διδύμοις **O B** : om. **W** / μοίρα] μοίρας **K W**

The dating of H¹

Fortunately, the critical text of the above passage gives us the exact position of Jupiter (Cnc 0° 30'), which is absent in the figure provided by Wolf. This fact has been crucial in finding a very plausible date for that horoscope: 25 June 448, about 2 and a quarter hours after midnight. At that time, indeed, the ascendant being located in Taurus 19° and the meridian culmination in Aquarius 3°, the planetary positions estimated by Ptolemy's *Handy Tables (HT)*¹¹ for 25 June 448 have minimal deviations (D) if compared to the data provided by the anonymous commentator (H¹):

25 June 448	H ¹	HT	D
Saturn	Leo 26°	Leo 26° 50'	0° 50'
Jupiter	Cnc 0° 30'	Cnc 0° 24'	0° 6'
Mars	Tau 20°	Tau 20° 24'	0° 24'
Sun	Cnc 1°	Cnc 1° 01'	0° 01'
Venus	Leo 6°	Leo 6° 11'	0° 11'
Mercury	Gem 19°	Gem 19° 21'	0° 21'
Moon	Vir 27°	Vir 26° 51'	0° 9'

Thus, the first horoscope of Anon. *in Ptol.* allows us to significantly delay the above-mentioned *terminus post quem* for the composition of this work, by placing it towards the middle of the fifth century, probably in Alexandria.

“My master once saw a comet”

However, this is not the only case where the Anonymous is providing astronomical evidence that could eventually allow for a more precise dating of his work. As will be demonstrated next, a passage from Book II of Anon. *in Ptol.* will enable us to establish a more precise *terminus post quem* in the late 60's of the fifth century, as well as a rough estimate of the *terminus ante quem* in the third quarter of the sixth century (not after 575 ca.).

Critical edition of Anon. *in Ptol.* II.10.1 (W 76.16-29) (Text 2)

At the end of the introductory chapter (προθεωρία) to Ptol. *Tetr.* II.10 περὶ χρωμάτων τῶν ἐκλείψεων καὶ τῶν κομητῶν (= W 75.3-4), the anonymous commentator briefly outlines the rules to be followed, according to Ptolemy, when interpreting the astrological effects of comets. At this point, in order to better illustrate these general principles, for the first and last time in his work the Anonymous intends to remember a story concerning his own master. Here is the critical edition of this passage¹².

CONSPECTUS SIGLORUM

U	Oxford, BL, Auctarium T.5.4	s. XIII ⁴ , f. 50r
K	Oxford, BL, Savile 12	s. XIV ¹ , f. 155r-v
D	Firenze, BML, plut. 28.20	s. XIV ¹⁻² , f. 175r
M	Venezia, BM, Gr. 314	s. XIV ¹⁻² , f. 126r
A	Roma, B. Angelica, Gr. 74	s. XIV ² , f. 44r-v
R	Oxford, BL, Rawlinson G 124	s. XIV ²⁻³ , f. 45r
V	CV, BAV, Vatic. Gr. 1048	s. XIV ³⁻⁴ , f. 49r-v
P	Paris, BNF, Gr. 2507	a. 1370 ca., f. 176v
B	München, BBS, Gr. 59	a. 1550 ca., f. 254r
W	Editio princeps (H. Wolf)	1559, f. 76, ll. 16-29
Q	CV, BAV, Barb. Gr. 274	s. XVI ³ , f. 75v
O	D M A R V	uel omnes uel praeter citatos
φ	B W Q	
ω	U K O	
Ω	ω φ	

Anon. *in Ptol.* II.10.1 (W 76.16-29)

Ὁ δὲ ἡμέτερος διδάσκαλος ἔλεγε δοκοῦ τινος 1 Our master used to relate that a celestial beam-comet was once seen, and then he announced that a

σύμπτωμα, καὶ ἀπέβη περὶ τὰς καταρτίους τῶν πλοίων· πολλὰ γὰρ τότε ναυάγια συνέπεσεν ἐν τῇ τοῦ πολέμου ναυμαχίᾳ. καὶ ἄλλο δὲ παραδοξότατον διηγείτο. εἶπε γὰρ καὶ τὸ πότε παυθήσεται κατὰ τοιάνδε αἰτίαν. ἐπειδὴ τὰ τοιαῦτα τῶν σχημάτων ἀποτελεῖται ἐκ τῆς τοῦ Ἄρεος καὶ τοῦ Ἑρμοῦ συνοικειώσεως, εὗρισκε τότε τὸν Ἑρμῆν προσθέτην καὶ εἶπε μέχρι τῆς ἀφαιρέσεως αὐτοῦ μένειν τὸ ἐπιφαινόμενον. καὶ οὕτω γέγονε. δεῖ οὖν σκοπεῖν τὴν ἐγγυὸς τοῦ Ἑρμοῦ ἢ τοῦ Ἄρεος ἀφαιρέσιν καὶ λέγειν μέχρι τότε τὴν φαντασίαν διαμένειν.

misfortune concerning tree trunks would be fulfilled, and so it did happen as to the masts of the ships: then, indeed, there were many shipwrecks in the naval battle of the war. And he told about a quite extraordinary achievement as well: indeed, he also said when and why the comet would disappear altogether. Since the effects of such appearances are due to their affinity with Mars and Mercury, he discovered that Mercury was then in direct motion, so he claimed that the appearance would be kept up until the retrogradation of Mercury. And so it did happen. One must therefore examine the nearest retrogradation of Mercury or Mars and say that the apparition remains until then.

2 εἰρηκέναι] εἰρηκέναι D / ἀποβήσασθαι P U K D Q : ἀποβήσεται O B W // 3 καταρτίους U K¹³ : παρακτίους O φ : παρακατίους P // 4 post πλοίων spatium vacuum rel. D A V, add. ζητεῖ M¹⁴ / τότε ναυάγια P O B W : ναυάγια τότε U K Q // 5 τοῦ πολέμου] τοῦ πομὰ πολέμου K // 6 παραδοξότατον] παραδοξώτατον Q / διηγείτο] διηγείται B // 7 παυθήσεται] παυθήσεν W / κατὰ om. K // 9 τοῦ Ἑρμοῦ P O φ : Ἑρμοῦ U K / συνοικειώσεως P O φ : οἰκειώσεως U K // 10 τότε ω φ : ὁπότε P // 11 ἐπιφαινόμενον] ἐπιφανόμενον Q // 12-13 τοῦ Ἑρμοῦ ἢ τοῦ Ἄρεος P O φ : τοῦ Ἄρεος ἢ τοῦ Ἑρμοῦ U K // 14 διαμένειν ω φ : διαμενεῖν P

Critical edition of Anon. in Ptol. II.10.1: the recension of Isaac Argyrus (Text 3)

Around 1370, in Constantinople, the Byzantine scholar Isaac Argyrus composed a fresh recension of Anon. in Ptol., whose autograph manuscript has been preserved: MS Paris, Bibliothèque Nationale de France, Grec 2507 (P). The text of the above passage in P differs slightly from that of the anonymous commentator, but it offers a better understanding of some of the ambiguous phrases of the original source (the textual variants in P are in italics, except for the changes in the word order):

Ἔλεγε δὲ καὶ ὁ ἐμὸς διδάσκαλος ὅτι δοκίδος τινὸς ὀφθεισίης ποτὲ εἶρηκε περὶ τὰ ξύλα ἀποβήσασθαι τὸ σύμπτωμα, καὶ ἀπέβη περὶ τὰς παρακατίους†¹⁵ τῶν πλοίων. καὶ πολλὰ δὲ τότε ναυάγια συνέπεσεν ἐν τῇ τοῦ πολέμου ναυμαχίᾳ. καὶ ἄλλο δὲ παραδοξότατον διηγείτο. εἶπε γὰρ καὶ τὸ πότε παυθήσεται διὰ τοιάνδε αἰτίαν. ἐπειδὴ γὰρ, ἔλεγε, τὰ τοιαῦτα τῶν σχημάτων ἀποτελεῖται ἐκ τῆς τοῦ Ἄρεος καὶ τοῦ Ἑρμοῦ συνοικειώσεως, εὗρισκεν ὁπότε ἔσται ὁ Ἑρμῆς προσθέτης καὶ εἶπε· μέχρι τοῦ παύσασθαι ἀφαιρεῖν, ὃ ἔστι μέχρι τοῦ ἄρξασθαι προστιθέναι, διαμενεῖ τὸ ἐπιφαινόμενον. καὶ οὕτω γέγονεν. δεῖ οὖν σκοπεῖν τὴν ἐγγιστα τοῦ Ἑρμοῦ ἢ τοῦ Ἄρεος ἀφαιρέσιν καὶ λέγειν μέχρι τότε τὴν φαντασίαν διαμενεῖν.

1 My master used to relate that a celestial beam-comet was once seen, and then he announced that a misfortune concerning *the* tree trunks would be fulfilled, and so it did happen *at the ship's anchorages*: and then, indeed, there were *just* many shipwrecks in the naval battle of the war. And he talked about a quite extraordinary achievement as well: indeed, he also said when and why the comet would disappear altogether. Since the effects of such appearances, *he said*, are due to their affinity with Mars and Mercury, he discovered *when Mercury should be* in direct motion, so he claimed that the appearance would be kept until the retrogradation of Mercury *was over, that is to say*, until *his direct movement would start again*. And so it did happen. One must therefore examine the nearest retrogradation of Mercury or Mars and say that the apparition *will* continue up until then.

Commentary: dating methodology

As we can see, the two available versions of this text¹⁶ report three events that, if cross-referenced with each other, could provide us with the date of the comet seen by the master of the anonymous commentator: a) In those days, a celestial beam-comet (δοκίς) was seen in the sky; b) Shortly afterwards, a naval battle took place where many ships were wrecked and many masts were lost (the “tree trunks” referred to in the master’s prediction); c) Furthermore, the comet appeared when Mercury was still in direct motion (this is

expressly stated by the text of Anon. *in Ptol.*) and was extinguished, as Argyrus opportunely points out, at the end of Mercury's retrograde motion.

The third event (section c) depends on the correct interpretation of the technical terms πρόσθεσις/προσθέτης and ἀφαίρεσις/ἀφαιρέτης as applied to the motion of the planets. In general, these terms, as well as the adjectives προσθετικός/ ἀφαιρετικός, have two meanings: an absolute meaning ("direct/retrograde in their longitudinal motion"), which only applies to planets, and a relative meaning ("faster/less than their average speed": προσθετικοί/ἀφαιρετικοί τοῖς ἀριθμοῖς), which can be applied to both planets and luminaries¹⁷. As the passage in the anonymous commentary on comets refers only to Mars and Mercury, it is more likely that its author is employing such terms with their absolute meaning¹⁸: on the one hand, a planet is 'direct' or 'additive' (προσθέτης/προσθετικός) when, being in the outer semicircle of its epicycle, it moves in the same direction (from west to east) as the center of the epicycle on the orbit of the planet (or deferent); on the other hand, a planet is 'retrograde' or 'subtractive' (ἀφαιρέτης/ἀφαιρετικός) when, being in the inner semicircle of its epicycle, it moves in the opposite direction to that on the deferent. In the framework of the theory of the epicycles, systematized by Ptolemy in the *Almagest*, a planet is in direct motion until it reaches the first station (πρῶτος στηριγμός), at which it appears to stand still before beginning retrograde motion; at the end of its retrogradation, a planet reaches the second station (δεύτερος στηριγμός) before regaining direct movement.

In this regard, there is a passage in the *Anonymous Commentary to Ptolemy's Tetrabiblos*, which undoubtedly shows what its author meant by πρόσθετης/πρόσθεσις (i.e., a planet in direct motion, until it gets to the first station) and by ἀφαιρέτης/ἀφαίρεσις (i.e., a planet in retrogradation, moving from the first station to the second station):

Anon. *in Ptol.* III.12 Περὶ μορφῆς καὶ κράσεως σωματικῆς (W 134.51-135.10)

Καθόλου γὰρ οἱ ἀστέρες ἀνατολικοὶ μὲν ὄντες ἀδιαφθόρους τὰς οἰκείας οἰκειότητος καὶ σώους ποιοῦσι· δυτικοὶ δὲ, ἀσθενεστέρας καὶ οὐ τὰς αὐτὰς· καὶ ἔφθοι μὲν ὄντες καὶ ἀνατολικοὶ μεγάλα ποιοῦσι τὰ σώματα, τὸν δὲ πρῶτον στηριγμὸν ποιοῦμενοι τὸν ἐπὶ ἀφαίρεσιν εὐτονα καὶ ἰσχυρά (δοκοῦσι γὰρ καὶ αὐτοὶ ἐν τῇ προσθέσει ἰσχυρότεροι εἶναι), ἀφαιροῦντες δὲ ἀσύμμετρα, στηρίζοντες δὲ ἐπὶ πρόσθεσιν τὸν δεύτερον στηριγμὸν ἀσθενῆ, ἐπειδὴ οὐπω ἰσχυροὶ ἐν τῇ προσθέσει γεγόνασιν, ἀλλ' ἔτι φέρουσι τὰ τῆς ἀφαιρέσεως λείψανα. δυτικοὶ δὲ ὄντες, ἄδοξα καὶ ἀσύμμετρα καὶ πρὸς κακοχυμίαν ἐπιτήδεια.

In general, the planets when oriental keep their specific properties uncorrupted and sound, but when they are occidental, they are weaker and not identical. If they are matutine and oriental, they make the bodies large; when making the first station, being about to start their retrogradation, well constituted and strong, for they themselves seem to be stronger in their direct motion; when retrograding, ill-proportioned; when making the second station, being about to start their direct motion, they are weak, since they have not yet strengthened in their direct motion, but still carry the burden of their retrogradation. If they are occidental, they are dark, ill-proportioned and prone to unhealthy humors.

Besides defining the key technical terms beyond any doubt, this text also shows that the planets are stronger in the first station and very much weaker in the second station, once their retrogradation is over. This is also the reason why a comet is more likely to disappear *at the end* of Mercury's retrogradation than at the beginning, which is how Isaac Argyrus (above, Text 3, ll. 11-14) rightly understood the ambiguous phrase *μεχρὶ τῆς ἀφαιρέσεως* in the text of the anonymous commentator (above, Text 2, ll. 10-11). On the other hand, the clarification of Argyrus is consistent with the doctrine on planetary action held by Ptolemy himself in the *Tetrabiblos*: whereas the effects of the planets have more strength while in direct motion, they become less efficient during their retrograde period¹⁹. Since comets are naturally associated with Mars and Mercury, in that they have a dry and fiery nature and generate warm winds, these appearances, the master of Anonymous seems to argue, tend to disappear once Mercury's retrograde motion is over²⁰.

Comets were ominous signs. It is to be expected, then, that if the master of the Anonymous, a specialist in Ptolemy's *Tetrabiblos*, lived somewhere in the Eastern Roman Empire, a naval battle where so many ships were lost should point to a severe defeat of the imperial fleet. Due to the unchallenged supremacy of the imperial navy of Constantinople over the eastern Mediterranean from the fifth to the eighth centuries, when the Arabs emerged as a serious threat to Byzantine ships, not many sea battles took place between these two dates, let alone those which were lost by the emperor's admirals. Nevertheless, in order not to stretch the field of the search too far, I do not intend to take for granted that the anonymous commentator is talking about a Byzantine defeat at sea, but simply about a naval battle where "there were many shipwrecks".

Thus, in order to obtain a plausible date for the naval disaster referred to by the master of the Anonymous, the following two conditions should be simultaneously met: a) That one of the naval battles held in the Mediterranean between 450 and 750²¹ was coincidentally preceded by the appearance of a comet (among the very numerous phenomena recorded by both Greek and Chinese sources²²) shaped like a beam or column (δοκός / δοκίς); b) That this comet emerged when Mercury was still in direct motion and vanished as soon as the retrograde period of that planet was finished.

Once the dating of this phenomenon is achieved, a *terminus ante quem* could be obtained for the composition of Anon. *in Ptol.* by adding at about 100 years to the date of the comet. This seems to be, in any case, the maximum period of time which can possibly have gone by between the occurrence of the comet and the composition of the anonymous commentary, if the event, let us assume, would have been told by an old master to a young disciple who was beginning his studies beside him.

Comets and naval battles in the Mediterranean Sea between 450-750

Next, the following data, which has been gathered for the period between 450-750, is going to be cross-checked with each other: a) The naval battles that resulted in "many shipwrecks"; b) The comets that preceded them; c) Whether their disappearance in the sky is recorded in the sources and coincides with the end of the retrograde motion of Mercury²³. Of course, the comets must have a beam-like shape (δοκός / δοκίς) at some point between their appearance and disappearance, i.e., they must have a long tail. In this respect, it should be noted that, in Chinese and Korean sources, a comet with a uniform coma and an indiscernible tail is often referred to as a *po* ("sparkling star"), while a comet that has already developed a perfectly visible tail is called a *hui* ("broom star")²⁴.

Naval battle of Cartagena/Lucentum (summer of 460)

In a surprise attack, Gensericus destroyed the fleet of 300 ships that, on the coast of Elche (today's Santa Pola), were being equipped by Majorianus, the emperor in Rome, and definitively frustrated the imperial project to destroy the vandal power in Africa and to save the Western Roman empire²⁵.

The first two comets that have been recorded before that battle date to 454 and 453, but, in both cases, they were a "sparkling star", so must be discarded²⁶. If we go back in time, we find that, in the year 451, Halley's Comet was visible in the morning sky. The sources do not agree on the exact duration of the phenomenon: a Chinese record puts its appearance on 10 June 451, but does not mention when it disappeared; two other Chinese sources point out that this 'broom star' became visible at some point during the lunar month that stretches from 15 June to 14 July; the chronicler Hydatius dates Halley's Comet between 18 June and the period between 16 July and 1 August²⁷; Finally, the *Consularia Italia* of 451 do not give accurate dates of this comet, but instead indicate that it remained in the sky for 30 days²⁸. Nevertheless, none of these dates correspond to the stations of Mercury referred to by the Anonymous: on any of the possible dates for the appearance of Halley's Comet (10, 15 or 18 June and 14 July), Mercury was in direct motion; as for its disappearance, neither 1 nor 12 August (which is obtained by adding 30 days to 14 July) fit, since Mercury's retrograde period lasted from 7 (Vir 3° 29' 13'') to 29 August (Leo 22° 34' 5'').

Naval battle of Cape Bon (468)

This battle was a complete disaster for the highly powerful imperial fleet under the command of Basiliscus, which included ships and infantry both from the West and the East, compared to Gensericus' Vandal army, which was much smaller in number and strength. As a matter of fact, there was almost no occasion for a

naval battle as such, because Gensericus, taking advantage of a five-day truce and a favorable wind, made a surprise attack from Carthage at night, by launching fire ships against the imperial fleet anchored off the eastern shore of the present Gulf of Tunis; then, in the midst of the confusion arising from the burning of the ships, he attacked and sank a substantial part of the Roman navy²⁹. According to Procopius, in the vicinity of the battle scene - which we know is next to Cape Bon because he himself reports the distance of 280 stadiums between the battle spot and Carthage - there was a temple devoted to Mercury, which is why the ancient sources call Cape Bon “Mercury’s promontory”³⁰.

One year before the battle of Cape Bon, which, as we have seen, involved massive wrecks of the imperial ships, Chinese and Greek sources record the appearance of a not too bright comet in the evening sky³¹. The Chinese source describes it as a “white vapor” and dates its emergence to 6 February 467. For the author of the *Chronicon Paschale*, this celestial sign was what some people used to call *σάλπιγξ* (“trumpet”), others *λογχίας* (“spear”) and others *δοκίς* (“beam”), and it remained in the sky for several days³². On the other hand, Theophanes states that it was “a cloud shaped like a trumpet” (*σάλπιγξ*) and was in the evening sky for 40 days³³. Despite the terminological fluctuation of the *Chronicon Paschale*, the three kinds of comets named by its author are almost comparable with each other, as they all have a thin and elongated tail in common³⁴. However, it is not impossible that this cloudy comet was gradually changing its shape as the days went by, widening out its own tail until it acquired the shape of a trumpet³⁵.

As for the dates, they fit almost perfectly with the stations of Mercury recorded by the master of the Anonymous. Indeed, if we combine the account of the Chinese record with the testimony of Theophanes, the comet first appeared on 6 February 467 and should have been no longer visible after 40 days, that is, on March 17. On the first date, Mercury was still in direct motion (Psc 5° 16′) and its retrogradation period lasted from 21 February (Psc 16° 22′ 5′) to 15 March (exactly, 15 March, about 11 hours after noon: Psc 2° 12′ 53′), i.e. almost 39 days after the emergence of the phenomenon. Within a margin of error of only one day, we can undoubtedly consider this comet of 467 as a very plausible candidate to be the one referred to by the Anonymous.

Destruction of the fleet of Vitalianus (515)

In 513 Vitalianus, *magister militum* of the province of Thrace, revolted against the Emperor Anastasius. After assembling a fleet of 200 ships, he headed for Constantinople to claim the throne, but, at the entrance to the Golden Horn, his ships were almost completely wiped out by the admiral Marinus, who, according to Malalas, employed a sulfur-based incendiary substance to destroy the enemy fleet³⁶.

On 15 August 507 a comet was seen in the morning sky, but it was a ‘sparkling star’, according to the only Chinese source recording it³⁷. One has to go back to the year 501 to find a comet reported before that naval engagement, and this circumstance would be enough to rule it out as applicable. It is a “long-tailed star” which, according to one of the two Chinese sources recording it, appeared in the sky on 13 February 501. If the celestial object registered by the same source on 14 April is the comet in question, as modern scholars suggest, it could have then been observed shortly before its disappearance³⁸. However, the closest stations of Mercury do not fit with these dates, since its retrogradation period lasted from 29 May (Gem 27° 37′ 5′) to 21 June (Gem 12° 21′ 56′).

The previous year, between January and October 500, another comet was noticed, which was recorded by a single Syrian source, Joshua the Stylite³⁹. It was a spear-like comet, visible in the evening sky to the southwest⁴⁰. The dates could fit with the stations of Mercury: of the three retrograde periods of this planet verified in the year 500, the final one lasted from 9 (Sco 0° 59′ 35′) to 31 October (Lib 22° 48′ 22′). The main objection to accepting this comet as applicable is the long interval of 15 years separating it from the naval battle.

Destruction of the fleet of the Roman general Maximinus in Naples (543)

During the siege of Naples by the Gothic king Totila, Emperor Justinian I sent Maximinus as Prefect of the praetorium in Italy, and with him a fleet consisting of Thracian and Armenian soldiers. When the fleet arrived in the bay of Naples, a fierce storm pushed the imperial ships to the coast, right where the Goths

had set up their camp, so that these, boarding the ships, easily killed the enemy soldiers and sank all of Maximinus' ships without opposition⁴¹.

According to two Chinese sources, a comet appeared on 17 November 539⁴², also reported by Procopius of Caesarea⁴³: "At that time also the comet appeared, at first about as long as a tall man, but later much larger. And the end of it was toward the west and its beginning toward the east, and it followed behind the sun itself. For the sun was in Capricorn and it was in Sagittarius. And some called it "the swordfish", because it was of goodly length and very sharp at the point, and others called it the bearded star; it was seen for more than forty days"⁴⁴.

If the data from the Chinese sources is compared with those supplied by Procopius, we can see that the positions of the Sun given by Procopius correspond to the disappearance of the comet. As a matter of fact, when the comet appeared on 17 November 539, the Sun was in Sco 24° 28' at noon; 45 days later ("more than 40 days" according to Procopius), that is, on 1 January 540 the zodiacal length of the Sun was Cap 10° 39'. As for the stations of Mercury, they do not fit the requirements indicated by the Anonymous. At the time of the appearance of the comet on 17 November 539, Mercury was in Sco 3° 9' at noon and moving directly, but on 1 January 540 it had not yet reached the first station. Nor does 30 January 540, another date proposed by modern researchers for the disappearance of the comet, match the end of the retrograde period of Mercury, because this lasted from 10 February (Psc 5° 10' 15'') to 3 March 540 (Aqr 20° 31' 2'').

Naval battle of Senigallia in the Gothic War (551)

A Byzantine navy of 50 ships sailed to the rescue of Ancona, besieged by Totila, and, off the coast of what is now Senigallia (*Sena Gallica*), defeated the fleet of the Goths, comprising 47 ships. According to Procopius, the inability of the admirals of the Goths to keep an orderly formation turned the battle in favor of the Romans, who destroyed almost all of the enemy ships⁴⁵.

No celestial sign has been registered between the comet of 539/40, discussed in the previous section, and the battle of Senigallia, so this naval engagement cannot be regarded as the one referred to by the Anonymous. In any case, even assuming that the comet of 539/40 might have been an omen for this battle, there are two main objections to considering it as a serious candidate: a) In that battle the Goths only lost about 40 ships of their fleet of 400 warships (10% of the total); b) As we have already seen, the disappearance of that phenomenon does not match the end of the retrograde motion of Mercury.

Naval battle during the Persian siege of Constantinople in the summer of 626

In this battle, the Byzantine fleet intercepted the canoes (*μονόζυλα*) of the Avars and Slavs, as they tried to transport the troops of the Sassanid Persians down the Bosphorus. Several days later, a massive assault launched by the Slavic flotilla through the Golden Horn was neutralized by the imperial navy, which managed to sink and/or burn the enemy canoes⁴⁶.

A first problem arising from that battle is concerned with the naval equipment of the canoes made available to the Persians by Slavs and Avars. Did they have masts and sails so that they could quickly sail across the Bosphorus with favorable winds? The Anonymous expressly speaks of the masts of the ships wrecked "in the naval battle of the war", so that the battle of the Bosphorus might be taken into account only if the Avar and Slavic canoes were equipped with masts and sails⁴⁷.

A few months before the Persian naval attack across the Bosphorus, "an extraordinarily bright comet appeared for four days in the west, after sunset"⁴⁸. Three Chinese sources provide the exact dates of its appearance and disappearance: 26 and 31 March 626, respectively. They also correctly indicate that the phenomenon passed through Aries, the Pleiades and Perseus⁴⁹. However, the closest period of Mercury's retrogradation lasted from 29 May (Gem 27° 54' 26'') to 21 June (Gem 12° 40' 12''). Furthermore, the Chinese records characterize this comet as a 'sparkling star' (which is not inconsistent with the testimony of the *Chronicon Paschale*). Thus, 626 must be discarded as the year when the master of the anonymous commentator saw the *δοκίς*.

There are two other comets that preceded the naval battle of 626 on the Bosphorus by 9 years, but neither of them meets all the requirements set by the Anonymous. A Chinese source records that a 'sparkling star' was visible in the evening sky during the lunar month stretching from 9 July to 6 August 617⁵⁰. The closest retrograde period of Mercury was from 10 July (Leo 9° 53' 44'') to 2 August 617 (Ccn

26° 8′ 58″). Although there is a very narrow margin of error in this case (4 days), this comet did not adopt the shape of a δοκός / δοκίς and preceded the siege of 626 by 9 years.

The second comet of 617 is indeed a ‘broom star’ according to the Chinese source recording it, but it was visible in the evening sky during the lunar month ranging from 6 October to 3 November of that year⁵¹. In that period Mercury was almost always in direct motion, its closest retrograde period being from 3 (Sco 25° 11′ 39″) to 25 (Sco 15° 18′ 52″) November 617.

Naval battle of Phoenix (Lydia) or “of the masts” (655)

After a series of campaigns undertaken by the newly created Arab fleet against Cyprus (649), Crete and Sicily, to the point of seriously threatening the imperial power over the Mediterranean, the Arabs and the Byzantines, the latter under the command of Emperor Constantius II himself, fought the so-called naval battle “of the masts” in the open sea. Arab, Byzantine, Syrian and Armenian sources all agree that the victory was for the Arabs, but also that both sides endured heavy losses of ships⁵². The point is that, from then onwards, the naval power of the Byzantines over the Mediterranean was seriously challenged by the Arabs. The name of “battle of the masts”, transmitted by Arab sources, points to the huge amount of destroyed masts⁵³, which is a rather curious coincidence with the masts upon which the prophecy announced by the master of the anonymous commentator was supposed to be fulfilled⁵⁴.

From a single Korean source, we learn that a ‘broom star’ was visible during the lunar month ranging from 5 September 647 to 3 October. However, the nearest retrogradation of Mercury lasted from 31 August (Vir 25° 19′ 57″) to 21 September (Vir 16° 28′ 7″). This means that, when the phenomenon first appeared in the sky, Mercury was already in retrograde motion. Thus, this comet does not meet the requirements of the prophecy made by the master of the Anonymous. Other comets that emerged in previous years (632, 634, 639, 641, 642) are too far away from the time of the naval battle (655) to be deserving of discussion⁵⁵.

Naval battle during the first Arab siege of Constantinople (677-678)

In this battle the Arab fleet was almost completely destroyed by the “Greek fire” shot by the Byzantines at the enemy warships, so that Emperor Constantine IV managed to put an end to a long-term siege of the capital⁵⁶.

Between the summer and autumn of 676, a very bright comet, looking like a fire column, was visible in the morning sky for two or three months, according to the many sources that reported it. Most sources set the appearance in the month of August and the disappearance at the end of October or early November⁵⁷. The nearest retrograde periods of Mercury do not match those dates, though: from 14 July (Leo 13° 30′ 9″) to 5 August (Leo 0° 2′ 44″) and from 7 (Sco 28° 57′ 53″) to 29 November (Sco 18° 46′ 17″).

Naval battle during the second Arab siege of Constantinople (717-718)

In the final stage of the second siege of Constantinople, the new caliph, Umar II (717-720), sent a fleet of 400 ships from Egypt and from Africa an additional naval force of 360 ships. Although both fleets anchored at different points off the Asian shore of the Sea of Marmara, sheltered from Greek fire, the defection of their crews, including many Christians from Egypt, and the intelligence provided to the emperor by the refugees allowed Leo III to launch a frontal attack onto their moored positions, destroying a great number of enemy ships with Greek fire and seizing the remaining ones with all their equipment and war weapons⁵⁸. In August 718, the siege forces withdrew on the caliph’s command.

From 10 August 712 or during the lunar month from 9 July to 6 August (depending on the alternative dates provided by various Chinese sources), a ‘broom star’ was visible at first in the evening sky, then in the morning sky⁵⁹. We do not know the precise date when the phenomenon ceased to be seen, but it should have remained visible for two or three months so that it could have disappeared at the end of Mercury’s retrogradation, which lasted from 13 September (Lib 7° 54′ 42″) to 5 October (Vir 29° 46′ 58″).

According to a Syrian source, a comet shaped like a spear appeared in the evening sky on 8 August 711. On the other hand, Bar the Hebrew states that the comet showed up in September and remained visible for a month⁶⁰. In 711 the nearest retrograde motion of Mercury lasted from 2 (Lib 23° 54′ 28″) to 23 October

(Lib 15° 59' 36''). Thus, only if the comet had appeared at the end of September would its disappearance have matched the end of Mercury's retrogradation.

In 708 and 709 there are records of some comets, but these all are 'sparkling stars'. Much closer to the end of Mercury's retrograde period is a 'broom star' that appeared in the evening sky on 16 November 707 and disappeared on 28 December⁶¹. Mercury started retrograde motion on 10 December (Cap 2° 12' 36'') and completed it on 2 January 708 (Sgt 18° 39' 0''). Thus, the comet disappeared 5 days before Mercury started moving directly again. Even so, two problems arise from this celestial sign: firstly, that it appeared 10 years before the sea battle it was supposed to announce; and secondly, that it was not even the comet immediately preceding that naval engagement.

Naval battle of Keramea in Cyprus (748)

An attack by the Egyptian fleet on the island of Cyprus caused the loss of about 30 Arab ships as a result of the clever tactics of the Byzantine commander, who managed to block the enemy navy at the entrance to the harbor of Keramea⁶².

A Japanese source reports that a 'sparkling star' was seen on 8 January 745 between γ , υ and 51 Andromeda, ϕ Perseus and $\beta\gamma$ Triangle, while the tenth-century Arab historian Agapius of Manjib recorded a "tailed star" that year, but gave no month or day for its appearance: from Agapius' description, though, it is likely that, when he saw the comet, it was closer to the sun and had developed an easily perceptible tail⁶³. In any case, we don't know when this luminous phenomenon disappeared. The nearest retrograde period of Mercury began on 21 January 745 (Aqr 16° 43' 30'') and ended on 13 February (Aqr 1° 27' 50''). If this comet met the requirements set by the Anonymous, it would have been visible in the sky for 38 days. However, the descriptions in the sources do not seem to aim at a beam- or spear-shaped comet, as required by the Anonymous.

The year before, Theophanes the Confessor reports that "a huge comet appeared in Syria". This news is confirmed by Agapius, who dated it to January 744 and described the phenomenon as similar to the Moon, with a dense and dark atmosphere. A Korean source adds that this "ominous star" was 5 pecks in size and remained for 10 days in the center of the sky⁶⁴. Given the above descriptions, this comet does not seem to be a $\delta\kappa\acute{o}\varsigma$. In any case, the nearest retrograde period of Mercury began on 9 February 744 (Psc 4° 43' 17'') and lasted until 2 March (Aqr 19° 58' 7'').

Some conclusions on the chronology of Anon. in Ptol.

Based on the data gathered from the ten naval battles discussed above, it can easily be seen that the only case that meets all the requirements set by the anonymous commentator is the naval battle of Cape Bon (468):

- a) An extraordinarily great number of imperial ships were sunk there.
- b) The naval battle was an episode of a war that was being waged for many years (the clash of both sides of the empire against the North African vandals lasted from 439 to 474), so that the Anonymous did not even find it necessary to expressly mention it ($\acute{\epsilon}\nu$ τῆ τοῦ πολέμου ναυμαχία).
- c) One year before the battle, on 6 February 467, a comet appeared in the evening sky shaped like a beam ($\delta\kappa\acute{o}\varsigma$ / $\delta\kappa\acute{o}\iota\varsigma$), a spear ($\lambda\omicron\gamma\chi\acute{\iota}\alpha\varsigma$) or a salpinx ($\sigma\acute{\alpha}\lambda\pi\iota\nu\chi\acute{\iota}$). The phenomenon is confirmed by a Chinese source (to which we owe the precise date of its occurrence) and two Byzantine sources (the *Chronicon Paschale* and Theophanes). Moreover, both Theophanes and the Chinese record agree in describing the comet as a kind of nebula ($\nu\epsilon\phi\acute{\epsilon}\lambda\eta$; *white vapor*, respectively).
- d) Theophanes reports that the comet was visible for 40 days, i.e. until 17 March. When the comet appeared on 6 February, Mercury was moving directly; when it disappeared, it had just finished its retrograde motion (from 21 February to 15 March, about 1 hour before midnight). These were, almost exactly, the requirements set by the master of the Anonymous in his prediction of when the luminous phenomenon would have disappeared.

So many coincidences cannot be accidental, indeed they strongly reinforce the conclusion that the master of the anonymous commentator saw a beam-comet in the night sky of 6 February 467, which he interpreted as an ominous sign related to tree trunks. The following year, the naval disaster of Cape Bon

would confirm the successful prediction made by the master of the Anonymous. In addition to this achievement, he also succeeded in predicting the day the comet would disappear.

Thus, the date of the composition of the *Anonymous Commentary on Ptolemy's Tetrabiblos* should fall between ca. 467 and 575, presumably in Alexandria. This chronology is also consistent with the date resulting from one of the two horoscopes commented on by the Anonymous, which can be safely placed in Lower Egypt on 25 June 448.

By putting forward this chronology in this paper, the author has not intended to presume any link of the anonymous commentary with a cultural or intellectual background relevant to a particular time. Now, once a precise chronology has been established on an astronomical basis between the years 470-570 ca., it is already possible to claim, as a well-founded hypothesis, that the large number of formal and structural similarities to be found between Anon. *in Ptol.* and other commentaries on Plato and Aristotle written by the Neoplatonic philosopher Ammonius and his disciples at that time⁶⁵ allow the ascription of the work of the anonymous commentator to an astrologer educated in the Neoplatonic school of Alexandria between the fifth and sixth centuries⁶⁶.

A further challenge for the research is to identify that mysterious master of the anonymous commentator, to whom he pays tribute by telling the story of the comet of 467. Between the fifth and sixth centuries, the only significant member of the Neoplatonic Alexandrian circle involved in astrology was Heliodorus, the younger brother of Ammonius, the school's headmaster. However, the "Heliodorus hypothesis" as a professor of the anonymous commentator has been dealt with at length by the author elsewhere⁶⁷.

Notes on Contributor

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Notes

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² H. Wolf, *In Claudii Ptolemaei Quadripartitum Enarrator ignoti nominis, quem tamen Proclum fuisse quidam existimant* (Basileae: Ex officina petriana, 1559), pp. 1-180 (from now on, the passages of Wolf's edition are quoted by page and line numbers separated by a dot; for example: W 1.32 = Wolf, p. 1, l. 32). The quotations from Anon. *in Ptol.* make reference to *Tetrabiblos's* book, chapter and paragraph commented by the Anonymous and, in brackets, to the page and line of Wolf's edition.

³ Dates are AD unless otherwise stated.

⁴ Anon. *in Ptol.* IV.10.15 (W 169.16).

⁵ Anon. *in Ptol.* I.2.1 (W 2.52-3.2).

⁶ Anon. *in Ptol.* II.11.1 (W 78.15-17).

⁷ G. Bezza, "Intorno ai primi commentatori del *Quadripartitum* tolemaico: il commento ascritto ad Eutocio d'Ascalona," *MHNH. Revista internacional de investigación sobre magia y astrología antiguas*, 9, 2009, pp. 265-271, at 265: "Per gli esempi citati, uno dei quali presente negli *Ἀποτελεσματικὰ* di Efestione medesimo, sembra databile tra la fine del V secolo e l'inizio del VI".

⁸ The dating of these horoscopes, as well as the issues of interpretation that they raise, have been dealt with in greater detail by the author in another paper, currently in press on the *Journal of The Warburg and Courtauld Institutes*: "The horoscopes of the *Anonymous Commentary on Ptolemy's Tetrabiblos*".

⁹ Cf. Anon. *in Ptol.* IV.10.13 (W 31-33): ἐπεὶ οὖν ἐν τῷ τρίτῳ κλίματι ἐγεννήθη, ἐκεῖσε τοὺς ἀναφορικοὺς χρόνους ληγόμεθα.

¹⁰ I am currently presenting the first critical edition of the Greek text and my own English translation. The ecdotic criteria applied here are those established by R. Caballero-Sánchez, "El *Comentario Anónimo al Tetrabiblos de Tolomeo*. Edición crítica y traducción castellana de los escolios metodológicos del libro I (in *Ptol. Tetr.* 1.1.1-1.3.1)," *MHNH. Revista internacional de investigación sobre magia y astrología antiguas*, 13, 2013, pp. 221-258, at 221-224. Due to a loss of fascicules, this passage has not been preserved in the oldest codex of Anon. *in Ptol.* (Firenze, BML, plut. 28.34, s. XI³ = L), which contains only the whole of Book I, the beginning of Book II and the end of Book IV (= W 175.51-179.39): cf. R. Caballero-Sánchez, "Historia del texto del *Comentario Anónimo al Tetrabiblos de Tolomeo*,"

MHNH. Revista internacional de investigación sobre magia y astrología antiguas, 13, 2013, pp. 77-198, at 89-92. The only manuscript testimony relying on the text of **L** –when the latter had not yet been damaged– is a new recension or paraphrase to Anon. in *Ptol.* written by Isaac Argyrus at Constantinople in the fourteenth century (Paris, BNF, Gr. 2507, 1370 ca. = **P**): being a fresh rewriting of the text, the significant variants in **P** have been taken into account in the critical apparatus whenever they agree with other manuscripts, as well as regarding the positions of the planets and the luminaries. In addition, the codices of the fourteenth century (**U K D M A R V**) on which all the others depend have been collated, as well as the manuscripts concerning Wolf's edition (**B W Q**). In the *Conspectus siglorum*, the dates of the manuscripts are indicated in quarters of a century: for example, s. XIV²⁻³ = between the second and third quarters of the fourteenth century, etc. Library abbreviations: BL = British Library; BML = Biblioteca Medicea Laurenziana; BM = Biblioteca Marziana; CV = Città del Vaticano; BAV = Biblioteca Apostolica Vaticana; BNF = Bibliothèque Nationale de France; BSB = Bayerische Staatsbibliothek.

¹¹ The author of Anon. in *Ptol.* used to rely on either the tables of the *Almagest* or on the *Handy Tables* by Ptolemy, probably in the two commented editions written by Theon of Alexandria in the first half of the fourth century. Throughout his work, the Anonymous testified or often recommended using the *Handy Tables*: Anon. in *Ptol.* II.5.3 (W 65.1-3) ; Anon. in *Ptol.* II.5.3 (W 65.6-7); Anon. in *Ptol.* II.7.1 (W 64.9-10). In any case, the deviation of the planetary positions in the time lag between the tables of the *Almagest* and the *Handy Tables* is negligible: cf. A. Jones, "Ancient Rejection and Adoption of Ptolemy's Frame of Reference for Longitudes," in A. Jones (ed), *Ptolemy in perspective. Use and Criticism of his Work from Antiquity to the Nineteenth Century* (London-New York: Springer, 2010), pp. 11-44, at 41 n. 21. However, in order to check the accuracy of the planetary positions provided by the anonymous commentator in H¹ and H², it is more appropriate to rely on the *Handy Tables* than on the *Almagest*. For this purpose, it is very useful to check the data on R. Mercier's software *Deviations I1*, which allows the user to find out the true positions of the Sun, the Moon and the planets according to Ptolemy's *Handy Tables* (= *HT*).

¹² For the ecdotic criteria, see n. 10 above. Being a fresh rewriting of the text, the significant variants in **P** have been taken into account in the critical apparatus only whenever they agree with other manuscripts, as well as regarding the positions of the planets and the luminaries. For the whole text of **P** containing the Byzantine recension by Isaac Argyrus of this passage, see Text 3 below.

¹³ The reading in **U K** makes perfect sense. The variant supplied by **O φ** overly complicates the syntax and meaning of the text, whatever interpretation is given to the obscure phrase *περὶ τὰς παρακτίους*: a) If *χώρας* is the noun to be implied here ("in the coastal regions", as interpreted in the Latin translation: "in locis maritimis"), this would clearly break the naturally expected parallel with *περὶ ζύλα*: what is expected by the reader in this passage is being told in which respect the predicted event has to do with "tree trunks", but not - or at least not primarily - the place where it will happen; on the other hand, this interpretation leaves the genitive *τῶν πλοίων* unexplained, since "in the coastal regions of the ships" does not make sense, or gives, at the very least, too trivial a sense; b) Neither do things improve very much if we prefer to imply *ναῦς* ("in the ships anchored on the coast"): this would require considering *τῶν πλοίων* a partitive genitive of *τὰς παρακτίους*, but thus it becomes quite difficult to explain the surprising *variatio* of grammatical gender between a neuter genitive (*τῶν πλοίων*) and a feminine accusative (*τὰς παρακτίους*).

¹⁴ Apparently, the recension **O** suspected that something was missing here, perhaps the feminine noun implicitly meant by *τὰς παρακτίους*.

¹⁵ Cf. n. 13 above.

¹⁶ G. Cardanus, *Opera Omnia*, t. V. (Lyon: Jean Antoine Huguetan and Marc Antione Ravaud, 1663), p. 210 echoes this passage in the following terms: "Narrat author ignotus magistrum suum, cum trabe ignea visa fuisset, dixisse casum portendi in lignis: successiveque naufragia multa ob bellum navale. Alium quendam praedixisse ex huiusmodi coeli signis, quae imminerent et quando desitura forent". As O. Pompeo Faracovi, *Girolamo Cardano. La Natività del Salvatore e l'astrologia mondiale* (Milano: Mimesis, 2002) rightly points out (pp. 158-159), Cardanus is wrong to attribute the interpretation of the last-mentioned prediction to someone other than the master of the Anonymous.

¹⁷ Cf. S. Heilen, *Hadriani Genitura. Die astrologischen Fragmente des Antigonos von Nikaia. Band 1: Edition und Übersetzung; Band 2: Kommentar*, Berlin-Boston: De Gruyter, 2015, pp. 1301-1307; pp. 989-990, n. 2466.

¹⁸ There are some late astrological texts that clearly document the use of *πρόσθεσις/προσθήτης* for 'direct motion' of the planets and *ἀφαίρεσις/ἀφαιρέτης* for their 'retrograde motion': for example, Rhetorius, *Epitome* IV.17: *ἀφαιρέτου δὲ ὄντος τοῦ οἰκοδεσπότητος, ποιεῖ αὐτοῦ τὸν περίπατον ἐπὶ τὰ ἡγούμενα ἀναποδίζων* ("stepping back") *ἕως τῆς μοίρας ἔνθα μέλλει στηρίξας* (this is the second station) *γενέσθαι προσθετικὸς/προσθήτης*; Olympiodorus, *Commentary to the Introduction by Paulus of Alexandria*, p. 14.4-5 Boer: *ὄθεν καὶ ἀφαιρέτης λέγεται, τῆνικαῦτα καὶ πρῶτον στηριγμὸν ποίων καὶ ὑποποδίζων* (= *ἀναποδίζων*).

¹⁹ Cf. Ptol. *Tetr.* I.24.3: *τὴν δὲ δύναμιν πρῶτον μὲν ἐκ τοῦ ἥτοι ἀνατολικὸς αὐτοὺς εἶναι καὶ προσθετικὸς ταῖς ἰδίαις κινήσεσι, τότε γὰρ μάλιστα εἰσιν ἰσχυροί, ἢ δυτικὸς καὶ ἀφαιρετικὸς, τότε γὰρ ἀσθενεστέραν ἔχουσι τὴν ἐνέργειαν*. The terms *προσθετικοί* and *ἀφαιρετικοί* in this text have been generally understood as referring to direct and retrograde motion respectively: A. Bouché-Leclercq, *L'Astrologie grecque* (Paris: Presses Universitaires de France, 1899), p. 111; F. E. Robbins, *Ptolemy. Tetrabiblos*, edited and translated by ... (Cambridge-MA/London: Harvard University Press, 1940), p. 115, n. 4; S. Feraboli, *Claudio Tolomeo. Le previsioni astrologiche (Tetrabiblos)*, a cura di ... (Milano: Arnoldo Mondadori, 1985), pp. 442-443, n. 64; Heilen, *Hadriani genitura*, p. 1301.

²⁰ The typology of comets in the ancient sources is mainly due to the shape they adopt in the sky: Pliny the Elder (*Natural History* II.89-90) systematized up to ten different types; three more kinds of comets were added by John the Lydian (*De Ostentis* 10). For further details, see the study by C. Macías Villalobos, "Los cometas en el mundo antiguo: entre la ciencia y la superstición," *Veleia*, 23, 2006, pp. 41-71, where all the ancient texts concerning comets have been collected and analyzed.

²¹ In order to establish the *terminus post quem* of the comet's appearance, the date of the first horoscope examined by the Anonymous (25 June 448) has been rounded off: see the section "The dating of H¹" above. As for the *terminus ante*

quem, it could be established 300 years later (750): in the eighth century, indeed, scientific and cultural production in Byzantium significantly declined, and it is completely unlikely that, at such a late date, a commentary to Ptolemy's *Tetrabiblos* could have been composed by an author who openly claimed that philosophy is "the most important of all sciences," (Anon. in *Ptol.* I.3.3 [W 11.28-29]: καὶ γὰρ καὶ ἡ φιλοσοφία, ἢ πασῶν τῶν ἐπιστημῶν κυριωτέρα, οὐκ ἔστι χρημάτων ποριστική) and that "one does not easily find someone who can attain perfection by making predictions through astrology and taking precautions through medicine and initiation rites" (Anon. in *Ptol.* I.3.13 [W 15.12-15]: τὸ μὴ εὐρίσκεσθαι ῥαδίως τινὰ δυνάμενον ἔχειν τὸ τέλειον προγινώσκοντα μὲν διὰ τῆς ἀστρολογίας, προφυλάττοντα δὲ διὰ τῆς ἰατρικῆς καὶ τελεστικῆς).

²² Between the two above-mentioned dates (450 and 750), it has been taken into account every comet that has been registered in the most complete inventory of comets ever compiled: G. W. Kronk, *Cometography: A Catalog of Comets. Volume 1: Ancient-1799* (Cambridge: Cambridge University Press, 1999) at 81-116.

²³ To compute the direct and retrograde motions of Mercury according to the astronomical models of Ptolemy's *Handy Tables*, I have relied on R. Mercier's software *Deviations11*: see n. 11 above.

²⁴ Cf. D. K. Yeomans, J. Rahe and R. S. Freitag, "The history of comet Halley," *Journal of the Royal Astronomical Society of Canada*, 80, 1986, pp. 62-86, at 71.

²⁵ Cf. J. Rodríguez González, *Diccionario de batallas de la Historia de Roma (753 a.C. – 476 d.C.)* (Madrid: Signifer, 2005), pp. 450-451; J. H. Pryor and E. M. Jeffreys, *The Age of the Δρόμων. The Byzantine Navy ca 500-1204* (Leiden-Boston: Brill, 2006), p. 9. In these studies, one can also find all the primary sources that account for the historical events surrounding each naval battle.

²⁶ Kronk, *Cometography*, pp. 82-83.

²⁷ Kronk, *Cometography*, pp. 81-82.

²⁸ J. Campos, *Idacio, obispo de Chaves, Su Crónica*, introducción, texto crítico, versión española y comentario por ... (Salamanca: Ediciones Calasancias, 1984) 182.

²⁹ Procopius, *History of the Wars* III.6.1-27 Wirth. Procopius does not give specific figures on the magnitude of the imperial fleet, but, if the land army amounted to 100,000 men, the figure of 1100 ships given by Priscus (fr. 53.1-5) does not seem far-fetched: cf. Rodríguez González, *Diccionario de batallas de la Historia de Roma* 16 (*Ad Mercurium* II); Pryor and Jeffreys, *The Age of the Δρόμων*, p. 9. The Roman fleet was almost completely destroyed, except for a few ships used by Basiliscus to flee back to Constantinople.

³⁰ Procopius, *History of the Wars* III.6.10 Wirth.

³¹ Kronk, *Cometography*, pp. 83-84.

³² *Chronicon Paschale* 597.13-15 Dindorf: τῷ αὐτῷ ἔτει ἐφάνη ἐν τῷ οὐρανῷ σημεῖον μέγιστον, ἀπὸ τινῶν λεγόμενον σάλπιγξ, ἀπὸ τινῶν δὲ λογχίας, καὶ ἀπὸ τινῶν δοκίς· ἐφάνη δὲ ἐπὶ ἡμέρας τινάς.

³³ Theophanes, *Chronographia*, p. 115.1-2 de Boor: τούτῳ τῷ ἔτει σημεῖον ἐφάνη ἐν τῷ οὐρανῷ, νεφέλη ὡσπερ σάλπιγγος ἐκτόπωμα ἔχουσα ἐπὶ ἡμέρας μ' καθ' ἑσπέραν.

³⁴ Other Byzantine sources also use more than one different term to refer to this same kind of long-tailed comet: cf. Theophanes, *Chronographia*, p. 336, 21-24 de Boor καὶ ἐφάνη σημεῖον ἐν τῷ οὐρανῷ κατὰ μεσημβρίαν, ὁ λεγόμενος δοκίτης, προμηνύων τὴν τῶν Ἀράβων ἐπικράτησιν· ἔμεινε δὲ ἡμέρας λ' διατείνων ἀπὸ μεσημβρίας ἕως ἄρκτου. ἦν δὲ ζιφοειδής.

³⁵ Comets have a gas tail and a dust tail, but both are seldom distinguishable to the naked eye. This might explain why the Chinese name chhang-keng ("vapour") is applied to this comet: in fact, a 1653 Chinese text thus calls a type of comet consisting of a nucleus and two tails (Kronk, *Cometography*, p. 83).

³⁶ Joannes Malalas, *Chronographia*, pp. 404.7-406.8 Dindorf; Evagrius, *Historia Ecclesiastica*, p. 145.17-29 Bidez and Parmentier.

³⁷ Kronk, *Cometography*, p. 85.

³⁸ Kronk, *Cometography*, p. 85.

³⁹ Cf. W. Wright, *The chronicle of Joshua the Stylite, composed in Syriac A.D. 507*, with a translation into English and notes by ... (Cambridge: Cambridge University Press, 1882), p. 27 (§ 37).

⁴⁰ Kronk, *Cometography*, pp. 84-85.

⁴¹ Procopius, *History of the Wars* VII.7.1-7 Wirth.

⁴² Cf. Kronk, *Cometography*, pp. 88-90.

⁴³ Procopius, *History of the Wars* II.4.1-3 Wirth: τότε καὶ ὁ κομήτης ἀστήρ ἐφάνη, τὰ μὲν πρῶτα ὅσον εὐμήκης ἀνήρ μάλιστα, ὕστερον δὲ καὶ πολλῶ μείζων. καὶ αὐτοῦ τὸ μὲν πέρασ πρὸς δύνοντα ἥλιον, ἡ δὲ ἀρχὴ πρὸς ἀνίσχοντα ἦν, αὐτῷ δὲ τῷ ἡλίῳ ὀπισθεν εἶπετο. ὁ μὲν γὰρ ἐν Αἰγοκέρῳ ἦν, αὐτὸς δὲ ἐν Τοξότῃ. καὶ αὐτὸν οἱ μὲν τινες ἐκάλουν ζιφίαν, ὅτι διὴ ἐπιμήκης τε ἦν καὶ λιαν ὀξεῖαν τὴν ἀρχὴν εἶχεν, οἱ δὲ *πωγωνίαν*, ἡμέρας τε πλείους ἢ τεσσαράκοντα ἐφάνη (*italics are mine*).

⁴⁴ Translated by H. B. Dewing, *Procopius. History of the Wars. Books I and II.*, with an English translation by ... (Cambridge: Harvard University Press, 1914), p. 287.

⁴⁵ Procopius, *History of the Wars* VIII.23 Wirth. Cf. Pryor and Jeffreys, *The Age of the Δρόμων*, pp. 17-18.

⁴⁶ *Chronicon Paschale*, pp. 715-726 Dindorf; Theophanes, *Chronographia*, p. 316 de Boor. Cf. Pryor and Jeffreys, *The Age of the Δρόμων*, p. 19.

⁴⁷ The sources are silent about it, but it's quite likely that they were. We learn from Constantine Porphyrogenitus (*De Administrando Imperio* 9 Moravcsik) that the Russians bought their canoes from the Slavs for their expeditions against Constantinople (ninth-tenth centuries), carried masts and sails overland and, when they reached the Black Sea and the Bosphorus, put them in their boats so that they could sail onto the open sea. According to M. Whitby and M. Whitby,

Chronicon Paschale, translated with introduction and notes by ... (Liverpool: Liverpool University Press, 2007) 175 n. 467, in the Slavic-Avar siege of 626 not all of the *monoxyla* could have been simple canoes, but some of them would have been large enough to ferry the Persian cavalry from one side of the Bosphorus to the other. Furthermore, the *Chronicon Paschale* points out that this was a secret mission planned to be carried out at night, so as to elude the surveillance of the imperial fleet. The Byzantine ships that sailed to intercept the Slavic canoes did not arrive in time to prevent the Persians from boarding because they were facing contrary winds (Whitby and Whitby, *Chronicon Paschale*, p. 178 n. 472). Maybe the Slavs, already loaded with the heavy Persian infantry and cavalry, were supposed to speed up the operation by taking advantage of the north wind by means of masts and sails to navigate through the Bosphorus, even though this would have left them exposed to the Byzantine army, as was the case. If the Byzantine ships dispatched to neutralize the passing of the enemy troops met *monoxyles* equipped with masts, this would probably have increased the extent of the disaster, once they were reached by the imperial fleet. But we cannot learn the details of these naval operations, because the *Chronicon Paschale*, our closest source to the facts - and the most thorough in describing the siege - has a lacuna of one page just in the account of the shipment. (Whitby and Whitby, *Chronicon Paschale*, p. 178 n. 472). On the different designations adopted by the Byzantine sources for the Slavic vessels that besieged Constantinople in the summer of 626, cf. L. Havlíková, "Slavic Ships in 5th – 12th Centuries Byzantine Historiography," *Byzantinoslavica*, 52, 1991, pp. 89-104, at 94-96.

⁴⁸ *Chronicon Paschale*, p. 715.6-8 Dindorf: τούτῳ τῷ ἐναυτῷ μῆνι δύστρω, κατὰ Ῥωμαίους μαρτίῳ, ἐφάνη ἐπὶ δ' ἡμέρας ἀστηρ φαιδρὸς πάνυ κατὰ δυσμᾶς μετὰ δύσιν ἡλίου.

⁴⁹ Kronk, *Cometography*, p. 102.

⁵⁰ Kronk, *Cometography*, p. 101.

⁵¹ Kronk, *Cometography*, pp. 101-102.

⁵² Cf. Pryor and Jeffreys, *The Age of the Δρόμων*, pp. 24-25. The events surrounding the battle are rather confusing: for a critical analysis of the sources, cf. A. N. Stratos, "The naval Engagement at Phoenix," in A. Laiou-Thomadakis (ed), *Charanis Studies, Essays in Honor of P. Charanis* (N. Brunswick N.J.: Rutgers University Press, 1980), pp. 229-247, at 229-224; V. Christides, "Un exemple d'incompétence navale: la bataille dite 'des mâts'," *Stratégique*, 89-90.1, 2008, pp. 213-229.

⁵³ Christides, "Un exemple d'incompétence navale", p. 221 n. 33.

⁵⁴ See Text 2 above (l. 3).

⁵⁵ Kronk, *Cometography*, pp. 102-104.

⁵⁶ Cf. Pryor and Jeffreys, *The Age of the Δρόμων*, pp. 26-27.

⁵⁷ Kronk, *Cometography*, pp. 107-108.

⁵⁸ Cf. Pryor and Jeffreys, *The Age of the Δρόμων*, pp. 32-33.

⁵⁹ Kronk, *Cometography*, p. 113.

⁶⁰ Kronk, *Cometography*, p. 113.

⁶¹ Kronk, *Cometography*, p. 112.

⁶² Teophanes, *Chronographia*, p. 424.1-7 de Boor.

⁶³ Kronk, *Cometography*, p. 116.

⁶⁴ Kronk, *Cometography*, pp. 115-116.

⁶⁵ For a detailed analysis of some of these parallels, cf. R. Caballero-Sánchez, "En busca del autor perdido. Algunas reflexiones sobre el contexto histórico-filosófico del *Comentario Anónimo al Tetrabiblos de Tolomeo*," in M. Labiano (ed), *De falsa et vera historia 2. De ayer y hoy. Contribuciones multidisciplinares sobre pseudoepígrafos literarios y documentales* (Madrid: Ediciones Clásicas, 2019), pp. 130-146, at 131-144.

⁶⁶ Caballero-Sánchez, "En busca del autor perdido", pp. 144-145.

⁶⁷ R. Caballero-Sánchez, "Heliodoro de Alejandría y el *Comentario Anónimo al Tetrabiblos de Tolomeo*", *Humanitas*, 76, 2020, pp. 33-56.