Received: 7th June 2020 Accepted: 19th July 2020

Small but Mighty: Critical Note to De facie *944A*

[*Pequeña pero poderosa: nota crítica a* De facie *944A*]

by

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Abstract

In *De facie* 944A, in the midst of his speech about the moon's nature and functions, the Stranger affirms that astronomers' calculations of the size of the moon are incorrect, and this body is, in fact, larger than previously thought. The text of the passage is not an easy one: there are a number of discrepancies between the manuscripts' readings, two lacunae, and several interventions by scholarship.

In this paper, I will first address other passages where the matter of the moon's size is discussed, so as to give some contextualization to the Stranger's views; and, secondly, I will survey the historical-philological background of the solutions offered in the past in order to suggest another way to solve the textual issues.

Key-Words: Plutarch, Moon, Textual Criticism, Ancient Astronomy.

Resumen

En *De facie* 944A, en el transcurso de su explicación sobre la naturaleza y función de la luna, el Extranjero afirma que las mediciones establecidas por los astrónomos son incorrectas. Según él, la luna es más grande. El texto presenta ciertos problemas: los manuscritos transmiten este pasaje con diferentes lecturas, hay dos lagunas, y los eruditos han contribuido con numerosas correcciones.

En este artículo contextualizo la opinión del Extranjero sobre el tamaño de la luna a través de un repaso de otros pasajes del tratado donde se trata la cuestión. A continuación, analizo y sopeso las correcciones propuestas en el pasado para ofrecer una nueva solución a las dificultades textuales.

Palabras clave: Plutarco, Luna, Crítica textual, Astronomía antigua.

In his speech, the Stranger informs his audience that many of the beliefs of the Greeks are totally or partially mistaken. He first reviews the myth of Demeter and Persephone (942DE), the composition of man (943A), and then the nature and size of the moon (943F and 944A). The last aspect has not received much attention since mid-last century. Unrightfully so, in my view.

He declares that the estimations suggested by astronomers are incorrect. Earlier in the text the methodology to calculate the size of the moon was introduced and some of the estimations were discussed[1]. Astronomers take the length of time the moon needs to cross the earth's shadow during an eclipse so as to determine its size. The Stranger uses this same procedure but his logic seems flawed.

The history of transmission of this passage shows a handful of variant readings and conjectures—we have a number of different readings between the manuscripts, two lacunae, and several layers of emendations by scholars—and yet the resulting text is not satisfying.

1. *Contextualizing the Size of the Moon*

Before the Stranger's intervention, the matter of the moon's size has already been discussed in the treatise. In order to properly place his views within the general topic, we shall first take a look into other passages dealing with the issue of the moon's measures and motions.

The matter of the moon's size is addressed in a number passages throughout the treatise, in all the cases we find different estimates, resulting from the use of various sources. According to Lucius, in 923AB, astronomers calculate the moon's size by the length of time it needs to cross the earth's cone of umbra during eclipses[2]. After a brief consideration regarding the reason why the form of the earth's shadow is conical, Lucius affirms that it takes three times the moon's size to cross the narrowest part of that shadow, and, consequently, he wonders how many times the earth is bigger than the moon[3].

Later on (932AB), Lucius discusses the issue again. In this case, he offers different calculations for the moon's diameter in respect to that of the earth: according to the

1 923AB, 932AB, 935DE. See below for the Greek text.

2 923AB, τὴν γῆν […], πολλῷ τινι μείζονα τῆς σελήνης οὖσαν, ὡς ἐν τοῖς ἐκλειπτικοῖς πάθεσιν οἱ μαθηματικοὶ καὶ ταῖς διὰ τοῦ σκιάσματος παρόδοις τῆς ἐποχῆς τὸ μέγεθος ἀναμετροῦσιν; […] ὑπὸ τούτου δὲ ὅμως ἁλισκομένη ταῖς ἐκλείψεσιν ἡ σελήνη, τρισὶ μόλις τοῖς αὑτῆς μεγέθεσιν ἀπαλλάττεται. The Greek text corresponds to the edition I prepared for my doctoral thesis, to be published by Brill next spring.

3 This estimate roughly corresponds to that of Hipparchus who stated that the cone of umbra is two and half times the moon's diameter (Ptolemy, *Almagest* 4.9). According to TORRACA 1992: 233, the slight exaggeration of estimations by previous thinkers was a rhetorical strategy widely

Egyptians, the moon is 1/72 of the earth; according to Anaxagoras, it is the size of the Peloponnesus; and, to conclude, that Aristarchus demonstrated that the ratio of the diameter of the earth to that of the moon is smaller than 60 to 19 and greater than 108 to 43 (the moon being then roughly three times smaller than the earth)[4].

Further on in the discussion (935C-E), Apollonides alludes to the moon's measurements in an attempt to show that the huge size of the shadowy spots imply that the bodies casting the shadow must be enormous. Because we do not see these enormous bodies, he concludes that the shadowy spots cannot be the result of geographical features. He estimates that the moon's diameter measures twelve digits at its mean distance from the earth and that each of the black and shadowy spots is greater than half a digit, consequently greater than one twenty-fourth of the moon's diameter. So, if the circumference of the moon is thirty thousand stades, he says, and its diameter ten thousand, each of the shadowy spots should accordingly measure no less than five hundred stades[5]. Despite Apollonides' attempt to provide specific calculations to support his rejection that

adopted in Antiquity. TORRACA further affirmed that the fact that the moon needs three of its own measurements to cross the earth's shadow does not imply that the moon's diameter is 1/3 of the earth's diameter—as implied by CHERNISS 1957: 144-145 n. a. TORRACA rightly explained that the moon is caught, according to the text, in the narrowest part of the earth's shadow, and, therefore, the earth must be many times larger than that (1992: 234-235).

4 932AB, Ἀλλὰ Αἰγυπτίους μὲν ἑβδομηκοστόδυον, οἶμαι, φάναι μόριον εἶναι τὴν σελήνην, Ἀναξαγόραν δέ, ὅση Πελοπόννησος. Ἀρίσταρχος δὲ τὴν διάμετρον τῆς σελήνης λόγον ἔχουσαν ἀποδείκνυσιν, ὃς ἐλάττων μὲν ἢ ἑξήκοντα πρὸς δεκαεννέα, μείζων δέ πως <ἢ> ἑκατὸν ὀκτὼ πρὸς τεσσαράκοντα τρία ἐστίν. GÖRGEMANNS 1970: 130-135 suggested that the Egyptian estimate is Pythagorean, but mistakenly attributed to Egyptian tradition. Anaxagoras is known for having compared the size of the Peloponnesus with the sun (A 42.8DK and A 72DK), but the comparison with the moon in not included in DIELS-KRANZ 1974. Aristarchus' estimate corresponds with proposition 17 of *On the Sizes and Distances of the Sun and Moon*. The last estimate—60/19 = 3.15, 108/43 = 2.51—results in the claim that the diameter of the earth should be between two and half and three times that of the moon; an estimate, again, close to Hipparchus' calculation (Ptolemy, *Almagest* 4.9). See TORRACA's analysis of this passage in 1992: 234.

5 935DE, ἡ μὲν διάμετρος τῆς σελήνης δυοκαίδεκα δακτύλους ἔχει τὸ φαινόμενον ἐν τοῖς μέσοις ἀποστήμασι μέγεθος, τῶν δὲ μελάνων καὶ σκιερῶν ἕκαστον ἡμιδακτυλίου φαίνεται μεῖζον, ὥστε τῆς διαμέτρου μεῖζον ἢ εἰκοστοτέταρτον εἶναι· καὶ μήν, εἰ μόνων ὑποθοίμεθα τὴν περίμετρον τῆς σελήνης τρισμυρίων σταδίων, μυρίων δὲ τὴν διάμετρον, κατὰ τὸ ὑποκείμενον οὐκ ἔλαττον ἂν εἶναι πεντακοσίων σταδίων ἐν αὐτῇ τῶν σκιερῶν ἕκαστον. CHERNISS 1957: 144-145 n. a and TORRACA 1992: 235 both pointed out that his estimates tend to be an exaggeration, probably in order to make his point more convincing: five hundred stades is 1/20, not 1/24, of ten thousand stades; and a moon's circumference of only thirty thousand stades is an impressively small estimate compared to other calculations existing at the time.

the shadowy spots are geographical features, Lamprias demonstrates his whole formulation to be inconsistent: the big size of a shadow does not necessarily imply that the body casting the shadow is big, since this depends on the distance—and of course inclination, but Lamprias does not mention this detail—of the source of light.

With this we arrive to the passage under analysis, 944A. Here, the Stranger puts into question all previous estimates[6].

2. *Text and Critical Commentary*

The text transmitted by the manuscripts runs as follows (944A)[7]:

1 εὐρος E / εὖρος B δὲ καὶ μέγεθος οὐχ ὅσον οἱ γεωμέτραι λέγουσιν, ἀλλὰ
2 μεῖζον πολλάκις ἐστί· καταμετρεῖ δὲ τὴν σκιὰν τῆς γῆς ὀλιγάκις τοῖς ἑαυτῆς
3 E / ἑαυτοῦ B μεγέθεσιν οὐχ ὑπὸ σμικρότητος, ἀλλὰ θερμ… E / θερμότητι B
4 επείγει τὴν κίνησιν, ὅπως ταχὺ διεκπερᾷ τὸν σκοτώδη τόπον ὑπεκφέρουσα
5 τῶν ἀγαθῶν σπευδούσας καὶ βοώσας

1 εὐρος E: εὖρος B: εὖρος Steph. **2** πολλάκις] πολλῷ SR67 (πολλῶ *sic*) *et alii*[8] | τῆς γῆς ὀλιγάκις] γῆς *om.* Basil. **2/3** ἑαυτῆς E: ἑαυτοῦ B **3** σμικρότητος] σμηκρότητος Ald. **3/4** ἀλλὰ θερμ… επείγει E : ἀλλὰ θερμότητι επείγει B : ἀναθερμότητα ἐπάγει Ald. : ἀλλὰ θερμότατα ἐπάγει I.22 : ἀλλὰ θερμοτάτην ἐπάγει SR67 : ἀλλὰ θερμότητος, ἢ ἐπείγει Wyt. *in app.* : ἀλλὰ θερμότερον επείγει Arnim : ἀλλὰ θερμότητος, ἢ κατ' επείγει Po. : ἀλλὰ θερμοτάτην ἐπείγει Ch. **4** διεκπερᾷ] διαπερᾷ Ald. **5** τὰς τῶν ἀγαθῶν ψυχὰς SR67: ψυχὰς *add. ante* τῶν ἀγαθῶν Basil.: τὰς ψυχὰς *add. post* βοώσας Bern.: τὰς ψυχὰς *add. post* τῶν ἀγαθῶν Po.: τὰς *addidi ante* τῶν ἀγαθῶν.

We encounter several grammatical issues that need attention. The first noticeable issue is the term 'measure' or 'width', which is wrongly spelled by both manuscripts: E reads εὐρος, without the circumflex accent, and B reads εὖρος, including the accent but with the wrong breath. Stephanus, in the 16th century, corrected this mistake (εὖρος).

The adverb πολλάκις was corrected into πολλῷ in the 16th century. The form is correctly written down in one of Gianotti's

6 Interestingly, the Stranger is not present during the conversation happening in *De facie*. His contribution is narrated by one of the participants in the conversation as a discussion which happened somewhere in the past. In this sense, his "corrections" and references to matters discussed earlier in the conversation are a coincidence, and a captivating rhetorical device on Plutarch's behalf. On this wise and mysterious Stranger, see LESAGE-GÁRRIGA 2019.

7 The two manuscripts transmitting *De facie* are today located at the National Library of France: *Parisinus graecus* 1672 and *Parisinus graecus* 1675, known as E and B respectively.

8 *Et alii* is used to indicate that an intervention in the text has generally been accepted by scholarship. The designations SR67 and I.22 refer to the handwritten annotations included in the copies of the Aldine edition belonging to N. Leonicus and S. Fortiguerri, respectively. For the remaining scholars listed above, see Bibliography.

personal copies, Amyot's *Basiliensis* edition and in Stephanus' edition, but incorrectly written as πολλῶ in Leonicus' Aldine exemplar and as τόλλῳ in another of Gianotti's copies and in Vettori's exemplar. The original conjecturer was Leonicus, and all remaining occurrences are direct or indirect copies from his exemplar. While the modification from πολλάκις into πολλῷ (with its numerous misspellings πολλῶ and τόλλῳ) is not necessary and of no consequence for the establishment of the text, this correction has been useful for the establishment of the inter-relationships between 16th century scholars and their copies with handwritten annotations[9].

Another *erratum* is included in the *Basiliensis* edition, which reads: τῆς ὀλιγάκις instead of τῆς γῆς ὀλιγάκις. The omission of the noun could be explained by haplography (τῆς γῆς) in combination with the ease for monosyllabic words to disappear. It was quickly corrected by the French scholar Amyot in his copy.

Concerning the second discrepancy between E and B, it affects the pronoun: while E reads ἑαυτῆς, B reads ἑαυτοῦ. The election is easily solved, because the subject of the sentence is the moon, the feminine must be maintained.

The Aldine edition misspelled the word σμικρότητος (σμηκρότητος), an error of iotacism common in this edition and quickly solved by Fortiguerri in the copy he owned and by the *Basiliensis* edition[10].

We arrive to the lacuna in E, which has led to many corrections. While E reports a seven-letter-gap after θερμ, it has traditionally been accepted that B reads θερμότητος. I say "has traditionally been accepted" because B actually ends the last two syllables of the noun with the abbreviation τ^{ι}. I have checked the appearances of this abbreviation throughout the treatise: 15 times in total, of which 12 represent an accusative singular, one is a dative singular (936A, βαθύτητι), another is a genitive singular (it is the word σμικρότητος appearing in this sentence), and the last appearance is the word concerning us here. Consequently, nothing compells θερμότης to be in genitive, in this case.

The Aldine edition, the first to modify the passage, transmitted ἀναθερμότητα ἐπάγει. The preverb (ἀνα) replaces the adversative conjunction, the noun is corrected into an accusative, and the verb of the manuscripts ἐπείγει ('to press,' or 'to push vividly') is unnecessarily corrected into ἐπάγω, which has almost the same meaning ('to take toward,' or 'to push against'). We cannot be sure if the accusative is due to the assumption that the abbreviation was meant only for accusatives, or if it is an intended

9 On this matter, see Lesage-Gárriga 2018: 253-259.

10 See, for instance, 929D and 930B with γεγενημένης turned into γεγενημένοις; and 932C with ἐκείνοις turned into ἐκείνης.

emendation of what was thought to be a genitive. Many scholars later based their corrections on the form of the verb given by the Aldine edition (ἐπάγει). Leonicus proposed ἀλλὰ θερμοτάτην ἐπάγει—he returned to the original adversative and suggested the superlative of θερμός, instead of the noun θερμότης. His replacement from noun to adjective is, in turn, followed by some editors: the *Basiliensis* edition read ἀλλὰ θερμότατα ἐπάγει; and Von Arnim corrected it into ἀλλὰ θερμότερον επείγει[11]. Wyttenbach adopted in the main body of the text Leonicus' correction, and, while he did not mention in the apparatus the source of such a correction, he did say that B's reading is θερμότητος, in genitive. He further proposed the emendation ἀλλὰ θερμότητος, ᾗ επείγει; this, Pohlenz would take as the basis for his proposal, ἀλλὰ θερμότητος, ᾗ κατεπείγει—here, however, the modification of the verb into κατεπείγω ('to press,' or 'to hasten') not only makes the correction too long for the space provided by E, but also adds no substantial value to the verb's meaning. Finally, Cherniss suggested the reading ἀλλὰ θερμοτάτην ἐπείγει, which he strangely attributed to the Aldine copy belonging to Turnebus. This copy, however, contains the correction ἀλλὰ θερμοτάτην, without any modification of the verb transmitted by the edition (ἐπάγει). As I demonstrated in a study of 16th century handwritten corrections to the treatise, the hand which wrote this correction copied the suggestion firstly proposed by Leonicus[12]. Consequently, and despite his attributing the correction ἀλλὰ θερμοτάτην ἐπείγει to someone else, Cherniss is the real author of this conjecture.

In my opinion, Wyttenbach's claim about θερμότης being in genitive, which is incidentally accepted by following scholars, is conditioned by the proximity of the noun, σμικρότητος, in genitive. This genitive, however, is imposed by the preposition preceding it (ὑπό), which does not apply to θερμότης.

My suggestion is that the abbreviation in B can be interpreted as a dative: this option, as far as I know, has not been contemplated by any scholar, and is backed up by the occurrence in 936A, where βαθύτ$^{\tau}$ indubitably stands for βαθύτητι. This interpretation offers two advantages with respect to previous attempts to read the text: 1) it does not require to correct the noun θερμότης transmitted by the manuscripts—as 16th century scholars, Von Arnim, and Cherniss did—and 2) there is no need to further modify the sentence—as Wyttenbach or Pohlenz did—: ἀλλὰ θερμότητι επείγει τὴν κίνησιν.

Another mistake by early editions concerns διεκπερᾷ ('pass through', 'traverse'), which is transmitted as διαπερᾷ

11 VON ARNIM 1921: 56-57.

12 LESAGE-GÁRRIGA 2018: 258-260.

(‘go over’, ‘go across’) by the Aldine and the *Basiliensis* editions. I cannot tell whether intentionally or not, given that this form has the same meaning as the verb transmitted by EB. Wyttenbach also included διαπερᾷ, without specifying in the apparatus that it is not the manuscripts’ reading.

Concerning the second lacuna, neither of the manuscripts signal a physical gap, but it is evident that a noun is missing: it should function as the object of ὑπεκφέρουσα, be the reference of τῶν ἀγαθῶν, and the subject of the two participles at the end, σπευδούσας καὶ βοώσας.

This problem was noticed by Leonicus, who conjectured <τὰς> τῶν ἀγαθῶν <ψυχάς>; the *Basiliensis* edition conjectured <ψυχὰς> τῶν ἀγαθῶν; Bernardakis suggested (in the apparatus) that τὰς ψυχάς should be placed after βοώσας; and Pohlenz proposed τῶν ἀγαθῶν <τὰς ψυχάς>, but assigned it to Bernardakis[13].

Based on Leonicus’ proposal, I suggest to insert only the article into the text, which would nominalize the following participles: τὰς τῶν ἀγαθῶν σπευδούσας καὶ βοώσας. Syntactically, this is the only addition required by the text, but obviously the presence of the article τάς implies that there is a noun underlying. In this case, the noun is easily deducted from the context: the souls (ψυχάς). While they have been left aside for a moment in the previous passage, they are the focus of the whole myth and always in the readers’ minds.

After the philological analysis of the problems in this passage, I propose the following text: εὖρος δὲ καὶ μέγεθος οὐχ ὅσον οἱ γεωμέτραι λέγουσιν, ἀλλὰ μεῖζον πολλάκις ἐστί· καταμετρεῖ δὲ τὴν σκιὰν τῆς γῆς ὀλιγάκις τοῖς ἑαυτῆς μεγέθεσιν οὐχ ὑπὸ σμικρότητος, ἀλλὰ θερμότητι ἐπείγει τὴν κίνησιν, ὅπως ταχὺ διεκπερᾷ τὸν σκοτώδη τόπον ὑπεκφέρουσα <τὰς> τῶν ἀγαθῶν σπευδούσας καὶ βοώσας·

Following the establishment of the text, the passage reads: “its width and size are not what geometers say, but many times bigger. It measures off the earth’s shadow with few of its own magnitudes not because (the shadow) is small but because with warmth the moon hastens its motion in order that it may cross the shadowy place fast, bearing away <those> of the good which urge it on and cry out”[14].

[13] While most of the editors integrated Leonicus’ conjecture, they erred in the attribution of authorship: Wyttenbach 1895: 822, and Bernardakis 1893: 468, simply omitted that it is not the manuscripts’ text; Cherniss 1957: 207, erroneously attributed it to J. J. Reiske.

[14] Here, the syntagma οὐχ ὑπὸ σμικρότητος (‘not because of smallness’) should not be interpreted as referring to the smallness of the moon itself, but to that of the earth’s

In order to prove that the moon's size is bigger than what astronomers had so far assumed, the Stranger affirms that the moon measures off the earth's shadow during eclipses with few of its own magnitudes due to its speed[15]. However, the formulation employed is bewildering, at the very least, as Cherniss rightly noted[16]. The speed does not affect the correlation between the diameter of the object and the distance traversed. Consequently, the cause provided seems to slightly contradict the Stranger's claim that the moon is bigger than what astronomers had calculated. Whether this is a simple *lapsus* on Plutarch's behalf or a way to implicitly discredit the Stranger's claim is not immediately clear[17]. At any rate, it is indeed the case that the moon is not bigger, as the Stranger defends, but smaller. Even smaller than the mainstream calculations by ancient astronomers: now we know that the moon is about one-fourth the size of the earth (ratio 1:4). Small, yes, but mighty.

3. *Conclusions*

After a careful analysis of the textual difficulties and their emendations over the centuries, we may conclude that several of the interventions were not in fact mandatory for a sound comprehension of the passage. Admittedly, a number of them seem to have been *errata* from the first printed editions—with more or less happy attempts to restore an acceptable reading by 16th century scholars. The following scholars, however, seem to have unnecessarily complicated the history of the text with their emendations and conjectures.

shadow. This is corroborated by the fact that in 923AB the moon was said to be caught in the narrowest part of the cone of umbra—i.e. the shadow. While PRICKARD 1911: 46, already included this interpretation in his translation, this is acknowledged in the translations by relatively few scholars of the 20th century—despite the fact that the text just established it is not that small after all.

15 On the moon's speed, see 923C, where Lucius suggests that the moon's motions and speed prevent its downward tendency to prevail; and 937E and 938F-939A, where Theon and Lamprias discuss whether the moon's speed may be dangerous or helpful to its possible inhabitants.

16 CHERNISS 1951: 153.

17 I doubt that Plutarch would make such a mistake. In point of fact, the earlier passages show that he has quite some knowledge concerning previous research on the moon from very different sources, namely Anaxagoras, the Egyptian tradition, Aristarchus and Hipparchus. This works against the possibility that he did not fully understand the functioning of movements, speed, and measures of heavenly bodies. In my view, while the Stranger is presented as a man possessing a knowledge beyond average, his words cannot simply be taken as representing the truth. In this sense, they cannot be literally accepted, but must be rightly interpreted. I hope to take up on this matter in a future paper.

By accepting Stephanus' correct accentuation of the word εὖρος, choosing E's reading for the pronoun (ἑαυτῆς), interpreting B's abbreviation as a dative (θερμότητι), and the insertion of the article τάς referring to the omitted noun ψυχάς, the passage is grammatically and syntactically coherent.

Particularly, with regard to the reinterpretation of the abbreviated word of the manuscript, we may conclude that a close study of the manuscripts, without a predetermined mindset, can still bring new light to their text. This new approach to the manuscripts' readings in combination with the scholarship's earlier work has allowed for a solution to the textual problems that is both effective and respectful to the manuscripts' text.

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