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STEPHANUS OF ALEXANDRIA; ON THE STRUCTURE AND DATE OF HIS ALCHEMICAL WORK

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SUMMARY

On the authorship of Stephanus' of Alexandria On the great and sacred art of making gold *many questions have arisen, and many scholars have in my estimation misunderstood and undervaluated it. As a commentary on selected passages of earlier alchemical texts it in fact offered an opportunity to its author to demonstrate wide rhetorical prowess, extensive learning, and significant breadth of philosophical understanding. In this article we present additional arguments in favour of Stephanus' authorship of the work; demonstrate that what was its concluding portion has been lost; indicate how two of the original lectures it contained have each been divided into two other lectures; and attempt to pin-point its exact date of composition on the basis of astronomical information it contains.*

A. *Stephanus' personality*

Stephanus of Alexandria is a Byzantine scholar who was active in the early seventh century. He is known as a commentator on Plato and Aristotle to whom astronomical, astrological, alchemical and medical works are also attributed. According to tradition he had been invited from Alexandria to Constantinople by the emperor Heraklius (610-641) to teach at the University, with the particular assignment of commenting on Plato and Aristotle and teaching the *Quadrivium*, an indication that he was already well known as an eminent scholar in Alexandria before moving to Constantinople.

Key words: Stephanus of Alexandria- Stephanus of Athens - Alchemy.

In most MSS., works attributed to him are described as those of Στεφάνου Ἀλεξανδρέως φιλοσόφου καὶ οἰκουμενικοῦ διδασκάλου (Stephanus Alexandrinus philosopher and œcumenic master), Στεφάνου Ἀλεξανδρέως φιλοσόφου (Stephanus Alexandrinus philosopher), Στεφάνου φιλοσόφου (Stephanus philosopher), Στεφάνου Ἀλεξανδρέως (Stephanus Alexandrinus), Στεφάνου (Stephanus), ὁ ἐπιστήμων Στέφανος (Stephanus the scientist), Στεφάνου φιλοσόφου καὶ μεγάλου διδασκάλου (Stephanus philosopher and great master), Στεφάνου φιλοσόφου Ἀλεξανδρέως (Stephanus philosopher Alexandrinus), Στεφάνου μεγάλου φιλοσόφου τοῦ Ἀλεξανδρέως καὶ καθολικοῦ διδασκάλου (Stephanus great philosopher Alexandrinus and catholic master)[1].

We must however be careful not to misinterpret the epithet *Alexandrinus*. This does not necessarily show that Alexandria was his native city; it merely indicates that, in changing his place of residence and activity to Constantinople, he did so from Alexandria. He could, in fact very well have been one and the same person as Stephanus Atheniensis, a famous scholar active in Alexandria but of Athenian provenience and thus surnamed Atheniensis, who after his invitation by the emperor Heraklius to Constantinople was thereupon re-named Alexandrinus, because it was from Alexandria that he moved to Constantinople[2].

In the catalogue of ποιηταί in *CAAG* are included both Stephanus and the emperor Heraklius, although no text authored by the latter has survived[3]; in the arabic tradition, by contrast, there exists a work in 14 parts attributed to this emperor[4]. As Heraklius was much occupied with his military expeditions against the Persians, it is unlikely that he would have had leisure-time to study, and to write the scientific works on astronomy[5] and alchemy now generally attributed to Stephanus. The tradition linking their activities suggests simply that the emperor was interested in these subjects, and for this reason invited Stephanus to Constantinople.

According to L. Leclerc it is very likely that Stephanus of Alexandria, Stephanus of Athens and Stephanus the Philosopher are one and the same person, who must also be identified with Iṣṭafan al- Qadīm (Stephanus the old) in the Arabic tradition, on the grounds that Stephanus of Athens, whose *Commentary on Galen* is included in the Arabic *Collection of Sixteen Books* of Galen's works, was very likely a physician in Alexandria who was occupied

with alchemy, and identifiable with the collector of these Sixteen Books of Galen. He also stresses that according to tradition prince Ḫalid ibn Yazīd was the first who asked scholars to translate for him medical, astronomical and alchemical books from Greek, Coptic or Egyptian into Arabic[6]. As far as the names of these scholars-translators are concerned, only that of Stephanus is preserved. Moreover it is said in Ḥāǧǧī Khalīfa that Stephanus the Greek from Alexandria translated the *Logic* and the *Categories* of Aristotle.

According to F. Sezgin the question of the authorship of the alchemical work attributed to Stephanus is more complicated, because there are two alchemists named Stephanus in the Arabic tradition. One was included in the catalogue of alchemists by Ḫalid ibn Yazīd the other was a monk from Mosul who lived about the middle of the 10th century[7]. Finally J. Ruska is of the opinion that the name Iṣṭafan al- Qadīm, the translator of Ḫalid ibn Yazīd according to Ibn an- Nadīm, was actually an error for the vaguely remembered Stephanus, the royal astrologer and alchemist of the emperor Heraklius[8].

B. The alchemical work

1. General

Stephanus' work On the great and sacred art of making gold (Στεφάνου Ἀλεξανδρέως οἰκουμενικοῦ φιλοσόφου καὶ διδασκάλου τῆς μεγάλης καὶ ἱερᾶς τέχνης. περὶ χρυσοποιΐας.) belongs to so-called *rhetorical alchemy* and especially to commentaries on earlier alchemical texts. The only complete but non-critical edition of the Greek text up to now is that of J. L. Ideler (1842), an edition based on the transcription of the text in *Monac. gr. 112* by Dietz[9]. This MS. is a XV-XVIth century copy of that found in the oldest alchemical codex, *Marc. gr. 299* (=M). In 1573, in Padua, Dominicus Pizimentius published a Latin paraphrase rather than a translation of the text[10], while in 1777, in Jena, Ch. Gf. Gruner published a translation of the first lecture with notes[11]. When in 1888 M. Berthelot published the *Collection des Anciens Alchimistes Grecs*, he did not include Stephanus' work in it for two reasons: first, it had been already published by Ideler; and secondly he considered it to be of

minor scholarly interest. Thus he gave only a brief summary of the subjects treated in it[12]. Finally, late in the thirties of this century, F. Sherwood Taylor revised the first three out of the nine lectures, with English translation and commentary, in *Ambix*[13].

In 1879 H. Usener questioned the authorship of the treatise. K. Krumbacher and K. H. Dannenfeldt were of the opinion that it is the work, not of Stephanus, but of a later writer, on the grounds that it is mentioned in the arabic bibliography Kitāb al-Fihrist[14] under the name *Stephanus the old*, who translated alchemical and other works for prince Ḫalid ibn Yazīd, who died in 704[15]. In favour of Stephanus' authorship are many chemists, philosophers and historians of science (e.g. M. Berthelot, E. O. von Lippmann, I. Hammer-Jensen, F. Sherwood Taylor, R. Vancourt, A. Lumpe, A. J. Festugière, O. Neugebauer, H. Hunger)[16], while other scholars (e.g. L. G. Westerink, P. Lemerle, E. Chauvon, H. D. Saffrey, G. Fowden) believe that only a critical edition of all works under Stephanus' name and their further study has any chance of offering a definite answer[17].

Apart from questions related to authorship, the text is marked by a cumbersome rhetorical style and an absence of original mathematical and physical ideas. The author also dislikes the whole alchemical apparatus, and polemicizes against people using the art of making gold for purposes of getting rich. Despite these features, however, the work was clearly greatly appreciated by the Greek, Arabic and Latin authors who read and referred to it, and it is this that has inspired me to study it anew. I tried to discover Stephanus' own principles and criteria underlying his work (they are what I call *intrinsic* principles and criteria, by contrast with our modern, *extrinsic* ones); to get a better understanding of it; and to elucidate a particular aspect of his personality and activities. Some of my results I published in an earlier article[18] (the total set is to be found in my dissertation)[19]; but only a recent extensive study of the work during my stay in Liège (Sept. '93 - March '94) in the *Centre d'histoire des sciences et des techniques* under the direction of Prof. Robert Halleux, general editor of *Les alchimistes grecs*[20], in preparation for a critical and annotated edition of it, enabled me to reach as complete an understanding of it as I think at this stage sustainable.

2. Manuscript tradition

As is well known, the last part (24813-25326) of Ideler's edition does not belong to Stephanus' work but to the *Dialogue between the philosopher Comarius and Cleopatra*, and scholars were persuaded that its missing conclusion, especially its final prayer in f. $74_{10\text{-}13}$, is to be found in *Paris*. Gr. 2327 (= A), copied in 1478 by Theodoros Pelecanos, or in *Scorial. gr. I.Φ.11* [21]. But this is a mistake. As H. Saffrey has shown, the oldest alchemical codex, *Marc. gr. 299* (= M, 10-11th century), has suffered both a loss of some quires and a rebinding of some other quires in wrong order, implying a loss either of whole works mentioned in its table of contents or of at least some of their parts[22].

According to my research Stephanus' work suffered an undoubted loss of its conclusion. For this reason the original text suddenly stops at ἔα κάτω, καὶ γεl (Id. 247_{23}). Further research shows that in *Paris. gr. 2325* (= B, 13th century) Stephanus' work stops at f. 81v (= Id. 243_{23}) and in f. 82r there immediately follows the title of a work of Zosimos (Ζωσίμου τοῦ Πανοπολίτου γνήσια ὑπομνήματα). This implies a) that B is a copy of M after the loss of the quires, and b) that the copyist of B knew very well that Stephanus' work is without a conclusion. In *Paris. gr. 2275* (= C), copied in 1465 by Emmanuel Roussotas, Stephanus' work also stops in the same place as it does in B, and some abbreviations in the prayers in the beginning or at the end of the lectures to be found in B are also found in C and A. This means a) that C and A are copies of B; and b) that, since there is no other MS. written between 1465 (C) and 1478 (A), the end of Stephanus' work included in A is very likely an interpolation of its copyist Theodoros Pelecanos, who was either inclined or ordered to add a suitable conclusion to Stephanus' mutilated text. From 1478 on we have MSS. that possess the new conclusion.

A study of the similarities and differences of the text and marginalia of the related folios of M, B, and A offers further evidence of their interdependence, and strengthens my opinion that the text found in B is a copy of that found in M, and that the text found in A is a copy of that found in B, including the added conclusion. My arguments are the following:

1) M (ff. $8r_{5\text{-}7}$, $10r_{9\text{-}15}$): In the beginning of Lectures I and II respectively there are two diagrams of chemical apparatus not contained in B and A.

2) M (f. $11r_{25}$): There is a series of symbols or non-Greek letters, very likely coptic, which represent a word used by the Gnostics. The copyist of B (f. $37v_{14\text{-}15}$) copied them in such a way that they bear some resemblance to Greek, while the copyist of A (f. $41v_{19\text{-}20}$) transformed them into purely Greek letters.

3) The abbreviation CH (σημείωσον, *note*) in the margins of B (f. $38r_{15}$) and A (f. $42r_{10}$) does not exist in the margin of the corresponding passage in M.

4) M (f. $15r_{13}$): The symbol used to designate a word in the text has been modified a little by the copyist of B (f. $44v_1$); the copyist of A, not having understood it, modified it further and also copied it in the margin (f. $46r_{26}$).

5) M (f. $16r_{16\text{-}21}$): In the margin there is what appears to be a fairly sophisticated design; this has been badly reproduced in the margin of the corresponding text in B (f. $46v_{16\text{-}19}$) and A (f. $47v_{16\text{-}19}$).

6) On two occasions B (f. $57r_{3,9}$) and A (f. $55r_{17,22}$) contain the same symbol as an abbeviation for the word ἀστέρων (*stars, here meaning planets*), a symbol which does not exist in M.

7) M (f. $22v_{14,15}$) has two small gaps, leaving a blank space (an erasure?) at a point where the following words are to be found in B (f. $58r_{12\text{-}13}$) and A (f. $55r_{25}$): a) ὠὸν τῶν φιλοσόφων (philosophers'egg) and b) ὄρνις οὐκ ἐγέννησε (bird did not lay [it]).

8) M (f. $22v_{17}$): its marginal abbreviation CH has been copied in the margin of the corresponding passage in B (f. $57r_{14}$) and in A (f. $55v_1$).

9) The sybillic enigma in B (f. $60v_{1\text{-}6}$) and A (f. $57v_{9\text{-}14}$) appears between quotation marks which do not exist in M.

10) B (f. $66r_{17}$) and A (f. $61v_{16}$) have the same marginal abbreviation CH which does not exist in M.

11) M (f. $30r_{21}$) has in the margin a note περὶ ἐργαλείων (on instruments) written by a later hand; this has been transferred as abbreviation CH to the margin of the corresponding text in B (f. $69r_{18}$) and A (f. $63v_{15}$).

12) A few marginal letters written by a later hand in M (f. $37v_{10\text{-}25}$) do not exist in B and A.

13) A few marginal letters very similar to the previous ones and written by the same hand in M (f. $39r_{16\text{-}29}$) are copied as

ἀφροσέλῆνον (aphroselenon) along the margin in B (f. $81r_{1\text{-}8}$) and A (f. $72r_{25\text{-}72}$).

3. Structure and division into πράξεις (lectures/ lessons)

This work, which is a commentary on some passages taken from earlier alchemical writings, consists of a series of nine πράξεις (lectures) written in a rhetorical style. It is the unique alchemical work with such a structure, typical of the School of Olympiodorus.

All titles apart from that of Lecture VIII contain the expression σὺν θεῷ (with God's help). The lectures usually begin and end with a prayer; but Lectures II, III and VI lack the introductory prayer, and Lecture III lacks also the final prayer. Generally the length of the prayer varies from a few lines (II, V, VI) to one page (I, IV, VII, VIII, IX) and contributes to the varying length of the lectures. We could then ask a) who it was who cut out or shortened these prayers (some time before the turn of the 10th century), and why; and b) whether there was any *further* interference with the original text before the appearance of M.

My remarks from a closer study of the whole text are as follows:

1) Lecture I is very short (115 lines), indeed the shortest, with no reference by the author to its length, by contrast with Lecture V, which is longer than the former (145 lines) and where he clearly says πρὸς τὸ βραχύτατόν μου πόνημα ἀπιέναι (to go back to my very short work, Id. 219_{29}). The end of its final prayer, which lacks the last words usually found at the end of the final prayer of the other lectures: νῦν καὶ ἀεὶ καὶ εἰς τοὺς αἰῶνας τῶν αἰώνων. Ἀμήν. (*now and always and unto the ages of the ages. Amen.*), sounds rather like an introduction to some subsequent commentary which is missing.

From a more careful study of the content of the last part of Lecture I and the beginning of Lecture II we know on the one hand that the subject preceding the final prayer of Lecture I is the *odd number*, and on the other hand that Lecture II, which has no introductory prayer, begins with a commentary on *the multitude of numbers* and their relation to the *monad*. I conclu-

de that Lecture I is an extensive, rhetorical, general introduction to the whole series of lectures composing this alchemical commentary. We could therefore imagine two possibilities. One is that Lecture I is an independent introductory lecture (of about twenty minutes). The other, which I find more likely, is that Lectures I and II were originally the constituents of one lecture, which some time before the 10th century was divided by a scholar/ copyist into two lectures.

2) The *Letter to Theodorus* (29 lines) and Lecture III (147 lines) differ greatly from all other lectures regarding their style, structure and content. First, there are no introductory and final prayers; secondly, they lack the rhetorical style of a commentary with its questions and answers and numerous expressions of admiration. On the contrary they have a dense structure with laconic phraseology, as if the author wanted to include in a single short text all general principles underlying the theory and the practice of the sacred art.

A careful look at the end of the *Letter to Theodorus*, whose final sentence is logically incomplete, and at the beginning of Lecture III shows that if we eliminate a part of the title of the latter, the end of the Letter finds its logical sequence in the beginning of Lecture III:

> (Letter, Id. 208_{31-33}) ... ἵνα ὁ θεόφρων καὶ καὶ ὁ θεογενὴς ἄνθρωπος διὰ τῆς εὐθείας ἐργασίας καὶ θεολογιῶν καὶ μυστικῶν λόγων μάθῃ.
> *... that the man who is godly minded and born of God may learn by direct experience and by theological investigations and mystical discourses.*
> (Lecture III, Id. 209_{1-4}) Τοῦ αὐτοῦ Στεφάνου περὶ τοῦ ἐνύλου κόσμου πρᾶξις σὺν θεῷ γ'. Πῶς διοργανοῦται καὶ πῶς ἐν αὐτῷ τὰ θεῖα μόρια ἐκκαθαιρόμενα ἀνίπτανται ...
> *Of the same Stephanus on the material world. Lecture III with God's help. How [the world] is organized and how the divine particles in it, being well purified, fly upwards ...*

According to my research, the expressions Τοῦ αὐτοῦ Στεφάνου (of the same Stephanus) and πρᾶξις σὺν θεῷ γ' (lecture III with God's help) are simply the interpolations of some scholar/copyist in the *original* Letter, resulting in the division of it into two parts: The Letter and Lecture III. The original text should read as follows:

> ἵνα ὁ θεόφρων καὶ ὁ θεογενὴς ἄνθρωπος διὰ τῆς εὐθείας ἐργασίας καὶ θεολογιῶν καὶ μυστικῶν λόγων μάθῃ περὶ τοῦ ἐνύλου κόσμου, πῶς διοργανοῦται καὶ πῶς ἐν αὐτῷ τὰ θεῖα μόρια ἐκκαθαιρόμενα ἀνίπτανται ...
> *that the man who is godly minded and born of God may learn by direct experience and by theological investigations and mystical discourses how the material world is organized and how the divine particles in it, being well purified, fly upwards...*

3) We must clarify the meaning of the word ἕκτον (sixth) in the phrase τὸ μετὰ χεῖρας τοῦτο ἕκτον σύγγραμμα (this sixth [systematic] work that I have at hand) in the beginning of Lecture VII. The word ἕκτον is to be found only in M. This shows that later copyists, thinking that Stephanus was referring to his own lecture with this phrase, excized the word sixth, thus destroying the serial number of Lecture VII. Ideler clearly shared this opinion, since in his edition he has corrected the word sixth to ἕβδομον (*seventh*, Id. 231_{13}).

In order to better understand the division of Stephanus' work into lectures, I located all passages in which Stephanus refers to *works* in various locutions. They are as follows:

a) Id. 199_{10}: τῆς ἐν χερσὶ πραγματείας τοῦδε τοῦ συγγράμματος τὰ κάλλιστα δρέπεσθαι (to gain possession of the best [knowledge/ ideas] of this treatise, which we have at hand, and contained in this work).

b) Id. 213_{29-30}: καὶ τοὺς αὐτῶν σπινθῆρας ἐν τοῖς τῶν αὐτῶν συγγράμμασιν ἀναγυμνῶσαι (and to unveil their sparks (i.e. genuine ideas) [contained] in their works).

c) Id. 213_{32}-214_{2}: ἔλθωμεν οὖν ἐπὶ τὸ προκείμενον καὶ τὴν πρότασιν τῆς αὐτῶν συντάξεως ἀκροασάμενοι μάθωμεν (let us then come to the subject and, having heard the introduction to their composition, learn ...).

d) Id. 217_{32-33}: πάλιν ἐπὶ τὸ προκείμενον μετέρχεται ἀνακεφαλαιῶν τὸν λόγον (he comes again to the subject, summing up the argument/ discourse).

e) Id. 219_{29}: πρὸς τὸ βραχύτατόν μου πόνημα ἀπιέναι (to go back to my very short work).

f) Id. 231_{12-13}: τὸ μετὰ χεῖρας τοῦτο ἕκτον (Id. ἕβδομον) σύγγραμμα ... ἐκπεράνω (to finish this sixth (Id. seventh) work I have at hand).

g) Id. 238_{14-15}: ἔλθωμεν οὖν ἐπὶ τὸ προκείμενον καὶ ἴδωμεν, τί βούλεται τοῦ τετάρτου λόγου τὴν πρότασιν ἐνάρξασθαι (let us then

come to the subject and see what is that which begins the introduction to the fourth discourse).

h) Id. 244$_9$: καὶ τὴν τῶν ἀρχαίων εἰσβολὴν τυπικῶς ἐπισκέπτομαι (and I typically examine the preface of the ancient [writers]).

i) Id. 244$_{17}$: ὡς ἔχει ἡ βίβλος (as it is in the book).

Comparing these passages one to another and especially to (e), in which Stephanus refers to his own work, modestly characterizing it as πόνημα (work) and not as σύγγραμμα (systematic writing/work) or πραγματεία (systematic treatise), which could give the impression of arrogance on his part, we may infer that (f) refers to a work on which he is commenting rather than to his own manuscript. Consequently, the word sixth does not relate to the division of the work into lectures and to their serial numbers.

According to the traditional division of the work, the subject of Lecture VII is the temper of copper and the making of *golden coral* and *molybdochalcon* out of it. Stephanus distinguishes between work on copper and that on silver and gold (Id. 233$_{37}$), mentioning Neilos the archpriest (Id. 236$_{36-37}$) and expressing his opposition to those who are ignorant and need many instruments for the making of gold (Id. 232$_{5-13}$, 233$_{6-13}$). But all this is found in the Syriac translation of the sixth book of Zosimos' *On work on copper*[23], and so it is very likely that Stephanus would have referred to it as the *sixth work*.

As far as (g) in the beginning of Lecture VIII is concerned, where Stephanus mentions the introduction to *the fourth discourse/ section*, it is very likely that he is commenting on the *fourth* book of Democritus, the introductory phrase of which is τὰ θειώδη κρατοῦνται ὑπὸ τῶν θειωδῶν (the sulfurous are dominated by the sulfurous)[24]. We find this Democritian phrase again in Lecture III, where Stephanus comments on the temper of copper as well as on divine water, magnesia and *aphroselenon*. It is one of a number of comments on various passages of earlier scholars, the introductory phrase of Democritus' fourth book included.

Having clarified the significance of the *sixth book* and the *fourth discourse/ section*, we can now introduce a *new* division - which was very likely the *original* one - of Stephanus' work into lessons before M was written, and their traditional title and serial number as the in MSS. and in Ideler's edition:

New division		MSS. and Ideler
1st Lesson	=	Lectures I + II
Letter to Theodorus	=	Letter to Theodorus +Lecture III
2nd Lesson	=	Lecture IV
3rd Lesson	=	Lecture V
4th Lesson	=	Lecture VI
5th Lesson	=	Lecture VII
6th Lesson	=	Lecture VIII
7th Lesson	=	Lecture IX

In this way we can explain the lack of an introductory prayer in Ideler's Lecture II, the Letter to Theodorus and Lecture III, and the lack of a final prayer in the Letter of Theodorus. According to the new division only the 4th Lesson lacks both prayers. Is it due to a scholar/copyist who dropped out the prayers thinking that the lesson was already very long? Could a similar idea have contributed to the division of the 1st Lesson into two lectures? This could not have been the criterion of the division of the original Letter to Theodorus into two lectures (Letter to Theodorus and Lecture III), as its length and content were not appropriate to such intervention.

It is certain that the traditional division into lectures dates back to the interval between the writing of M (10th-11th century) and Stephanus' death a little later than 621[25]. As far as the motive underlying it is concerned, however, this could either have been the desire of a scholar/ copyist to have *nine* lectures like Plotinus' *Enneads* or the importance of the number *nine* as explained in the analysis of the enigma of the philosophers' stone in Stephanus' 4th Lesson (Id. VI).

4. Style

Generally speaking, Stephanus' lectures have a loose structure which cannot be attributed to his rhetorical style. It is rather due to the author's efforts to place various ideas from various disciplines into a logical sequence and to fashion them into a whole. This, says Stephanus, is exactly the research method of the philosopher[26] (and clearly his own method too), who although he says he will clarify everything in fact says nothing that is clear.

We should remember here that according to L. G. Westerink the lack of clarity and (logical) sequence in the mixing of ideas is a characteristic element of Stephanus' *Commentary on De anima*. In this case Westerink's opinion is an additional argument for the authorship of Stephanus as far as the alchemical work is concerned. Another argument for this hypothesis is H. Blumenthal's conclusion that Stephanus mixes Aristotelian and Neoplatonic ideas in a strange way. My research on the alchemical work yields the same conclusion.

C. Date of the work

1. The passage and its data

According to generally accepted opinion this work includes no evidence which could help pin-point either the identity of its author or the date of its composition. In my opinion, however, the evidence provided by one single astronomical passage throws conclusive light on both questions. This passage is as follows:

> Id. 225_{25-32}: Πάλιν ὁ [ὁ *correxi:* ἡ MBA] τῆς Ἀφροδίτης τὴν περσικὴν λαχὼν [λαχὼν correxi: λαχοῦσα MBA] ἑῷαν προηγεῖται τὰς τοῦ ἡλίου αὐγάς· πάλιν ὁ τοῦ Ἑρμοῦ ὑπὸ τὰς τοῦ ἡλίου αὐγὰς ἐπὶ τὰ ἑπόμενα εὑρίσκεται· πάλιν ὁ τοῦ Κρόνου διὰ τὴν τοῦ ὕψους βαθύτητα ἀμυδρῶς προσφαίνεται· πάλιν ὁ τοῦ Ἄρεως τὴν πυρώδη τομὴν ἀπεργάζεται· ἐν οἷς ἡ νυμφικῶς διασκευασμένη προέρχεται σελήνη, τὰς ἐννέα τῶν τμημάτων ἀναλαμβάνει ὁλκάδας, δι' ἧς τὸ συγκιρνώμενον τελειοῦται κρᾶμα.
> *Again the [planet] of Venus having attained the Persian dawn precedes the rays of the Sun; again the [planet] of Mercury being under the rays of the Sun is found in the subsequent [Zodiacal signs]; again the [planet] of Saturn is faintly seen because of the depth of the height; again the [planet] of Mars is preparing the burning cut; towards which [planets] comes the Moon dressed as a bride [and] takes up the towed ships of the nine parts; by which [Moon] the alloy mixing itself comes to perfection.*

Apart from the Sun and the Moon four out of the five planets visible to the naked eye - i.e. Mercury, Venus, Mars and Saturn (Jupiter is missing) - are mentioned in this passage, which, as we will see, astronomically explained gives a full description of the

view and the order of the planets as seen in the eastern sky near the horizon at dawn:

Mercury being under the rays of the sun is found in the subsequent [Zodiacal signs]: this means that Mercury rises after sunrise; i.e. it is now under the horizon and consequently is invisible. After sunrise it will continue to be invisible because hidden under the rays of the Sun, i.e. because of the bright sunlight. As we will see, it was visible as an *evening star* after sunset.

The Sun has not yet arisen, otherwise its light would have hidden the other planets.

Venus having attained the Persian dawn precedes the rays of the Sun: consequently it is visible as *the morning star* near the eastern horizon at dawn.

Mars and Saturn are still visible in the dawn:

Saturn is faintly seen because of the depth of the height, i.e. because of its great distance from the Earth, as according to ancient cosmological models Saturn is revolving on the most remote planetary sphere round the Earth.

Mars is preparing the burning cut, i.e. it is preparing its passage from the last Zodiacal sign, Pisces, which astrologically belongs to the trinity of *watery* signs (Cancer, Scorpio, Pisces), to the first one, Aries, which belongs to the trinity of *fiery* signs (Aries, Leo, Sagittarius). It is easier to understand the meaning of this passage if we remember that the planet Mars, the ruler of Aries, is linked in astrology with violent activities, especially with weapons, cuts and burns, and in alchemy with the metal *iron*.

The *Moon*, which moves very rapidly in the Zodiac and has a synodic period of 29 1/2 days, *comes dressed as a bride* towards the above mentioned planets. Taking into account that the *conjunction* of the Moon with the Sun, i.e. the *new moon*, *was* considered as their marriage, a *theogamia*, it becomes clear that the Moon, having passed its phase of *full moon*, where it is in *opposition* with the Sun, is now moving towards the above mentioned planets and the Sun, without having yet been in conjunction with any one of them.

According to the author's poetic account of this phenomenon, the order of the planet positions from east to west is as follows:

Mercury- Sun (both under the horizon)- *Venus- Saturn- Mars- Moon* (all four above the horizon).

2. *Relation between alchemy and astronomy*

In the last sentence of the above mentioned passage Stephanus refers to the *alloy which is mixing itself and comes to perfection by the Moon*. The question which arises is: Why did he relate this celestial phenomenon to (al)chemical operations? To answer this question we must remember the Stoic principle of *sympathy* between all parts of the world, which underlies the traditional correspondence between celestial bodies (planets), terrestrial things (metals, precious and semiprecious stones, plants, animals etc) and parts of the human body.

In an earlier article on Stephanus' *alchemical cosmology* I studied the correspondences introduced by him over and above the known ones; e.g. the secret name of the philosophers' stone, composed of nine letters and divided into four syllables, corresponds to the *tetrasomia*, i.e. the four basic substances used in (al)chemical operations. These four substances further correspond to the four cosmic elements (fire, air, water, earth), to the equinoctial and solsticial points of the Sun's annual path on the Zodiac (i.e. the seasons), to the parts and four humors of the human body (blood, yellow bile, black bile, phlegm) etc. He also compares the passages of the seven planets through the twelve Zodiacal signs with the appearances and disappearances of the seven metals and colours in the composition of the tetrasomia, and the changes of the four primary elements from one to another, as well as those of the natural phenomena, with the phenomena occuring in the chemical apparatus[27].

We can now explain that the *alloy* which is mixing itself and comes to perfection by the *Moon* is that of the metals corresponding to the mentioned planets, and it may be related to the subsequent passage:

> Id. $228_{28\text{-}32}$: ... ἵνα τριῶν ὄντων τῶν τῆς καθόλου ἐργασίας, τετάρτην ἀναδείξῃ τὴν τετρασωμίαν βαδίζουσαν εὐτάκτως. Καὶ διατρέχουσι πρὸς ὑπηρεσίαν τῆς καθαρωτάτης, ἵνα διὰ τῶν εὐτονούντων κεντήσωσιν πρὸς τὰς τοῦ ἡλίου αὐγάς, ὅπως τὸ ἐκ τελείου τέλειον τελείοις συναφθῇ.

> *... so that being three [bodies/ elements/ metals] of the whole operation, it displays as a fourth one the tetrasomia (= the four bodies) walking in order. And they (= the bodies/ planets) run about to serve the most pure (= Moon), so that by means of those <conjunctions?> having vigour they spur <themselves?> on towards the rays of the Sun, so that that what is perfect made up of a perfect (thing) is combined with perfect (things).*

Assuming that the expression *the tetrasomia walking in order* - the tetrasomia being related to four basic metals - means *the four planets* (apart from the Sun and the Moon) *moving in order* (on the Zodiac), and knowing that each planet corresponds to a metal (Sun-gold, Moon-silver, Mercury-quicksilver, Venus-copper, Mars-iron, Jupiter-tin, Saturn-lead), we may explain the passage as follows:

The Moon-silver, which is only inferior to the Sun as planet and to gold as metal, coming in successive conjunctions with the four planets (i.e. with the metals of the tetrasomia), changes their colours (i.e. it transmutes their substances) and leads them towards the Sun as it (sc. the Moon) is moving towards its conjunction with the Sun (i.e. it leads them towards their perfection by union with the Sun- gold, the perfect metal).

3. *Astronomical calculation*

In order to check whether this passage really refers to an astronomical phenomenon observed by Stephanus during the time he was busy writing his alchemical work, I used the Programme Voyager II for Macintosh, which within ca. 500 years of the present calculates planet positions to an accuracy of 1 to 2 arc minutes of angle; outside this range, the accuracy is typically 5 to 10 arc minutes, depending on the planet. I sought for a *great conjunction* (or *assembly*) of the Sun, the Moon, Mercury, Venus, Mars and Saturn, seen in the eastern sky at dawn during the reign of the emperor Heraklius (5 Oct. 610 - 11 Jan. 641) at Constantinople (Longitude= 28° 58' E, Latitude= 41° 01' N). As far as Jupiter is concerned, there is no reference to it in the text; obviously it was not visible and consequently was not part of Stephanus' observations.

The angular distance between the Sun and the waning Moon from full moon to new moon diminishes from 180° to 0°, and the time required for this is ca. 14 3/4 days - time enough for the order among the planets (especially the Sun, Mercury and Venus) to change. In order to minimize this time, I chose a maximal separation of 48° for the set of the planets, equal to the greatest elongation of Venus, i.e. its greatest angular distance from the Sun as seen from the Earth. If we find the Moon at 48° angular distance from the Sun subsequent to their conjunction, i.e. about four days *after* the new moon, we can go back and calculate both the date of the previous new moon and the time of the Moon's antecedent conjunctions with each of the other planets. In this way we can estimate the duration of the entire astronomical phenomenon in question.

According to the calculations made on the computer, during the reign of Heraklius there were 92 cases of such *great conjunctions* of these four planets, the Sun and the Moon, independently of their order in the sky and their visibility. Having checked one by one all cases as far as the order of the involved planets (Sun and Moon included), their visibility in the eastern sky, and the invisibility of Jupiter at dawn are concerned, I have excluded all but the following three cases:

1) N° 18: 7 June 617, 06:56 pm local time (16:56 Universal Time= UT), maximal separation of planets 44.06°.

2) N° 80: 11 March 636, 02:24 am (00:24 UT), maximal separation 47.89°.

3) N° 85: 19 February 638, 02:00 am (00:00 UT), maximal separation 20.84°.

According to my research Stephanus must have died a little after 1 Sept. 621[28]; consequently we can exclude the last two of these cases. The astronomical data of the *only one* remaining case, calculated for the dawn of this date, are the following:

Constantinople, 7 June 617, 04:15 am local time (02:15 UT)

Planet	Rose	Set	Zodiacal sign
Sun	04:29 am	07:32 pm	17° 49' Gemini
Mercury	05:32 am	08:56 pm	04° 31' Cancer
Venus	03:54 am	06:42 pm	07° 48' Gemini
Mars	01:04 am	01:00 pm	01° 35' Aries
[Jupiter	*11:32 am*	*12:29 am*	*15° 17' Virgo]*

Saturn	03:21 am	05:32 pm	25° 29' Taurus
Moon	03:09 am	05:53 pm	23° 21' Taurus

At that time the Sun was below the horizon (altitude -3°); Venus was very bright (apparent magnitude -3.9) and a little above the horizon (altitude +2°53') as it had risen 20 minutes earlier; Saturn was bright (apparent magnitude 1.1), in conjunction with the crescent of the waning Moon (apparent magnitude -8.6) near the eastern horizon (altitudes +9°06' and +10°39' respectively); Mars was brighter (apparent magnitude +0.3) than Saturn and high enough in the sky (altitude +33°12'). In the evening of the same day (8:30 pm), when the Sun had set below the horizon (altitude -9°36'), Mercury was bright (apparent magnitude -0.5) as an evening star near the western horizon (altitude +3°36').

4. *Date of the alchemical work*

One can be certain that Stephanus had been observing the planets for many days as this particular astronomical phenomenon gradually evolved. The position of Mars in 1°35' Aries, a *fiery* Zodiacal sign and the first subsequent to the vernal equinox, explains the meaning of his writing that *Mars is preparing the burning cut*: he had been observing Mars before this date, as it was moving through the last degrees of Pisces (a *watery* sign, and the last one on the Zodiac) *en route* to entering *fiery* Aries at 9:30 pm of 4 June. Meantime the Moon, after the full moon of 26 May, would come successively into conjunction with Mars in Pisces (June 3), Saturn in Taurus (June 7) and Venus in Gemini (June 8), reaching its next *theogamia* with the Sun in Gemini - i.e. the stage of new moon - on 9 June 617.

Stephanus mentions how *Mars is preparing the burning cut*, and how *the Moon comes dressed as a bride*, which means that the latter was still very bright after the full moon, but he does not mention their conjunction of 3 June (in Pisces). Consequently, he was very likely writing the 4th Lesson (Id. VI) some time after 26 May and some time before 3 June 617.

That such astronomical phenomena were of critical interest to Stephanus is shown convincingly in his *Commentary on the*

Handy Tables of Ptolemy where he gives examples of solar, lunar and planetary positions, as well as of solar and lunar eclipses for the years 617-619 in Constantinople[29]. But when he embellished his alchemical work by including his very poetic account of the above described phenomenon he could barely have imagined that it would constitute an argument in favour of his own authorship of the work and its exact date.

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5. Στεφάνου μεγάλου φιλοσόφου καὶ Ἀλεξανδρέως διασάφησις ἐξ οἰκείων ὑποδειγμάτων τῆς τῶν προχείρων κανόνων ἐφόδου τοῦ Θέωνος. i.e. *Explanation through individual examles of Theon's method for the Handy Tables* or shorter *Commentary on the Handy Tables* (of Ptolemy). This unpublished work is attributed to Heraklius in three out of the 14 known MSS.: Paris. gr. 2492, Cromwell 12, Cantabr. 1043.

6. The most important question is, whether it is possible that Stephanus of Alexandria was invited by Ḫālid from Constantinople to Damascus in order to translate these books for him. When Yazīd aged less than 40 died on 11. Nov. 683, his junger son Ḫālid should have been 15-20 years old. As the new Khalif and stepfather of Ḫālid, Merwan, who died a little later, in April 685, appointed his son Abd al-Malik as crown prince, Ḫālid should have given up his rights in the throne and been occupied with sciences until his death in 704. But this would have made Stephanus himself 120 years old in 685! LECLERC L., *Histoire de la médecine arabe*. I, Paris 1876, pp. 41-42, 65-69.
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Articoli/*Articles*

VIAGGIATORI BAROCCHI: GIOVANNI BATTISTA BONAGENTE, UN MEDICO VENETO AL CAIRO.

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SUMMARY
GIOVANNI BATTISTA BONAGENTE, A VENETIAN PHYSICIAN IN CAIRO

Giovanni Battista Bonagente from Vicenza was a physician attached to the Venetian consulate in Cairo from 1634 to 1641. Though he did not leave a diary, he partially narrated his Egyptian experience in the letters he sent to his uncle, Giambattista Benasutti. The unpublished correspondance between Bonagente and Benasutti is investigated by the present paper.

I medici veneziani e l'Oriente

Una folta rappresentanza dei tanti sudditi della Repubblica Veneta che si recarono in quelle terre che oggi definiremo come Medio Oriente è costituita da medici. Fin dai primi anni del XIV secolo, la Republica di Venezia stabilì che un medico suo dipendente dovesse essere assegnato alle galee che dal bacino di S. Marco si allontanavano verso mari più o meno lontani.

Le comunità veneziane insediate in quelle città del bacino mediterraneo che costituivano i più importanti scali commerciali della Repubblica, invece, si dovettero servire per molto tempo di medici ebrei lì stanziati; man mano che le colonie veneziane e le rappresentanze diplomatiche cui esse riferivano

Key words: Republic of Venice's physicians - Egypt