

## **Pseudo-Democritus' Alchemical Works:**

### **Tradition, Contents and Afterlife**

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My paper today will focus on the four alchemical books ascribed to the Greek atomist Democritus, a treatise that ranks among the most ancient examples of Western alchemical writing. These books were composed in the first century AD and were considered by all the later alchemists as a fundamental reference work: Ps.-Democritus' writings, in fact, are frequently cited by the alchemists whose treatises make up the Greek *Corpus alchemicum*, including Zosimus of Panopolis, Synesius, Olympiodorus and other Byzantine alchemists, such as Stephanus and Christianus. In my paper I will focus especially on the manuscript tradition of these four books, by analysing the different versions in which they have been preserved and by trying to give you a general overview of their contents.

In 1884, the 17<sup>th</sup> of December, the French chemist Marcellin Berthelot read to the *Comité central des travaux historiques et scientifiques* the following communication:

In many important European libraries there is a big collection of Greek manuscripts that is very important for the history of natural sciences, the technology of metals and ceramic, as well as for the history of scientific ideas during the first centuries of the Christian era: it is the collection of alchemical manuscripts, which nowadays remains yet to be edited.

The collaboration between Berthelot and the scholar C. E. Ruelle led to the publication of the first edition of the Greek alchemical texts [*Collection des anciens alchimistes grecs*, I-III, Paris 1887, (hereafter *CAAG*)], the only existing edition so far of most of these treatises. Even today, more than one century after Berthelot-Ruelle's edition, when we speak of Graeco-Egyptian and Byzantine alchemy, we actually refer to this big collection of treatises that were composed over a period of more or less 10 centuries, from the 1<sup>st</sup> centuries AD up to the 10-11<sup>th</sup> century. These treatises have been preserved – often in incomplete and summarized versions -- in big and to some extent different anthologies of alchemical works, which are handed down by several Byzantine manuscripts nowadays kept in the most important European libraries.

Between the first and the second World War, the *Union Académique Internationale*, under the supervision of Joseph Bidez, patronized the publication of the *Catalogue des manuscrits alchimiques grecs* (Bruxelles 1924-1932; hereafter *CMAG*), a work in eight volumes that wanted to describe all the alchemical manuscripts that were known at that time: about one hundred manuscripts have been listed in these volumes. The most important manuscripts, which have been taken into account for the more recent editions of some alchemical texts (see, in particular Michèle Mertens' edition of Zosimus), are the following 3 manuscripts, which I have considered as important testimonies also for the alchemical works of Ps.-Democritus:

1) *Marcianus gr.* 299 (10<sup>th</sup>-11<sup>th</sup> century) = *CMAG* II 1-22

2) *Parisinus gr.* 2325 (13<sup>th</sup> century) = *CMAG* I 1-17

3) *Parisinus gr.* 2327 (15<sup>th</sup> century) = *CMAG* I 17-62. According to the colophon, the codex was written by the otherwise unknown Theodoros Pelekanos (from Corfu) who finished copying the ms. in Crete in 1478<sup>1</sup>.

The codex *Marcianus* is a parchment manuscript written in the so-called “mixed minuscule”, which, in its actual form, counts 196 folia; on paleographical bases, it has been dated to the end of the 10<sup>th</sup> century AD, when it was probably composed in Byzantium. The title of the first treatise included in the collection – namely a lecture (or *praxis*) by the Byzantine alchemist Stephanus of Alexandria (7<sup>th</sup> c. AD) entitled “Stephanos of Alexandria the Universal Philosopher and Teacher of This Great and Sacred Art of the Making of Gold. First Lecture with the Help of God” (Στεφάνου Ἀλεξανδρέως οἰκουμενικοῦ φιλοσόφου καὶ διδασκάλου τῆς μεγάλης καὶ ἱεράς ταύτης τέχνης περὶ χρυσοποιίας. Πρώξις σὺν θεῷ πρώτη) – is inscribed in a so-called *pylè* or *portico*, a kind of architectural motif painted in

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<sup>1</sup> The codex, which counts 299 folia, entered the library of Fontainebleau in the first half of the 16<sup>th</sup> century (it is already registered in the first ‘catalogue’ or ‘list of manuscripts’ dating to 1545). The fol. 291r preserves a colophon that reads: ἐτελειώθη ἡ παρούσα βίβλος διὰ χειρὸς ἐμοῦ Θεοδώρου τοῦ Πελεκάνου τυγχάνωντος ἀπὸ χώρας Κερύκας νήσου τῶν Φεάκων· μηνὶ ἰουνίῳ εἰς τὰς κβ. εἰς χώραν τῆς Κρήτης εἰς τὸ λεγόμενον Χάντακα : ἐπὶ ἔτους ςλψς· τὸ δὲ ἀπὸ τῆς Χριστοῦ γεννήσεως ,αουα· καὶ ἔσται ἡ βίβλος αὕτη ἐμοῦ Θεοδώρου τοῦ Πελεκάνου χάριτι Χριστοῦ τοῦ Θεοῦ ἡμῶν, ὦ (*sic*) ἡ δόξα καὶ τὸ κράτος εἰς τοὺς αἰῶνας ἀμήν, “I, Theodoros Pelekanos, coming from the region of Corfu, island of Phaeacians, have finished this manuscript, in the month of June 22nd, in the place called Chantaka in Crete: in the year 6986, that is, 1478 after the birth of Jesus Christ. I, Theodoros Pelekanos, will have this book for want of Jesus Christ, let he have praise and power over the centuries, amen”.

four colors, namely gold, bleu, red and green; moreover the title is written in the so-called “epigraphic majuscule” in gilded ink (sorry for the black and white picture). This rich decoration led Saffrey<sup>2</sup> to suppose that the manuscript was composed for a rich commissioner (or client), perhaps for the same Imperial Library of Constantinople. Afterwards, the manuscript entered cardinal Bessarione’s collection, as is possible to infer from the shelf-mark still readable at the bottom of the same folium (8<sup>r</sup>): τόπος π', locus 80. (However, we must remind that the codex does not have the well-known *ex-libris* of the cardinal).

On fol. 2 the manuscript presents a *pinax* or table of contents that lists 52 titles of alchemical treatises. However, the order of the titles does not correspond anymore to the order in which the treatises appear within the manuscript<sup>3</sup>. In its actual form, in fact, the manuscript is the result of a recent rebinding, in which the quires have been rebound in a mistaken order. Moreover some quires or some leaves have been lost, and, for this reason, some of the treatises listed in the *pinax* are no longer available within the manuscript. As far as Ps.-Democritus’s sections are concerned, the two titles listed in the *pinax* correspond to the content of the manuscript:

1) **fol. 2r** Democritus, *On the Making of Purple and Gold: Natural and Secret Questions*. This work is preserved in the manuscript (fol. 66v27) under the simple title of *Democritus, Natural and Secret Questions*.

2) **fol. 2v** *On the Making of Silver by the same author*. A section with the same title is preserved in the manuscript, at fol. 71r7, where we read *On the Making of Silver*.

If we compare these two sections with the information provided by the indirect tradition about Ps.-Democritus’ alchemical works, we can easily realize that the *Marcianus* manuscript preserves an abridged or epitomized version of a more extended and organic work. The works ascribed to Democritus, in fact, became quite popular among Late Antique and Byzantine alchemical authors, who packed their own treatises with quotations from the earlier alchemist.

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<sup>2</sup> See Henry Dominique Saffrey, *Historique et description du Marcianus Graecus 299*, p. 2: « Cette décoration luxueuse est à mon avis le signe que le manuscrit a été confectionné pour un grand personnage, peut-être même pour la bibliothèque impériale ».

<sup>3</sup> In four places *Marcianus* shows textual lacunae (fols. 39-40; 111-112; 140-141; 180-181), possibly because of the loss of leaves: in fact, these lacunae are always at the end of a quire, and it is possible that some quires or some leaves went lost following a new binding of the manuscript. Moreover, in a recent important article Saffrey pointed out that it is possible to reorganize the manuscript’s quires so that the order of the texts corresponds to the succession of the titles in the table of contents.

Some of these authors preserve also precious information about the original structure of Ps.-Democritus work, which was originally divided in 4 different books.

In particular, a commentary in dialogue form on Ps.-Democritus writings appears under the name of Synesius; it is handed down in the manuscript tradition under the title of *The Philosopher Synesius to Dioscorus: Notes on Democritus' book*. Immediately after these words, the work opens with the subtitle: “With God’s approval, the philosopher Synesius greets Dioscorus, priest of the great Serapis in Alexandria”. Since Dioscorus is presented as a priest of the Serapeum, Synesius’ work probably dates before 391 AD, when the temple was destroyed. It is likely that the commentary was composed at the beginning of the 4<sup>th</sup> c. AD, since it presents many similarities with the treatises of the Egyptian alchemist Zosimus of Panopolis, active between the 3<sup>th</sup> and the 4<sup>th</sup> century. Both the authors draw a particular attention to ps.-Democritus’ writings, and Synesius provided us with detailed information about the treatises ascribed to the pre-socratic philosopher. He wrote, in particular:

He [Democritus] took his basic principles from him (i.e. Ostanos, his alleged master) and composed four books on dyeing, on gold, silver, [precious] stones and purple. I stress this point: he composed by taking his basic principles from the great Ostanos. For he was the first to write that nature delights in nature, and nature masters nature, and nature conquers nature, and so on.<sup>4</sup>

Moreover, similar information is preserved also in two later sources. On the one hand, the alchemist Olympiodorus (according to some scholars, to be identified with the homonymous Neo-Platonic philosopher) in his commentary on Zosimus’ work specifies:

For nature delights in nature and so on. Democritus, by taking [his knowledge] from these [aphorisms; i.e. the aphorisms on the nature, already quoted by Synesius and which Olympiodorus quotes a few lines], composed four books under the title of *Principle*.<sup>5</sup>

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<sup>4</sup> Syn. Alch. § 1, ll. 11-17 M. Εκ τούτου λαβὼν ἀφορμὰς, συνεγράψατο βιβλίους τέσσαρας βαφικὰς, περὶ χρυσοῦ καὶ ἀργύρου, καὶ λίθων, καὶ πορφύρας. Λέγω δὴ τὰς ἀφορμὰς λαβὼν, συνεγράψατο παρὰ τοῦ μεγάλου Ὀσάνου. Ἐκεῖνος γὰρ ἦν πρῶτος ὁ γράψας ὅτι ἡ φύσις τῇ φύσει τέρεται, καὶ ἡ φύσις τὴν φύσιν κρατεῖ, καὶ ἡ φύσις τὴν φύσιν νικᾷ, καὶ τὰ ἐξῆς.

<sup>5</sup> CAAG II 102,17-18: ἡ γὰρ φύσις τῇ φύσει τέρεται, καὶ τὰ ἐξῆς. Ὁ δὲ Δημόκριτος ἐκ τούτων λαβὼν συνεγράψατο βιβλία τέσσαρα τῷ τῆς ἀφορμῆς ὀνόματι. This passage has been edited on the basis of **M** reading by Letrouit 1995, 76 (t. V).

Even though Olympiodorus does not specify the topics of these books, he seems to indicate the title under which all four books were collected: the *Principle*. However, the reliability of such information is questionable. Olympiodorus closely follows the passage by Synesius, which is probably his source. The same expressions are recognizable in both the texts: ἐκ τούτων λαβῶν in Olympiodorus is close to Synesius' words Ἐκ τούτου λαβῶν, while both authors employ the verb συγγράφειν (to compose). Given that Olympiodorus also quotes Synesius just a few lines before the abovementioned passage, it seems quite likely that he was misreading his source when he gave the title of *Principle* (ἀφορμή) to the books of ps.-Democritus. Specifically, Synesius' first line may have sounded ambiguous, leading Olympiodorus to take "principles" (ἀφορμάς) to refer to the title of the four books mentioned immediately after. Synesius himself seems to have been aware of the risk of being misread, hence his reassertion in the following line, that ps.-Democritus wrote his own books by following the principles that he had learned from his master Ostanes.

Moreover, such a title is not mentioned in the only no-alchemical source regarding ps.-Democritus' treatises. The Byzantine chronographer Synkellus, who probably knew a *Corpus* of alchemical writings quite similar to the anthology preserved for us in the Byzantine manuscripts, writes in his *Chronography*:

Democritus of Abdera, the natural philosopher, was flourishing. In Egypt, Democritus was initiated into the mysteries by Ostanes the Mede, who had been dispatched to Egypt by the Persian kings of that time to take charge of the temples in Egypt. He was initiated in the temple of Memphis along with other priests and philosophers, among them a Hebrew woman of learning named Mariam, and Pammenes. **Democritus wrote about gold and silver, and stones and purple, but in an oblique way.**<sup>6</sup>

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<sup>6</sup> Syncell. 297,24-28 Mosshammer (= 68 [55] 300,16 DK): Δημόκριτος Ἀβδηρίτης φυσικὸς φιλόσοφος ἤκμαζεν. ἐν Αἰγύπτῳ μνηθεὶς ὑπὸ Ὀσάνου τοῦ Μήδου σταλέντος ἐν Αἰγύπτῳ παρὰ τῶν τηνικαῦτα βασιλέων Περσῶν ἄρχειν τῶν ἐν Αἰγύπτῳ ἱερῶν, ἐν τῷ ἱερῷ τῆς Μέμφεως σὺν ἄλλοις ἱερεῦσι καὶ φιλοσόφοις, ἐν οἷς ἦν καὶ Μαρία τις Ἑβραία σοφὴ καὶ Παμμένης, συνέγραψε περὶ χρυσοῦ καὶ ἀργύρου καὶ λίθων καὶ πορφύρας λοξῶς· ὁμοίως δὲ καὶ Μαρία. ἀλλ' οὗτοι μὲν Δημόκριτος καὶ Μαρία ἐπηνέθησαν παρ' Ὀσάνου ὡς πολλοῖς καὶ σοφοῖς αἰνίγμασι κρύψαντες τὴν τέχνην, Παμμένους δὲ κατέγνωσαν ἀφθόνως γράψαντος. Transl. by Adler-Tuffin 2002, 361. The passage has been edited also by Bidez-Cumont 1938, II, 311 fr. A3, on the basis of the manuscripts *Parisini Graeci* 1711, fol. 147 e 1764, fol. 93.

When we compare the information preserved in the indirect tradition with the two above-mentioned sections preserved in the *Marcianus* gr. 299, it is possible to find many common elements. The *pinax* of the manuscript explicitly states that the first excerpt, *Physika kai mystika*, concerns the making of gold and purple, which were the topic of the first and fourth original books according to Synesius and Synkellu's testimonies. The content of *Physika kai mystika* confirms that the excerpt is composed from two distinct parts:

1) The first part – which is quite shorter, since it covers just two folia of the manuscript – opens with a recipe that describes how to dye wool purple by means of two ingredients, namely *bryon thalassion* (seaweed; probably a dyeing alga such as the *Plocamium coccineum* or the *Rytiphlaea tinctoria*) and *lakcha* (perhaps a dyestuff usually called lac-dye, that is, a pigment extracted from the scale insect *Kerria lacca* Kerr), which are two substitutes of the so-called Phoenician 'purple', a very expensive dyeing substance extracted from different shellfishes, such as the *Murex trunculus* or the *Murex brandaris*: we know, in fact, that ancients needed 12.000 shellfishes to make about 0,03 ounces of purple dye. After this recipe we find a long list of other dyeing substances used for coloring wool. Finally a narrative section closes this first part: in this story the author explains his own initiation to the alchemical secrets by his 'master' Ostanos. Ostanos died before Ps.-Democritus completed his study of the main principles of the alchemical practice; however, when the author along with other disciples were celebrating a festival in an Egyptian temple, a column broke down, where Ps.-Democritus discovered the secret book of Ostanos, which consisted in the above-quoted formula explaining any 'chemical' combination: ἡ φύσις τῆ φύσει τέρεται, ἡ φύσις τὴν φύσιν νικᾷ, ἡ φύσις τὴν φύσιν κρατεῖ, «Nature is delighted by Nature, Nature conquers Nature, Nature dominates Nature».

2) The second part opens with a kind of short introductory paragraph, where the author claims:

Ἔγω δὲ καὶ ἐν Αἰγύπτῳ φέρων τὰ φυσικὰ, ὅπως τῆς πολλῆς περιεργείας καὶ συγκεχυμένης ὕλης καταφρονήσητε.

I too have come to Egypt to deal with natural substances, so that you may disregard many captious questions and the confused matter.

This paragraph is not amalgamated seamlessly with the previous one, since it does not continue the account where the author describes his initiation into the alchemical art after the collapse of the column containing the secret books of his master Ostanos. Indeed, the reader may have some trouble following the correct sequence of events, since in this new paragraph the author claims to have come to Egypt, while according to the previous one he should have been there already, since the collapsing column was part of an Egyptian temple. In the light of similar considerations, scholars such as Berthelot, Bidez-Cumont, and Festugière supposed that this break in the text must be understood as an artefact of the epitomised form in which ps.-Democritus' work has been handed down. While the first part is probably what remains of the original book on purple (that is, the original fourth book of ps.-Democritus), the second part represents what remains of the original first book on the making of gold. Two elements, indeed, seem to confirm such a reconstruction. On the one hand, the manuscript *Marcianus* itself seems to indicate a break between the section on ps.-Democritus' initiation and the section regarding his coming to Egypt: in the *Marcianus*, in fact, there is there is a simple horizontal dash in the left margin, just next to the beginning of the second section, a sign that presumably indicates the beginning of the new book about gold making. Moreover, the same content of this second part confirms the change of topic. After this introductory paragraph we find a long section on *chrysopoeia*, which includes thirteen recipes describing how to process several solid and liquid substances used for dyeing base metals yellow, that is, for transmuting them into gold. Each recipe is concluded by the repetition of one of the three segments that compose the above-quoted aphorism about the power of nature (show an example in the manuscript).

Moreover, while the section entitled *Physika kai mystika* is an epitome of the two original books on gold and silver, the second section preserved in the *Marcianus* under the title of *On the Making of Silver*, is clearly derived from the original book on silver. This book is handed down as a separate treatise, which does not present any introduction and is composed by ten recipes describing how to process solid and liquid substances used for whitening base metals, that is for transforming them into silver. Also in this book, each recipe is closed by a part of the aphorism about nature (show an example in the manuscript).

In conclusion, this close analysis of the direct and indirect tradition allows us to better understand how the original alchemical work of ps.-Democritus was reworked and abbreviated during the Byzantine period. Of four original books, dealing respectively with the

(1) making of gold, (2) the making of silver, (3) the making of precious stone and (4) the purple dyeing of wool, just two long sections on gold and silver (preceded by a quite short piece of the book on purple) have been preserved in the alchemical collections handed down in the *Marcianus* gr. 299, which completely omits the original book on stones.

In contrast with a wider idea of alchemical production that was concerned with a variety of dyeing techniques applied to metals, precious stones and fabrics, the epitomizer of ps.-Democritus books followed a more restricted interest and focused especially on the processes for producing precious metals. Such a criterion seems to reflect a narrower idea of alchemy, which is attested by different Byzantine sources. A similar situation, for instance, is attested in the *Letter on the Making of Gold* of the Byzantine scholars Michael Psellus, who worked in the same period when the *Marcianus* manuscript was copied down. Michael I Keroularios, patriarch of Constantinople (1043-1059) asked Psellus to make a study of the ancient methods for transforming base metals into gold. In his *Letter on the Making of Gold*, Psellus explains the results of his investigation and shows how he had to narrow the scope of his inquiry because of Keroularios' specific interest in *chrysopoeia*:

*(Letter on the Making of Gold, § 5 partim):*<sup>7</sup> Since in my preface I have already insisted enough on the fact that transformations of matter happen according to natural changes, and not by means of magic spells, miracles, or some other secret practice (so, we must not wonder), it is time to pass on to this art of transformation. I would have liked to compose a complete discourse on this art and on how to work the matters [...] and to teach what makes quartz and sapphire porous, what produces a fake emerald and beryl, which nature can soften stones, which one can dilute pearls and make them watery, and which one can make them again solid and round, and how to whiten them [...] However, since you (*i.e.* Michael Keroularios) do not allow me to delay with such superfluous inquiries, wasting all my

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<sup>7</sup> Edition by Bidez, *Épître sur la Chrysopée*, 30, 16-31, 9. Ἐπεὶ οὖν ἰκανῶς ἡμῖν πεπροοιμάσται ὡς αἱ τῶν ὑλῶν μεταβολαὶ φυσικὴν τινα ἀλλοίωσιν ἔχουσιν καὶ οὐκ ἐξ ἐπωδῆς τινος ἢ τερατείας ἢ ἄλλης ἀρρητουργίας (διὸ καὶ θαυμάζειν οὐ χρή), ἐπ' αὐτὴν ἤδη σοὶ τὴν τέχνην χωρῶ τῆς μεταβολῆς. Ἐβουλόμην μὲν οὖν καθολικὴν τινὰ σοὶ τεχνολογίαν ποιήσασθαι καὶ πάσαν ὑλουργίαν διερευνήσασθαι, [...] διδάξαι τε τί μὲν τὸν κρύσταλλον ἀραιοῦν, τί δὲ τὸν ὑάκινθον, καὶ πῶς ἂν τις καὶ σμάραγδον οὐκ ὄντα ποιήσῃ καὶ βήρυλλον, τίς δὲ ἡ φύσις τοῦ τὰς λίθους ἀπάσας μαλάττοντος, καὶ πῶς μὲν ἡ μαργανίτις λυθεῖ καὶ εἰς ὕδωρ ἀναλυθεῖ, πῶς δ' αὐτὴς συμπαγεῖ καὶ σφαιρωθεῖ, τίς δὲ ὁ λόγος τῆς τούτων λευκάνσεως [...] ἐπεὶ δὲ σὺ σχολάζεις ἡμᾶς ἐν τοῖς περιττοῖς οὐκ ἔως οὐδὲ ἐν τοῖς ἀσπουδάστοις καταναλίσκειν πᾶν τὸ φιλότιμον, τοῦτο δὲ μόνον διερευνῆσαι προῆρησαι ἐκ τίνων ὑλῶν καὶ διὰ ποίας τῆς ἐπιστήμης χρυσὸν ἂν τις ποιήσῃ, ταύτην μόνην τὴν τεχνολογίαν σοὶ δίδειμι.



studiousness in a worthless research, but you want me to examine with which substances and according to which scientific method gold may be produced, I am going to explain only this topic.

It is likely that the epitomizer of ps.-Democritus' four books followed a similar criterion, by leaving the book on stones aside and focusing his attention especially on the sections on gold and silver making. Such a selection suggests the development over time of a narrower conception of alchemy, concerned particularly with metallic transmutation, a conception well attested, for instance, in the definition given by the Byzantine lexicon *Suda*:

*Suda* χ 280 Adler χημεία· ἡ τοῦ ἀργύρου καὶ χρυσοῦ κατασκευή, ἣς τὰ βιβλία διερευνησάμενος ὁ Διοκλητιανὸς ἔκαυσεν. ὅτι διὰ τὰ νεωτερισθέντα Αἰγυπτίους Διοκλητιανῶ τούτοις ἀνημέρως καὶ φονικῶς ἐχρήσατο. ὅτε δὴ καὶ τὰ περὶ χημείας χρυσοῦ καὶ ἀργύρου τοῖς παλαιοῖς αὐτῶν γεγραμμένα βιβλία διερευνησάμενος ἔκαυσε πρὸς τὸ μηκέτι πλοῦτον Αἰγυπτίους ἐκ τῆς τοιαύτης προσγίνεσθαι τέχνης μηδὲ χρημάτων αὐτοὺς θαρροῦντας περιουσίᾳ τοῦ λοιποῦ Ῥωμαίοις ἀνταίρειν. ζῆται ἐν τῷ δέρας.

*Chēmeia*: the preparation of gold and silver; Diocletian looked for the books on this subject and burned them. Diocletian had a violent and bloody reactions against Egyptians, because their revolts against him. After examining the books on the *chēmeia* of gold and silver written by their ancestors, he burnt them so that Egyptians would have no longer gained money out of this art (*tekhnē*) and thenceforward they would have no longer had confidence in the abundance of their substances and risen up against Romans. Look under the entry *deras* (i.e. fleece, vellum)

The reference here to Diocletian is significant. The emperor's role is described in detail and he is said to have burnt all the books in Egypt on the *chēmeia* of gold and silver (χημείας χρυσοῦ καὶ ἀργύρου) to prevent the striking of false coins, debasing the coinage, and revolts against Roman authority. The source for this information is the chronographer John of Antioch (7<sup>th</sup> century AD, active under the Byzantine emperor Heraclius), who also provides an alchemical interpretation of the myth of the Argonauts (fr. 248 Roberto = *FHG* IV, fr. 165 Müller). The lexicon *Souda* refers to this explanation at the end of the above-mentioned passage, where he refers to the entry *deras* (in this case the Golden Fleece or Vellum): in John of Antioch's interpretation, the Golden Fleece represents a parchment that explains how

to produce gold by means of *chēmeia*.<sup>8</sup> The definition given by the *Souda* reflects the same idea of alchemy already expressed by John of Antioch, who identified this art with the making of gold and silver. A similar idea of alchemy is detectable also behind the selection of the ps.-Democritus' sections to be included into the Byzantine epitomes, and could provide us with an explanation of the incomplete form into which the original four books have been transmitted to us.

However, if we broaden our investigation to other alchemical manuscripts, it is possible to recognize different criteria according to which alchemical anthologies were compiled. In this respect, we find a significant example in the codex *Parisinus gr. 2325*, a manuscript written on oriental paper, which has been dated to the 13<sup>th</sup> century.<sup>9</sup> When compared with the *Marcianus*, this codex presents a partially different selection of treatises, which are arranged according to a different order. The collection seems to represent an example of alchemical handbook, with a certain balance between theoretical and practical sections. First of all the collection is introduced by some explanatory texts, among which we find, for instance, an alchemical *Lexicon on the Making of Gold*, which represents a kind of general introduction. In the following part we have the ancient authors and a selection of Byzantine commentators: we find, in particular, ps.-Democritus<sup>10</sup>, Zosimus, Stephanos of Alexandria and the philosopher Christianos. As far as Ps.-Democritus is concerned, regrettably his four books are preserved in the same epitomized form we have already explained with regard to the *Marcianus*:

1) At the fol. 8v there is the Byzantine compilation *Physika kai mystika*; also in this case the copyist has marked the break between the first part about purple and the second part about gold: at fol. ## the paragraph on ps.-Democritus' initiation ends with a *dikolon*, and the first paragraph of the section on gold making shows the first letter was probably expected to be rubricated (that is, capitalized and written with red ink); as in other occasions in the manuscript, the rubricator did not complete his work, since we have just the aspirate without the first letter of the first word (in this case *hita*).

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<sup>8</sup> Fr. 26,3 Roberto = *FHG* IV, fr. 165 Müller.

<sup>9</sup> A specific feature of this codex must be emphasized: in five different points of the manuscript the copyist introduced a textual caesura, that is, he left a blank space after the end of a specific treatise and he started copying the following treatise at the beginning of the next folium.

<sup>10</sup> Which, regrettably, is preserved in the same epitomized form we have already explained with regard to the *Marcianus*; since the *Parisinus* does not stem from the *Marcianus*, we might suppose that ps.-Democritus' four books had been already summarized before the *Marcianus* was compiled

2) At fo. 17r we have the treatise *On the Making of Silver*, stemming from the original book on the same topic.

Since the *Parisinus* is not a copy of the *Marcianus* (but the two manuscripts probably stem from a common and earlier source), we might suppose that ps.-Democritus's four books had been already summarized when the *Marcianus* was compiled (that is, before the 10<sup>th</sup> century AD).

On the other hand, the second part of the *Parisinus* ms. adds some important technical sections, which are not preserved in the *Marcianus*. In fact, a clear textual caesura divides the first part of the manuscript (where we find ps.-Democritus) from the second part of the manuscripts, which include only recipe-books: at fol. 152r the copyist finished copying a section by Zosimus and left the rest of the page blank; in the following page (fol. 152v) he started copying a recipe book on the making of pearls, followed by recipes on silver (fol. 159v), cinnabar (fol. 160r) and on the making of precious stones, as is possible to read at fol. 160v, which introduces a recipe-book entirely devoted to this last topic: *Deep Tincture of Stones, Emeralds, Rubies and Jacinths from the Book Taken from the Sancta Sanctorum of the Temples* (Καταβαφή λίθων καὶ σμαράγδων καὶ λυχνίτων καὶ ὑακίνθων ἐκ τοῦ ἀδύτου τῶν ἱερῶν ἐκδοθέντος βιβλίου). This section is particularly relevant for two important reasons. On the one hand, it deals with a wider set of dyeing techniques, not restricted only to gold-making and silver-making, and shows how in the 13<sup>th</sup> century a broader idea of alchemy, still encompassing different kinds of expertise. The above-mentioned recipe-book, in fact, focuses on the making of stones, which is exactly the topic of ps.-Democritus book *Peri lithon* (*On Stones*), which has been left aside by the epitomizer of his original four books.

Moreover, this section *On Deep Tinctures of Stones* includes several quotations taken from those ancient alchemists who dealt with this topic. The section *On Deep Tinctures of Stones*, in fact, alternates theoretical discussions about the opinions of ancient authors and practical recipes for the making of precious stones and pearls. In particular in the theoretical paragraphs, we find several references to the works of Ostanes, Maria the Jewess, Zosimus and ps.-Democritus. I would like to show a short example related to the use of a specific ingredient, called *kōmaris* or *komaron*, which apparently was very appreciated by ancient alchemists with regard to the making of precious stones:

Τί δὲ τὸ ἐν εἶδος, ὦ Δημόκριτε; Ὁ δὲ φησι φέκλιν καὶ ὠοῦ τὸ λευκόν. Ζώσιμος δὲ τὴν φέκλιν ἀφροσέληνον εἶπε καὶ τὸ ἀφροσέληνον κόμαρον, λέγων ἐν τοῖς περὶ κομάρου καὶ ἀφροσελήνου παρὰ Δημοκρίτου ταῦτα· Ἀφροσέληνον λέγει ἐν εἶδος [...]. Ὅτι δὲ αἰεὶ αὐτὸ τινες ἐκδεδώκασιν, εἴτε φέκλιν εἶναι ἀπὸ Κοπτικοῦ εἴτε ἀπὸ σεληνιακῆς ἀπορροίας, ἄγει ἀφροσέληνον καὶ κόμαρον· [...] τὸ ἀφροσέληνον καὶ τὸ κόμαρον ἐνέργειαν μίαν ἔχουσι πάντως. [...] ὁ Δημόκριτος, ἐπὶ τῆς κομάρευς ἐλθὼν, κατηγορεῖ φάσκων· Ἐπίχριε ὅσον βούλει λίθον, λειώσας αὐτὸν, καὶ ἔσται μαργαρίτης.

Which is the unique species, o Democritus? He says (it is) wine dregs and egg white. However Zosimus claimed that wine dregs corresponds to ‘moon foam’ and that ‘moon foam’ corresponds to *komaron*; in his work *On Komaron and Moon Foam* (used) by Democritus he says: (Democritus) claims that ‘Spume foam’ is only one species. Since some (alchemists) have always given the same interpretation, namely that dregs derive either from the Coptic (stibnite) or from the exhalation of the moonstone, he leads us (to consider) moon foam and *komaron*: moon foam and *komaron* have exactly the same capacity. Democritus, going on with the *komaris*, gives the following demonstration: “after diluting this substance (i.e. *komaris*) rub it on whatever stone you want, and it will become a pearl.”

This passage clearly reflects a late-antique or Byzantine discussion about the identification of the substances used in the recipes for the making of stones. In line with a certain tendency of ancient alchemist to find a kind of universal dyeing substance able to perform all the required chromatic transformations, the author of this section focus his attention especially on some passages taken from two ancient alchemists, namely Zosimus and Democritus, who seem to focus on the use of *aphroselenon* and *komaron*. The identification of these ingredients is quite problematic for us; according to Dioscorides’s *De materia medica* (V 141), the term *aphroselenon* refers to *selenites*, a stone related to moon’s phase, which could be collected when the moon is waxing. Its description led scholars to identify the stone with the modern selenite or gypsum flower, a variety of the mineral gypsum, which shows a crystalline structure and is quite ‘soft’ and quite crumbly. Such an identification seems to be confirmed both by an entry of the above-mentioned *Lexicon on the Making of Gold* and by a second (and later passage) of our section *Deep Tincture of Stones*:

1) *Lexicon on the Making of Gold*, CAAG II 5: Ἀφροσέληνόν ἐστι κόμαρις καὶ κουφόλιθος

Moon foam is *kōmaris* and light stone (probably talc).

2) *Deep Tincture of Stones*, CAAG II 358: Τοῦτο τὸ ἀφροσέληνον καὶ τὸ κόμαρον αἰνιγματωδῶς οἱ φιλόσοφοι εἶπον. Τὸ γὰρ ἀφροσέληνον καὶ τὸ κόμαρον μιᾶς ἐπιστήμης ὑπάρχουσιν [...]. ἀλλ' οἱ σοφοὶ τῶν Ἰσμηλιτῶν σαφῶς εἶπον τοῦτο καὶ οὕτως εἰρμήνευσαν, οἱ μὲν ταλκ <ἦ> καλκ, οἱ δὲ χαλκ.

Philosophers use these words ‘moon foam’ and ‘komaron’ in a criptic way; for ‘moon moan’ and ‘komaron’ belong to the same science. But wise scholars among Arabs have employed a clear terminology in interpreting this word, some of the as *talk* or *kalk*, some of them as chalk. (It is easy to detect behind theses forms the Arabic term طلق (talq), ‘talc, talcum powder’).

When these passages seem to confirm that ancient alchemists considered *aphoselenon* and *komaron/komaris* as referring to the same ingredient, which might be identified with talc, Zosimus seems to take a step forwards, since he identified wine dregs with ‘spume moan’ and *komaris*. This interpretation seems to be based on a specific reading of ps.-Democritus earlier books, where these ingredients were presumably used in processes for making precious stones. The same quotation at the end of the passage – “after diluting this substance (i.e. *komaris*) rub it on whatever stone you want, and it will become a pearl”-- is probably taken from a recipe included in ps.-Democritus’s book *On stones*, which, as we have already seen, has been not included into the Byzantine collections.

Such a gap can be at least partially filled if we take into account the Oriental tradition, which preserves a more complete version of the four original books by Ps.-Democritus. In particular, among the recipes preserved in the Syriac tradition we find a text, which seems to be the original ps.-Democritean recipe form which the above-mentioned quotation derives. The recipe reads:

**SyrC**, fol. 97<sup>r</sup>12-97<sup>v</sup>2

Here is for you *kwmrys* (= gr. κώμαρις) from Scythia, which is a region. But than one which comes from Scythia is strong and deadly for men and kills easily. That is why they keep its power secret. Throw it into quicklime (*kelšo* = Greek ἄσβεστος) by mixing with wine dregs (*asp<sup>h</sup>qlys* = Greek σφέκλη) and pound these ingredients in their natural moisture; when the *kōmaris* gets softs and water, rub it on whatever stone you want. Crush this material and it will be similar to marble (here the Syriac reads *mormoritis*, which seems a translation of a Greek term such as μαρμαρίτις, ‘similar to marbe’). However, if we compare this recipes with the quotation – where we have μαργαρίτης ‘pearl’-- we cannot rule out that the Syriac text

originally read *morgoritis*, that is, the transcription of the Greek word μαργαρίτης). *Kōmaris*, after being diluted, gives its beauty to stones.

On the one hand the combined use of wine dregs and *komaris* seems quite relevant, if read in the light of the above mentioned passages taken from the section *Deep Tincture of Stones*. In fact, the identification of wine dregs with spume foam and *komaris*, which was proposed by Zosimus, could derive from the interpretation that Zosimus proposed of this recipe (or similar recipes) by ps.-Democritus. It is well known, in fact, that Zosimus interpreted several ps.-Democritean recipes by considering the names of several substances employed by the earlier alchemist as code-names referring to different ingredients. The combination of wine dregs and *komaris* in ps.-Democritus' recipe could have lead the alchemist to consider the two ingredients equally important in the dyeing process and to equate their properties. On the other end, the exact match of the second part of the Syriac recipe and the ps.-Democritean quotation in the Byzantine section on *Deep Tinctures of Stones* confirms that the Syriac recipe is the translation of a ps.-Democritus recipe, which is lost in its original Greek form.

This recipe is included in two collections of alchemical texts handed down by three important Syriac manuscripts kept in London and Cambridge, which preserve the Syriac translations of several Greek alchemical texts. As well as for the Byzantine tradition, also for the Syriac tradition, the first and only study on alchemy was accomplished by the chemist Berthelot, who collaborated with the orientalist Rubens Duval and in 1893 published the second volume of *La chimie au Moyen-Age*, which was entirely devoted to 'Syriac alchemy'. The two scholars partially edited and translated into French the content of three quite late manuscripts:

Two manuscripts kept in London, at the British Library, the Egerton 709 and the Oriental 1593 (both dating to the beginning of the 16<sup>th</sup> century). They preserve the same collection of alchemical treatises, which is composed by two parts: the first one in Syriac and the second one in *garshuni*, that is, Arabic language written in Syriac alphabet (in our case the so-called *serto*).

The manuscript Mm. 6.29, kept at the Cambridge University Library, which dates to the 15<sup>th</sup> century and preserve only Syriac texts (without any section in *garshuni* or Arabic).

Although the late composition of these manuscripts, they seem to be copies of earlier collections of Syriac translations of Greek alchemical texts, which were probably composed

between the 6<sup>th</sup> and the 8<sup>th</sup>-9<sup>th</sup> century AD. On the one hand, in fact, one of these manuscripts (namely the Cambridge manuscript Mm. 6.29) includes an epitomized version of the translation of Galen's treatise *On simple drugs* (the so-called *De simplicium medicamentorum temperamentis ac facultatibus*) which was composed by the Syriac physician and priest Sergius of Rēš 'Aynā (died 536), who studied in Alexandria and established a school in Rēš 'Aynā (the modern Syrian city of Ra's al-'Ayn), located about midway between the intellectual centers of Edessa and Nisibis, in northern Mesopotamia. On the other hand, a few Syriac chronicles emphasise the fact that already the Abbasid caliph al-Manṣūr turned to Syriac monks in order to gather information about alchemy. Scholars have already emphasized that the caliph probably sponsored the translations of Greek alchemical treatises into Arabic, after hearing the stories told by his ambassador 'Umāra ibn Ḥamza who was coming back from Constantinople. In fact, according to some 10<sup>th</sup> c. Arabic geographers<sup>11</sup>, 'Umāra ibn Ḥamza visited the court of the Byzantine emperor Constantine V (8<sup>th</sup> c.), who shown him a special building, where two kinds of powder – called elixir – had been stored: a white powder that, when applied on tin, transmuted it into silver; and a yellow powder that, applied on copper, transformed the metal into gold. For this reason the caliph would have developed a certain interest towards alchemy, and according to Syriac chronicles he would have supported also the ecclesiastical or political career of those Syriac monks who were considered experts in alchemy. In particular, Syriac chroniclers focus their attention on the figure of Isaac, a Nestorian monk from the monastery of Qartmīm (south-east of Turkey). For instance, the anonymous *Chronicle of Zuqnīn* (end of the 8<sup>th</sup> century) reads:

After the holy Mār Yōhānīs, Patriarch of Antioch, a monk named Isaac of the monastery of Qartmīm became patriarch of Antioch, and established his residence in Edessa. But because he was practicing **alchemy of silver and gold** (*kimiḃō d-si'mō wa-d-dahbō*), he won the friendship of 'Abd-Allah, the amīr of the Jazīra, who \*later also\* became Caliph (al-Manṣūr). As 'Abd-Allah sought to honour this friendship, he appointed Isaac patriarch of Antioch after Mār Yōhānīs<sup>12</sup>.

The figure of the monk Isaac seems to show that alchemy was somehow known in Syriac

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<sup>11</sup> In particular, Ibn al-Faqīh (10<sup>th</sup> century Persian historian and geographer), author of the *Muḥtaṣar kitāb al-buldān* (Concise book of Lands).

<sup>12</sup> *Chronique de Zuqnin*, vol. 2, p. 210, l. 22 – p. 211, l. 9 Chabot. Translation by Amir Harrak, *The Chronicle of Zuqnīn, parts III and IV, A.D. 488-775* (Toronto: Pontifical Institute of Mediaeval Studies, 1999), p. 192.

monasteries, where collections of alchemical treatises based on earlier Greek material were probably copied down. Moreover, we must stress the fact that the extant Syriac collections preserve treatises only ascribed to the most ancient Greek alchemists, in particular pseudo-Democritus and the Graeco-Egyptian alchemist Zosimus of Panopolis (3th c. AD). The majority of the material ascribed to these authors is constituted by recipes, which represent the most consistent sections translated into Syriac.

If we focus our attention on the parts preserved under the name of Democritus, the Cambridge manuscript deserves a special attention, since it preserves three long sections taken from the four original books by ps.-Democritus:

1) At fol. 90v we have a first books entitled *Book by Democritus, On the Making of Shiny Gold* (*ktobo d-dimuqr'iṭis: tuqono d-'squsya d-šemšo nahiro*). This section corresponds with the section on the Making of gold preserved in the Byzantine epitome *Physika kai mystika*, and confirms that the two sections stem from the original book *On Gold*.

2) At fol. 94r we have the *Second Book by the Philosopher Democritus* (*ktobo d-treyn d-dimuqr'iṭis pillusupo*) dealing with silver making. This part matches the Byzantine *On the Making of Silver* (*Peri asemou poieseos*) and also preserves one additional section that was probably lost in the Byzantine tradition.

3) At fol 96v we read the title of a third part *Again by Democritus: I greet you wise men* (*tub d-dimuqr'iṭis. 'omar ana l-kun ḥekime šlom*), where recipes several recipes on the making of precious stone and on the purple dyeing of wool are collected. These recipes derive from the two original books *On Stones* and *On purple*, and preserve texts which did not entered the Byzantine alchemical collections.

In conclusion, it is clear that the Syriac translations preserved in the Cambridge manuscripts are based on a selection of the four original books, which is different from the selection preserved by the Byzantine tradition. If this conclusion makes the Oriental tradition particularly precious for reconstructing the original work by ps.-Democritus, before concluding this presentation I would like to stress an important problem related to the transmission of our text. In fact, when the Greek and the Syriac versions are compared, it is easy to realize that the transmitted versions present strong differences that cannot be easily explained. I would like to present here just one example, taken from the recipe that opens the



section on the making of gold both in the Byzantine and in the Syriac tradition:

*Physika kai mystika*, § 5 M: Take mercury and make it solid with the body of magnesia, or with the body of Italian stibnite, or with unburnt sulphur, or with moon foam, or with roasted lime, or with alum from Milos, or with orpiment, or according to your knowledge. If it (mercury) turns white, lay it on copper, and you will have ‘shadowless’ copper. (If it turns) yellow, lay it on silver and you will have gold; on gold, and it will be solid gold coral.

**SyrC**, fol. 90v2-10: Take mercury and make it solid with the body of magnesia, or with Italian stibnite, or with red sulphur, or with moon foam, or with lime, or with alum, or with orpiment, or according to your understanding. So get two melting-pots (*kwnos* = Greek χόανος or χῶνος) ready, and cook (mercury?) and lay it on Hermes (copper or mercury?). Measure its rust: if it is red, add silver and it will be gold; but with the gold any metal will be gold coral.

The Syriac tradition seems to preserve a different version of the recipe: in particular its central part introduces two melting pots, in which mercury seems to be treated with the ingredients listed in the first lines of the recipes (lines that are almost identical in the Byzantine and in the Syriac versions). This procedure is supposed to produce a ‘red rust’ used for treating silver and gold; there is no mention, however, of the white drug that, according to the Greek version of the recipe, was employed for whitening copper.

It is quite difficult to decide which one of the two versions is closer to the original version that was part of Ps.-Democritus’s book *On Gold*. However, the introduction of the two melting pots – an instrument never mentioned in the other ps.-Democritean recipes – might be read as an attempt to interpret the process, and could be a kind of explanation to the process added by a later reader. Of course, it is difficult to date a similar addition, and a deeper analysis of the Oriental tradition would be required, in order to better understand the form in which ps.-Democritus’ texts were circulating. Regrettably the Arabic tradition of ps.-Democritus has been not deeply investigated so far; however, it is already possible to detect a version of the recipe similar to the version preserved in the Byzantine tradition. In fact, this version – in an abridged form -- is attested within a treatise entitled *Turba philosophorum* (*Assembly of the philosophers*), which the Latin translation of a lost Arabic dialogue between nine Greek philosophers about the first principles of the universe and about several alchemical questions. These nine philosophers – whose original Greek names were first translated into Arabic, and

afterwards translated from Arabic into Latin – are non easily recognizable. Some of them may be identified with Empedocles, Anaxagoras, Leucippus, Pythagoras and Democritus (see Plessner 1954 and 1975). In a chapter related to philosopher Parmenides, the author quotes the following recipe (without ascribing it to Democritus):

(*Turba philosophorum*, chap. 11 in Ruska 1931, p. 119, ll. 17-21): argentum vivum accipite et in magnesie corpore coagulate, vel in kuhul, vel in sulphure, quod non comburitur; et facite ipsum naturam albam, ac aeri nostro imponite, et album fit, et si rubeum facitis, rubeum fit, et si deinceps coquitis, aurum fit.

“Take mercury and make it solid with the body of the *magnēsia*, or stibnite (the Latin term *kuhul* corresponds to the Arabic and Syriac *ku‘lō*), or sulphur that has not been burnt. Make its nature white, and lay it on our copper, and it will turn white; if you make it (i.e. mercury) red, copper will turn red; and after cooking, it will become gold.”

Even if in an abridged form, this Arabic/Latin version does not mention the melting pot and follows the same steps considered by the Greek version: mercury is first made white, in order to white base metals; it is afterwards made yellow (or red), in order to transform base into gold. Although quite late, this quotation confirms the great popularity and circulation of ps.-Democritus recipes and remind us that further research are required in order to better understand the transmission and transformation of an alchemical treatise that played a central role in the development of alchemy as a discipline both in the Western and in the Eastern world.