ISSUES on Greek Alchemy
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The mutations of alchemy and the development of “chymistry” during the post-Byzantine era in the Greek-speaking communities
(Looking into some first interesting indications)

Vangelis Koutalis

Introductory remarks: between national science and non-science

The Greek historiography of the Enlightenment in SE Europe has highlighted the emergence, during the second half of 18th century, of ideological orientations among the strata of Greek-speaking Ottoman Christian scholars, clerics, merchants and officials, which were both new in the descriptive sense of being radically different from the hitherto dominant practices and prone to justify, or even exalt, novelties as such. New aspirations grew and were loudly voiced, deviant ways of thinking were espoused, oppositional collective identities were gradually formed, the very feeling of belonging to a community was restructured, the sense of identifying oneself as a Greek started being redefined. Within this cluster of dislocations and shifts, one of the most conspicuous elements is the proliferation of writings and educational courses ‘on nature’, employable for the dissemination of theories drawn from the rich repertoire of the modern, Cartesian or Newtonian philosophia naturalis as markers of a major cultural change already well underway in the societies of Western Europe1.

During the last decades, historians working on this area of research have admittedly made one great step forward, conceding that this dissemination must be interpreted more as an “appropriation” of means of knowledge production by active agents than

as a “transfer” of knowledge products to passive recipients. One principal question, though, remains pending: what was really the upshot of the articulation of various theories, conveyed from Western Europe – as well as theories, in not a few cases, sanctioned by existing, prior to Enlightenment, traditions – into new fields of knowledge? Historians find themselves in a quandary about what answer should they pick out. At the one end of the balance, the answer proposed is that the process of appropriation brought about a peculiarly “Greek” scientific discourse. A new, specifically “Greek” kind, therefore, of science have seen the light of day: “Greek”, in so far as the Greek-speaking scholars, despite the lack of original scientific production, did not confine themselves to the role of translators, but incorporated, instead, the new knowledge into “a pre-existing edifice”, without breaking the cultural continuity, and offering thus “new syntheses which shaped, by and large, a different view regarding education, a new scientifical-philosophical insight into the phenomena, a new, different spiritual consciousness”² (we shall call this, Thesis I). At the other end of the balance, we are induced to resolve that the appropriation led merely to a “sound philosophy”, a discourse on nature suited howsoever to serve moral edification, all the more so, in a period where the ideals of individual prudence, self-reflectivity, and self-governmentality had gained considerable ground, but, for all that, bereft of those requirements of rationality and objectivity that are meant to demarcate science proper from philosophy³ (Thesis II).

In the first case, the difference in the national context of appropriation differentiates what is appropriated. It results in a different species of science, with dissimilar criteria of evaluation to those that have prevailed in the other, West European species, most commonly known to our days as science proper. In the second case, the difference in the dynamics of appropriation inhibits appropriation itself. The “absence of any discussion concerning the character of the rules of new ways to study nature, the processes of legitimizing the new viewpoint and the initiation of consensual activities to consolidate the new attitude about the ways of dealing with natural

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phenomena”, an absence readily ascertainable within the various Ottoman Christian scholarly milieux, is interpreted here as an indication, not of a different kind of science, but of the absence of science itself. “In introducing the new sciences, the Greek scholars did not attempt to introduce natural philosophy per se, but, rather, they sought a new way of philosophizing”: the type of discourse they developed “lacked the constitutive features of the discourse of natural philosophy as it was being articulated and legitimized in Western Europe and it was primarily a philosophical discourse”. What is scientific in the West, and remains scientific after being disseminated to the Western periphery (e.g. to the Iberian Peninsula), is transformed into something strictly, or essentially, philosophical, when it is appropriated in the Eastern periphery. In either case, Ottoman Christian scholars are confessedly presented as active agents, since they appropriate, indeed, scientific knowledge. But their agency ends up distorting this knowledge. Either by altering arbitrarily, just for the reason that another cultural community is posited as the context of its appropriation, the standards of its evaluation, namely, the yardsticks that permit a rational decision to the question whether this knowledge qualifies to pass as scientific or not. Or by altering its nature: diluting scientific knowledge to such a degree that it is not scientific any more.

The distortion carried out is so extensive that we can hardly compare the input of the appropriation process with its output, or even critically relate the one with the other. In Thesis I, the only element that remains common, after the appropriation has been through, is one signifier, “science”, devoid of any meaningful content. In Thesis II, the historian of science can only confirm that some modern theories on natural phenomena eventually passed the borders of this peripheral territory. After getting this done, she has no jurisdiction of going further than noting that what was produced in this territory through appropriation falls short of the mark: it can no longer bear the credentials of being science. Other specialties, philosophers, historians of ideas, historians of culture, or historians generally, must now come into play, if this odd singularity, which lies outside the province of science, is to be apprehended at all.

Choosing the first option, science is dissolved in its particular national manifestations,

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ends up being subsumed under the rubric of one population’s cultural distinctiveness. Should we refuse to “adopt different principles for every country in accordance with the saying ‘different countries, different customs’”, or to believe that “in one country $3 \times 1 = 1$, in another that women have no souls, in a third that beer is drunk in heaven”, and, on the contrary, keep considering science as something that can be evaluated in terms of objective testing and rational criticism, which means something that can be evaluated in similar, or at least converging, terms universally, often against the conditions set by a particular cultural context (how else could we deny, for example, the merits of a Nazi science?), then, we have to switch to the second option. There, science retains without fail its universality, at the price, however, of lapsing into a sheer absence when it gravitates from its productive Western center to the appropriating Eastern periphery. Science is disseminated only to be negated, either in the form of a national species, or in that of a new philosophy.

This seemingly tight knot tends to be a sort of historiographical vicious circle: in the very terms in which this problem is formulated, as a problem necessitating historical reconstructions in order to be tackled as such, non-historical significations are tacitly presupposed, or rather significations that invest historical determinations with the status of ontological ones. “Science”, this common denomination for a number of distinct, self-sustained specialized sciences, as we know them, today, from the specific social historical standpoint that delimits and shapes our view, appears to be the reference standard used to evaluate every knowledge-acquiring undertaking of the past intended, then, and not now, to meet the requirements of objectively assessed experimentation and openness to rational criticism. “Natural philosophy” is but the name of one precursory form of modern physics: if nothing else, it is characterized by the same “processes of legitimizing” the viewpoint proper to it and the same “consensual activities” to consolidate the attitude proper to it. By the same token, the fact that only during the last half of the 19th century philosophy assumed the narrow sense of a discipline concerned mostly with the manipulation of certain notions abstracted from the specialized sciences, and only very recently it has remitted itself to the precarious condition of being nothing but an appellation for certain university

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departments doomed to be financial viable or else to get closed, passes entirely unnoticed. A “new way of philosophizing” is but the name of another way of reasoning, since philosophy is tacitly assumed to have been always co-extensive with, or at any rate reducible to, that kind of intellectual activity which has reasoning schemas as its object, and which we have no hesitations, today, in describing as “philosophy”.

There is something, then, that both these interpretative strategies, beneath their procedural differences, share: the non-historical signification of the terms “science” and “philosophy” respectively. Yet another common denominator can be shown to exist. The significantly different formulations notwithstanding, underneath we can detect the same assumption that scientific knowledge migrating from the West bears, essentially and unavoidably, some hallmarks pertaining to a particularly West European mindset, certain inerasable signatures of its cultural origin. Whether it is about “different views regarding education” and “new scientifico-philosophical insights”, according to the more epistemologically oriented Thesis I, or about “processes of legitimizing” and “consensual activities”, according to Thesis II, leaning, as it confessedly does, towards explanations involving cultural history and contextual determinations, what departs from the West as science, and is bound to be transformed, when passing through the Eastern parts of Europe, into a new, Greek species of science or a new way of philosophizing, is regarded as possessing some inherent formal properties, a normative structure above all, that cannot thrive in soil impregnated with different, South-East European cultural values, precisely because these properties are postulated to be inextricably tied to a cultural environment typical for Western Europe.

This stance threatens to create a novel source of stagnation for historical theorizing, additional to the old drawbacks it has seemingly helped us to surmount. The reason is that it prominently involves the elevation of the “network of constraining localities” to a normative structure incumbent on any discourse immersing itself across any given cultural space. The process of appropriation is identified with the “ways devised to overcome cultural resistance and make the new ideas compatible with local intellectual traditions”, and “hence, understanding the character of resistance to the
new scientific ideas becomes of paramount importance”\(^\text{6}\). But, following this track, “local intellectual traditions” are presumed to be far more solid than they actually, under close examination, could be always proved to be. Substituting the notion of appropriation for that of transfer, time-worn accounts of “what is filtered out” are, thankfully, at last cast aside. In their place, accounts of what is filtered in are to be introduced. Yet, both this “in” and that “out” are presumed to remain more or less unaffected by the processes respectively of going out and coming in. That which weighs most is the character of resistance which the spread of scientific knowledge has encountered, just as the character of the eligible for dissemination scientific knowledge has been previously considered to be the alpha that remains, more or less, alpha regardless of the fact that we often must pass through many of the other letters. Since science, philosophy, cultural context, are equally pushed aside as objects themselves of historical research, let alone being brought in, more generally speaking, as objects themselves of scientific research, historians of science have no new, untrodden terrains to discover and explore, no interesting questions to ask, no tentative answers to test, no science to exercise. Some years ago, Dialetis and Nicolaidis pointed out that “an anti-history of science position” has been entrenched in the Greek intellectual milieu, due to “the fact that history of science was either part of the history of philosophy, or sociology, or history of education”\(^\text{7}\) (1994, 124). Strangely enough, recent constructivist accounts, aspiring to remedy this situation by erecting a self-sustaining history of science, tend sometimes to converge with the most profoundly barren historiographical traditions in instituting a cultural chasm between East and West, as a point of departure so ruthlessly fixed as to discourage closer scrutiny by supplying tacitly in advance the general conclusion, and the fixed framework, of any possible historical narrative.

**An untrodden territory**

A way out from the vicious circle is not likely to be found unless we try to reinstate science and philosophy in their temporal rhythm, in their becoming, and accordingly

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to problematize our current notions of what science is, what philosophy should be in regard with what science presently is, and how the South-Eastern and the North-Western parts of Europe are related to each other as cultural spaces. Such a way of proceeding entails the laborious task of reactivating the available, or yet to be located, primary sources, and putting them into interplay with the secondary sources through which the posterior significations of the historical events or entities under study are crystallized and conveyed. The history of alchemy, designating a set of trajectories cutting across multiple fields of experience and a variety of disciplines, opens up one of the most promising avenues for this kind of work.

How and whether alchemy have been practiced, studied or diffused, and under what form or mutations, in Greek-speaking communities, during the post-Byzantine era, is something that up to the present is almost totally unexplored. There are two assumptions, which despite to some evidence to the contrary already available, are still dominant in the Greek historiography of science:

a) Modern sciences emerged in the Greek-speaking communities through the dissemination or appropriation of Newtonianism.

b) Chemistry arrived here only later, when Lavoisier had established his “new chemistry”, through some printed translations.

Alchemy did not play any role, not even that of an obstacle. Although, its origins date back to the encounter between the Greek and Egyptian cultures during the first centuries CE; although it was part of the Greek literary heritage of the Late Antiquity; although the corpus of the surviving Greek alchemical texts was constituted in Byzantine times, between the 7th and the early 11th century\textsuperscript{8}, alchemy seems to have been ruled out as an object of intellectual interest, or even just of curiosity, by the Greek-speaking literati in the first two centuries of the early modernity, even more so by those who were principal actors in the Enlightenment. But is it really so?

We know, at least, one instance of a scholar of Greek origin who studied alchemy and wrote about it. Angelo Forte, born at the end of the 15th century in Corfu, which at that time was under Venetian rule, at a young age moved to the capital of the Serenissima Repubblica. It is unclear whether he was given formally there the title of the doctor of the art of medicine, but he eventually used it. He dealt also with

astrology. From 1520 to 1556 he published a series of treatises of his own in Italian and Latin, the second of which (printed in 1525) was dedicated to the “sacred art” of alchemy (Verità della alchemia), where he defines the alchemical opus as a “medication” of metals. In his later works, especially after his Opera nuova of 1532 he renounced chrysopoeia and turned his attention to iatrochemistry. It is difficult to determine precisely what relations he had formed with the other Greek scholars residing in Venice, but, anyway, it seems that Forte shared certain deep preoccupations with many of his contemporary thinkers aspiring to find a place in the greyer zones of the front line of the Renaissance: Neoplatonism, Hermetism, theories on natural magic, corpuscular matter theories, projects of reformation.9

Strictly speaking, Forte was not a scholar actively contributing to the intellectual edification of young Greek-speaking students or scholars, since he did not write any of his works in Greek. This is not the case with Nikolaos Mavrocordatos (1670-1730)10, Grand Dragoman to the Divan (1697), and consequently the first Phanariote

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Hospodar of the Danubian Principalities. Nikolaos was one of the most eminent Greek-speaking scholars and officials of the late 17th and the early 18th centuries. In his treatise on the duties of a prince (Περὶ τῶν καθηκόντων βιβλίον, first published in 1719), in the chapter “On the justice towards God, and towards oneself, and towards one’s neighbor” (“Περὶ τῆς εἰς θεῶν, καὶ εἰς ἑαυτοῦ, καὶ εἰς τῶν ἄνθρωπων δικαιοσύνης”), chemistry is compared to astrology and is reproached as a trickery. Two equally vain, and morally harmful, arts: instigated by the passion for gold and silver, the chemist distorts nature, transcends impermissibly the limitations posed by God to each of his creations, and deceives both himself and those around him. In his Φιλοθέου πάρεργα (written in the period 1716-1719), however, a distinction is drawn between the deceiving and the non-deceiving chemistry. On the one side, we find the Arab swindlers (“ἐν τοῖς περὶ τὴν χημείαν φενακισµοῖς τῶν ἀπεταµῶν καὶ ἀγυρτῶν”)


11 The full title is: Nikolaos Mavrocordatos, Περὶ τῶν καθηκόντων βιβλίον, Συγγραφεία παρὰ τοῦ Ἐυσπερίστατον, Υψηλόστατον, καὶ Συροκτίατον Ἀθηναν καὶ Τηρεμόνος Πίπης Οὔγχρομολογίας κυρίου κυρίου Τιανόν Νικολάου Αλεξάντρου Μαυροκορδάτου Βοεβόδα. Νῦν πρώτον Τύπου εκδοθέντα ἐπὶ τῆς Ημεροθίας τῆς αὐτῆς Υψηλόστατος, Ἀρχιερατεύτον τοῦ Πανυρσείατος καὶ Θεοπροβλήτου Μητροπολίτου Κυρίου Λαυρη, Ἐπιμελείται καὶ διηθήσεως τοῦ λογιστικοῦ καὶ Γεωργίου Τρικαζόντου, ὀδοκαίον τῆς ἐν Βουκουρεστίῳ ἀθηναϊκῆς σχολῆς. Ἐν τῇ σεβασμῖ τοῦ τῶν Ἀρχον Πάντων τῇ ἐν Βουκουρεστίῳ. Εἶπε ἀπὸ Θεογονίας φως” [81719]. Κατὰ Μήνια Δεκέμβριον. The book was re-published in 1722 and in 1724. 12 “παραπαθείσος δήται οἱ επιστομονοὶ ταῖς τῶν ἀστρόλογων ψευδολογίαις, τὰ γὰρ ἐπὶ μέρος προνοίας διωκόμετον, οὐδ’ ἔχουσιν διότι κινήσεις οἱ αὐτές τῆς ἡμέρας προαίρεσεν, τῆς μήτε παρὰ τοῦ πλαστοῦ ἡμᾶς βιωμένην. «ἴδον δέδωκα πρὸ προσώπου σου σήμερον τὴν χαρίν, καὶ τὸν θάνατον, τὸ ἄγαθον καὶ τὸ κακόν», ἤθελον οἱ ἄρση χρυσοῦ καὶ ἄργους τοῖς περὶ χημείας πόνος στερεβὸν τὴν φύσιν, εὐαυτὸν τε, καὶ τοῖς ἄλλοις φενακισεῖν, καὶ ἔθελον κακούργην, δόμα τῷ ἐν τῇ θάλασσῃ θηράντῃ λαγῳ, καὶ ἐν δρασὶν θύδας διώκοντο, ἀφόρεσε γὰρ ὁ ἰδιομορφος τῇ ἐκάστῳ γενέσις τῶν κατάλληλον, καὶ δρομὸν ἔθετο τοῖς οὖσιν, δ’ οὐ παρελθόντον”. Nikolaos Mavrocordatos, op. cit. (n. 11), pp. πη’–πθ’.”

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And on the other, we come up against the depths of the non-deceiving chemistry, which may offer unfathomable and real, though not material, riches (“τὰ ἄνωτα τῆς μὴ φενακίζουσης, μυρίοις δ’ ἀγαθοῖς πλουτιζοῦσης τὸν βίον χρηματεί”)\(^{13}\). But this contradiction has much wider implications: the deceiving chemistry occupies the same rank with the vain scholasticism, the epicurean ethics, the Platonic mysticism, and generally any theory or stance that is content with the testimony of the senses, with reality as something given. On the other side, we find theories and intellectual stances that are genuinely philosophical, that tend to question what is given and seek what is hidden beneath. Modern chemistry is not anymore a vain art, just as modern Platonism (that of Marsilio Ficino and Giovanni Pico della Mirandola, who are explicitly mentioned, in this regard, by Mavrocordatos\(^{14}\)) is not anymore a barren way of philosophical conduct.

In 1719, the same year that Mavrocordatos published his book on the duties of a prince, Anastasios Popas of Ioannina, a scholar “well acquainted with philosophy, theology and the grammatical art”\(^{15}\), who was then employed as a teacher in the school of Serres, a post he retained until 1740 (or perhaps until 1742\(^{16}\)), composed a book of general knowledge, dialogic in form, called Φιώσφορος. He dedicated it to the physician Michael Perdikares (or Predikares) of Monemvasia\(^{17}\), a key figure himself...
in Anastasios’ wide-embracing multi-thematic literary undertaking: as a matter of fact, the dialogue which takes place in the book is explicitly staged as an encounter between Michael, whose voice is that of the enquirer, and Anastasios, who assumes the role of the respondent.

Having roamed, already from the very outset, over an impressive variety of topics, ranging from the highly abstract preoccupation with the nature of God (“μὰ ὄρθες μοι τί εἶναι ὁ θεὸς”), or that with the definition of hell (“Τί εἶναι ἡ κόλασις”), to more particular problems, such as that of the peculiarities in character exhibited by women (“Παρακαλῶ την, νά μὲ εἰπῆς μερικαῖς γνώμας διὰ τὰς γυναῖκας;) or that of the analogical relation between the cosmos as a whole, the macrocosm, and the human being as a “recapitulation” of the cosmos on a smaller scale, the microcosm (“Διατὶ ὁ ἄνθρωπος λέγεται μικρός κόσμος;”)18, Popas at one point is invited to answer yet another root philosophical question: what is the primary principle in the created universe (“Ποία εἶναι ἡ ἀρχή τοῦ κόσμου;”)? He sums up the conclusions reached by the early Greek philosophers, tacitly restricting himself to those that we customarily classify as ‘pre-Socratics’, who all shared the belief “that God created the world out of matter and form”, and then right away he makes his interlocutor aware of the relevant views held by “the chymists” (“οἱ χημικοί”) and Hermes Trismegistus. The first have opined that the primary principles of things are the acid (“ἄκιδον”) and the alkali (“ἄλκαλι”); the second, that this merit belongs to salt, sulfur, and mercury (“ἄλας, θησίων, καὶ ἐμεῦν [sic]”). Of course, the true story is to be found beyond the philosophical controversies, in what the Holy Scripture narrates. God created all things “out of non-beings”, as indicated in the book of Judith: “You conceived of everything and everything was produced in you” (“ἐννόησας καὶ πάντα παρῆχθησάν σοι”). “And still, chymists”, Popas adds, “decompose everything into water”19.

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19 Popas, op. cit. (n. 18), p. 27.
Although the passage from Judith is inaccurately quoted, the meaning conveyed here is similar to that assigned to the particular verse of the original text, to which Popas refers, by some of the most rigorous Christian thinkers of the past. For John Philoponus, e.g., when Judith addresses God, saying “You had the thought and they came to be; you minded it and they were present”, the clearly discernible idea illustrated by this divinely inspired, poetical wording is that God’s creative power is infinite. And, what’s more, any attempt to acquire knowledge on the nature of material things should be tuned in to the implications of this conception. Natural philosophy should intersect and interact with theology. The knowledge of nature, of what is created, cannot be dissociated from the knowledge of God, of the creating agent. Popas likewise, in another of his answers, stresses the paramount position occupied by the knowledge of God in the ascending scale of erudition: the sensible soul is subject to the rational soul; the latter is subject to theory; and theory is subject to truth, that is, to God. By invoking the theory of creation ex nihilo, perhaps he wants to remind his reader of how utterly futile and vain the quest for material primary principles is.

Even more noteworthy, though, at least from the point of view adopted in this paper, is the fact that Popas places the theories on the elementary constituents of reality proposed by this distinct class of philosophers called “the chymists” side by side with those of the early Greek naturalists. As it seems, he is only very roughly familiar with what he is talking about. Nevertheless, his knowledge is in some degree up-to-date. The acid-alkali theory which he succinctly brings up was first formulated by Otto Tachenius (1610-1680), in a work entitled Hippocrates chimicus which was


21 ἡ αἰσθητικὴ φωνὴ ὑπόκειται εἰς τὴν λογικὴν, διότι ἐσωτερικῶν εἶναι ὁ ἀνθρώπος, ἀπὸ τὸ ζῷον· πάλιν ἢ λογικὴ φωνὴ ὑπόκειται εἰς τὴν θεωρίαν· ὡστε καλλήρεσις εἶναι ὁ θεωρητικὸς [sic] ἀνθρώπος, ἀπὸ τὸν πρακτικὸν· πάλιν ἢ θεωρία ὑπόκειται εἰς τὴν ἀλήθειαν, ἢ ὡς ὀνομάζεται ὁ ἄθλος”. Popas, op. cit. (n. 18), p. 4.

published in 1666, on the basis of the suggestion put forward, less than a decade earlier, by the professor of medicine at the University of Leiden, François de la Boë (or Franciscus Sylvius, 1614-1672), that all physiological processes could be explained in terms of chemical interactions, wherein the polarity between the acidic and the alkaline components was of key importance. It was developed further, popularized, and defended as well against the objections that Robert Boyle had raised, in the meantime, with his Experiments, Notes, etc. About the Mechanical Origine or Production of divers Qualities (1675), by the French physician François de Saint-André, whose Entretiens sur l’acide et sur l’alkali (first published in 1677) went through a second enlarged edition in 1687. As for the theory of Hermes, which

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Popas lists together with that of “the chymists”, it is the well-known Paracelsian theory of the *tria prima*, which was presented, both by Paracelsus (1493-1541) himself and by his follower, Gerhard Dorn (1530/1535 - † after 1584), as the outcome of a faithful interpretation of the legendary Egyptian wise man’s rediscovered authoritative sayings. It was disseminated broadly during the first half of the 17th century, when Dorn’s *Liber de naturae luce physica, ex Genesi desumpta* (1583) was included in the first volume of the monumental anthology *Theatrum chemicum* edited by Lazarus Zetzner (1602)27.

In all probability, it would be erroneous to assume that Popas had read any of the primary sources that we just specified. It is, rather, obvious, that we have to do with information received at second, if not third, hand: perhaps, from one of his own teachers, when he was younger, or from Perdikaires himself. This is not to say that Popas’ short encyclopaedic and dialogic guide, which seems to rely much upon the

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tradition of medieval florilegia, is nothing but an assemblage of unrelated commonplace aphorisms. Even supposing that this was all, we would still have to dwell on the question how theories propounded by Paracelsus or Tachenius found somehow their way into an arsenal of serviceable maxims at the disposal of an average local educator. But there are some indications that this is not all. We will pick out one that is particularly interesting. Popas appended to his Φώσφορον a relatively lengthy “enchiridion called institutes of moral philosophy” (Ἐγχειρίδιον ἄριστον καλούμενον Κανόνες τῆς ἡθικῆς φιλοσοφίας), consisting of 767 propositions. In the chapter on God, besides the numerous predictable apophatic pronouncements we may also fall upon some enunciations which link notably more strongly God to the palpable reality of life in this world. Such is the 384th proposition, where we learn that “the world is but a visible image of the invisible deity, because this and other things as well were becoming images of the saints”; the 390th proposition, according to which “God is life-surpassing and life-giving, the overflowing, containing in itself the principle of life, and simplest life”; and the 416th proposition, which goes as follows: “God is the alpha, and the omega, the beginning and the end; in which we live, and move, and exist.” Popas uses commonly known, among literate Orthodox Christians, materials, but, in some instances at least, he shades them in tones reminiscent of certain naturalistic or vitalistic Renaissance philosophical proclivities.

What we have seen till now are no more than singular cases pointing to a dimension, hitherto unnoticed by the historians of the Enlightenment in SE Europe. A renowned scholar and statesman, such as Mavrocordatos, and an average, perhaps well-educated, teacher, saying a few words about an idiosyncratic field of knowledge, this is what we have seen for the moment. “Chemistry” in the first case and “the chymists” in the second suddenly, though only passingly, appear as something familiar or as something that can be actually embraced or taken into account: both a moral risk of beguilement and a promise of intellectual wealth for Mavrocordatos; an alternative theory on the elementary structure of the universe, comparable to those of the early Greek naturalists, for Popas. But we have only gone across a small segment in the territory that we decided to traverse. The continuation of this paper will examine further, and much richer, evidence provided by some of the surviving manuscripts of the period.

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28 Popas, op. cit. (n. 18), pp. 51-204.
31 “Ὁ Θεός εἶναι τὸ ἄλφα, καὶ τὸ ὀμέγα ἡ ἀρχὴ καὶ τὸ τέλος· ἐν τῷ ζῷῳ, καὶ κινούμεθα καὶ ἐσμέν”. Popas, op. cit. (n. 18), p. 139.
Olympiodore l'alchimiste et la taricheia.
La transformation du minerai d'or : technê, nature, histoire et archéologie

Cristina Viano

Le commentaire d'Olympiodore *Sur le Kat'energeian* de Zosime, débute par la citation d'une phrase de Zosime concernant la « macération » (*taricheia*), opération paradigmatisante du traitement du minerai d'or, comportant plusieurs étapes et interprétée comme une allégorie de l'opération alchimique.

Or, la confrontation des procédés décrits par Olympiodore avec le témoignage historique d'Agatharchide sur les mines d'or d'Erythrée ainsi que les résultats de récentes fouilles conduites en Égypte dans les sites miniers aurifères de l'époque ptolémaïque1, permet de faire lumière sur les enjeux théoriques et pratiques des étapes de la transformation du minerai d'or et notamment sur le rapport entre nature et technê tel que le concevaient les alchimistes grecs. Il s'agit d'un très bel exemple de la fécondité d'une approche multidisciplinaire des textes de l'alchimie grecque.

1. Préludes: la structure du commentaire sur le *Kat'energeian* de Zosime par Olympiodore

Avant d'aborder le passage qui nous intéresse, et afin de définir sa place dans le commentaire du *Kat'energeian* de Zosime par Olympiodore, je voudrais résumer brièvement les résultats de mes dernières recherches sur la structure, la nature et la composition de ce traité.

Comme la plupart des textes du *corpus* des alchimistes grecs, qui sont fabriqués à partir du démembrement de textes perdus, le commentaire d'Olympiodore présente une nature composite. Le titre même, tel qu'on le trouve dans le manuscrit principal, le *Marcianus Graecus* 299 (M) illustre bien cela: «Olympiodore, philosophe d'Alexandrie, sur le livre *Selon l'action* de Zosime tout ce qui a été dit par Hermès et les philosophes» (ΔΟΛΥΜΠΙΟΔΩΡΟΥ ΦΙΛΟΣΟΦΟΥ ΑΛΕΞΑΝΔΡΕΩΣ ΕΙΣ ΤΟ

1 Je remercie chaleureusement les collègues archéologues de la Mission Française du Désert Oriental: Jean-Pierre Brun (Collège de France), Thomas Faucher (CNRS, IRAMAT) et Bérangère Redon (CNRS, HiSoMa), pour les précieuses informations et la documentation qu'ils m'ont généreusement transmises au sujet de cette découverte.
Dans sa description de M, Lagercrantz² divise le texte d'Olympiodore en deux sections dont seulement la première présente une structure cohérente.

En effet, la première section (M, f. 163r - 166r; BeRu II, 69, 12- 77, 14; § 1-14) est structurée en cinq parties séparées et distinctes : l'opération de l'extraction des paillettes d’or du minerai, à travers la « macération » (taricheia) et le « lessivage » (plusis) (§1-7. Ensuite est introduite la « soudure » (chrysocolle) de l’or (§8-11), qui consiste à rassembler les particules d’or obtenues en un corps homogène. Ces deux opérations spécifiques, de séparation et de réunion, sont ici interprétées comme des allégories de la transmutation des métaux. Viennent ensuite les trois types de teinture des anciens alchimistes (§ 11-14).

La deuxième section — la partie la plus étendue du texte (f. 166r, 26-179r, 4 = II, 77, 15-104, 7; §15-55) — est constituée par une suite destructurée d'excerpta et de digressions accompagnés de notes sur les principales opérations alchimiques.

Or dans une étude récente³, j'ai montré qu'au-delà de cette apparence de désordre et confusion, on peut saisir dans le déroulement de notre traité un dessin rationnel et cohérent, révélé par deux traces. La première consiste dans le fil rouge de la logique qui relie les opérations alchimiques, les principes et les substances fondamentales. On peut en effet constater une progression dans la présentation des composantes de l'alchimie, qui va des opérations fondamentales (lévigation, fusion, teinture) à ses principes causaux et matériels, pour terminer avec des considérations épistémologiques sur cette discipline en tant que techné.

Le deuxième fil rouge consiste en des formules que l'on pourrait définir comme «de raccord et d'accompagnement», où l'auteur parle à la première personne et signale la transition entre les différentes parties ainsi que le but, la méthode et l'organisation interne de son travail. Notre texte se révèle ainsi être une epitomê, un résumé au but

protreptique⁴, offrant un choix de témoignages, accompagnés de commentaires, découps à partir des écrits des anciens alchimistes, mais aussi des philosophes proprement dits, sur les fondements de l'art (les opérations, les ingrédients, et aussi l'histoire). Il est adressé à quelqu'un, probablement quelqu'un de jeune et de rang élevé dans le but de lui offrir «une vue d'ensemble de l'art complet» (tês enukukliou technês hê sunopsis, §38).

Selon mon hypothèse, un ouvrage perdu d'Olympiodore, rédigé dans une forme plus structurée, était à l'origine du texte que nous possédons. Celui-ci serait constitué au moins de deux couches: le commentaire d'Olympiodore au Kat'energeian de Zosime et l'arrangement d'un compilateur. Celui-ci a pu copier Olympiodore jusqu'à un certain point et ajouter ensuite une série de notes sur les principales opérations alchimiques, accompagnées d’excerpta de Zosime et d'autres auteurs alchimiques, en cousant le tout avec ce double fil rouge: d'une part, celui de la progression logique dans l'apprentissage des opérations et des principes de l'alchimie, et de l'autre, l'introduction de formules signalant la transition entre les parties ainsi que la méthode de composition et le but de ce précis.

Je pense que le morceau initial (§1-7) provient directement du commentaire au Kat'energeian d'Olympiodore le néoplatonicien ainsi qu'une bonne partie de la doxographie sur les Présocratiques que l'on trouve au milieu du traité (§18-27). Puisque dans l'ensemble du traité, les citations de Zosime sont plus fréquentes et plus nombreuses (son nom est cités explicitement vingt fois) que celles des autres alchimistes et, qu'en plus du titre du commentaire, deux excerpta sont explicitement déclarés par la suite comme provenant du Kat'energeian⁵, il est aussi fort probable que cette compilation se superpose à la trace du commentaire. C'est-à dire que le compilateur a inséré d'autres excerpta et digressions mais il a pu revenir au commentaire d'Olympiodore sur le Kat'energeian et en copier et/ou paraphraser d'autres parties, comme justement la partie doxographique qui à mon avis est d'Olympiodore du moins en ce qui concerne les Présocratiques. Il est aussi tout à fait plausible que le Kat'energeian de Zosime soit déjà un ouvrage doxographique en ce

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⁴ Cf. 71, 18: « L'expression "réaliser l'acte de la macération" exhorte au travail pratique» (Τῇ δὲ «ποιῆσαι τῆς ταριχείας ἐνέργειαν» πρὸς τὴν ἐμπρακτὴν ἑργασίαν προτρέπει).  
⁵ Cf. II, 89, 8 (§32): «Et Zosime dans son livre Selon l’action (Kai: Zosvimo” ejn th’/ Katae ejnervgeian bivbwh/)...» et 100, 9 (§50): « Et vois que Zosime, dans le livre Selon l’action, dans la seconde section (ejn th’/ Katae ejnervgeian bivbwh/, tw’/ deutevwr/ lovgw)/...».
qui concerne les opinions des alchimistes et qu'Olympiodore dans son commentaire y ait rajouté une doxographie sur les Présocratiques, structurée selon le schéma typique des doxographies néoplatoniciennes6. Les parties que je suppose avoir été copiées directement du commentaire d'Olympiodore sont justement caractérisées par des ressemblances formelles (le schéma typique du commentaire selon lexis, théôria, exegesis kata lexin; l'agencement de la doxographie), terminologiques et conceptuelles frappantes avec le commentaire des Meteorologica et d'autres ouvrages d'Olympiodore7.

Or, si cette hypothèse est vraie, nous pouvons expliquer que, par la suite, ce texte a été attribué dans son entier à Olympiodore d'Alexandrie, par une sorte d' «attraction» de la partie initiale. J'exclus qu'il était dans les intentions du compilateur du patchwork de s'attribuer le nom d'Olympiodore. Le titre ne fait que refléter précisément ce qu'est cet ouvrage: le commentaire d'Olympiodore à Zosime et une collection d'excerpta. Il faut donc distinguer les deux parties du titre par un kai ou une virgule. Quant au compilateur, on pourrait vraisemblablement songer à ce Théodore, qui aurait rassemblé la collection entière des textes alchimiques à l'époque d'Héraclius et composé la préface en vers qui se trouve au début de M (f. 5v).

2. La «macération» (taricheia)

Venons maintenant au passage qui nous intéresse. Le lemma cité concerne l'opération de l’extraction des paillettes d’or du minerai, à travers la «macération» (taricheia) et le «lessivage» (plusis) (§1-7). Comme nous l'avons déjà mentionné, il est suivi par la description de la «soudure» (chrysocolle) de l’or (§8-11), qui consiste à rassembler les particules d’or obtenues en un corps homogène. Ces deux opérations spécifiques, de séparation et de réunion, sont ici interprétées comme des allégories de la transmutation des métaux. Viennent ensuite les trois types de teinture des anciens alchimistes (§ 11-14). Le § 15 énonce le but fondamental de la teinture : donner à un corps «dissipable» une nature indélébile. Cela signifie, en termes opératifs, fixer la


coloration d’un métal de manière à lui donner une nature persistante

BeRu, CAAG, II, 69, 15 -70, 3:

1. Είναι δὲ ἡ ταριχεία ἀπὸ μηνὸς μεχίρ κε’ [καὶ] ἔως μεσωρὶ (15) (70.) κε’· ὅσο ἡν δόνη ταριχεύσαι καὶ πλῦναι ἔως ἀφής τὰ αὐτὰ ἐν ἀγγείοις ἀποκείμενα. Καὶ ἡν δόνη ποιῆσαι, ποίησον τῆς ταριχείας τὴν ἐνέργειαν, κάλλιστε τῶν σοφῶν.

«La macération se fait à partir du 25 du mois de méchir jusqu’au 25 du mois de mésori (70). Toutes les choses que tu peux faire macérer et lessiver, mets-les de côté dans des récipients. Et, si tu peux le faire, réalise en acte la macération, toi, le plus noble des sages».

La citation, vraisemblablement de Zosime, est commentée selon le schéma «classique» des commentateurs néoplatoniciens, typique d’Olympiodore le néoplatonicien: d’abord le morceau à commenter, une explication générale, qui correspond à la theoria, et ensuite l’exégèse détaillée des phrase et des termes (lexis), que nous trouvons aux paragraphes 2, 3, 4, 5, 6, 7.

La considération générale porte sur la coutume des anciens de cacher la vérité aux non-initiés au moyen d'allégories et d'un langage ésotérique; l'auteur évoque, de manière obscure (comme il se doit), comme exemple les formulations de Platon et d’Aristote concernant la substance et les accidents. Ensuite Olympiodore annonce l'exégèse du procédé de la taricheia dans la perspective de «pousser les chercheurs des objets physiques vers les objets non physiques».

Même si l'analyse de cette citation se conclut avec la distinction entre le «lavage mystique» (plusis mustikê), le «lavage proprement dit» (plusis apolelumenê) et l'identification de celui-ci au «grand traitement» (megale therapeia), ce qui semblerait se situer sur le plan allégorique de la transmutation, de fait, l'exégèse détaillée d'Olympiodore, au-delà d'un certain nombre d'obscurités, apparaît essentiellement technique et se référant à des procédés bien réels.

En effet, il y a l'intention d'expliquer, en termes concrets, les étapes, les temps, les outils et les phases de l'opération de la lévigation du minerai d'or, décrite dans la citation de Zosime.

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Ainsi, apprend-on que le point de départ de la «macération» est la «terre boueuse (ou limoneuse)» (§2)\(^8\), qui doit être lessivée jusqu'à ce que la boue ait disparu, et qu'il ne reste que le minerai (psammo
c), c'est-à-dire les paillettes d'or, argentées ou plombées. La phase successive consistera à soumettre les paillettes à l'action du feu.

De plus, Olympiodore interprète l’expression «réaliser l'acte de la macération» comme une exhortation au travail pratique. Le terme «acte» (energeia, qui donne le
titre à l'ouvrage de Zosime ici commenté, le Kat'energeian: («selon l'action») est
interprété ici comme «action pratique», «opération » (5. Tō dē «πουήσαι τῆς ταριχείας ἐνέργειαν» πρὸς τὴν ἐμπρακτὸν ἐργασίαν προτρέπεται. Καὶ ἡ ἐνέργεια γὰρ ἐνταῦθα εἰς τὴν πρᾶξιν ἐκλαμβάνεται). Il s'agit donc de mettre en pratique une prescription.

Mais peut-on dire quelque chose de plus concernant la taricheia?

3. 1. La taricheia dans le CAAG

Le terme taricheia en grec signifie trois choses\(^9\). En premier lieu : a) « dessiccation, salaison, conservation sous sel » (Aristote, Meteor., II, 3, 359 a16 suiv.). Chez
Aristote, dans Meteor. II, 3, 359 b 12, nous trouvons un rapport entre la «boue» et la
«macération». Aristote présente comme preuve (tekmêrion) du fait que la mer est un
mélange d'eau et de sel, la densité de la masse de la mer. En effet, si l'on fait un
mélange d'eau, en y mêlant une grande quantité de sel, le résultat est une sorte de
«boue» (w{sper phlov”). La même opération est faite pour les «conserves à la
saumure» (tauio; de; tou'to drw'si kai; peri; ta;" tariceiva") trad. P. Louis; «dans
les salaisons des poissons», J. Tricot, cf. Hist anim., VIII, 30, 607 b 28, où il est question
des salaisons des thons ). Ici la taricheia est décrite comme un procédé de
conservation sous sel au moyen d'un mélange de sel et d'eau. C'est le sens le plus

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\(^8\) Le morceau de Zosime est attribué à Olympiodore, dans une version plus étendue, dans un recueil de
fragments, relativement récent selon Berthelot, intitulé Sur la pierre philosophale, CAAG II, 200, 7
(transcrit sur A) : « La macération a lieu depuis le 25 du mois de méchir jusqu'au 25 du dernier mois de
l'automne (6)... Toutes les choses que tu peux faire macérer et lessiver, laisse-
les déposer dans des
vases (convenables). La macération s'exécute sur la terre limoneuse, jusqu'à
ce que la partie limoneuse
s'en aille et que le minerai soit isolé. Cet art ne se pratique pas au moyen du feu. » (Γ
ίνεται ἡ ταριχεία ἀπὸ μηνὸς μεχ' ἐκ' ἔτους μετασφυριῶν ἐκ'-δια ἀν' ἀονὴ ταριχεύσαι καὶ πλάνων ἐκ' ἀφῆς αὐτῆς ἐν ἄγγεσιν ἀποκεμέναι. Γίνεται δὲ ἡ ταριχεία περὶ τῆς πτηλούδους γῆς, μέχρις ἂν τὸ πτηλοῦδος ἐξελθῃ, καὶ ἐς ψάμμων κυταλιζῇ. Ὑπὲρ τὴν τέχνην αὐτήν ἡ πυρὸς ὅτι γίνεται). S'agit-il de la version plus complète
d'un fragment du Kat'energeian de Zosime? En effet  ces deux dernières phrases, absentes dans le
morceau présenté au début de notre texte, sont ensuite commentées aux paragraphes 2 et 16.

\(^9\) Cf. LSJ: ταριχεία, Ion. ταριχ-ητή, ἥ, (1) preserving, pickling, in pl., εἰς ταριχείας φαύλου
mummification, PEleph.8.8 (iii B.C.), POxy.40.9 (ii A.D.). (3). maceration, Olymp.Alch.p.69B., al. II.
Ταριχεία prob. factories for salting fish, Hdt.2.15.113, Str.3.1.8

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commun du mot. b) Dans la taricheia d'Olympiodore, il n'est pas question de sel mais il reste la notion d'un mélange humide et dense d'où il faut séparer la partie solide. Pour la signification de macération, LS renvoie justement à ce passage d'Olympiodore. c) La taricheia peut signifier aussi «momification», il s'agit au fond là aussi d'un traitement de conservation où le sel (natron) joue un rôle important.

Dans le corpus des alchimistes grecs, on trouve de nombreuses occurrences du terme taricheia surtout chez Zosime, ce qui fait penser qu'il s'agit d'une terme central dans le Kat'energeian. Il semble désigner tantôt l'ensemble des opérations de lévigation du minerai d'or, tantôt la phase préalable qui consiste à réaliser un mélange du minerai broyé et réduit en poudre avec de l'eau et à le faire décanter dans des récipients. (cf. CAAG, 121, 18; 136, 8; 155, 19; 199, 1)

Dans l'une des Visions, représentée comme un autel en forme de coupe contenant de l'eau bouillonnante où s'opère la transformation (metabolê) des hommes qui abandonnent les corps et deviennent esprits, elle est le symbole de la purification du minerai d'or de la terre (cf. Mém. auth. X, 37, 50-57 Mertens). Dans d'autres passages, par rapport aux quatre phases principales de la transformation (noir, blanc, jaune et iōsis), elle prend sa place entre le noircissement et le blanchiment (cf. Zosime, 220, 3-14; Comarius, 290, xxx).

3.2. Agatharchide

Parmi les témoignages non alchimiques, les étapes techniques de l'extraction du minerai et de son traitement jusqu'à sa transformation en or sont décrites en détail par le géographe Agatharchide (qui a vécu en Égypte à la fin du IIe s. av. J.-C. et a été précepteur de Ptolémée X), qui a laissé un récit très vivant de l’activité des mines d’or du désert Oriental.

En réalité, ce témoignage n'est pas du tout extérieur au corpus alchimique puisque dans M (f. 138-141) on en trouve un abrégé :

Sur la pierre métallique; en quels lieux elle est préparée CAAG, 26, 9-27, 3; trad. p. 27-28:

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Il faut connaître en quel lieu de la terre de Thébaïde se prépare la paillette métallique: Cléopolis (Héracléopolis), Alycoprios (Lycopolis); Aphrodite; Apolenos (Apollinopolis); Eléphantine.

La pierre métallique ressemble au marbre; elle est dure, et les hommes qui, dans les lieux précités en font l'extraction avec beaucoup de peine, la préparent à l'intérieur (de la terre); ils portent des lampes..., et lorsqu'ils trouvent un filon, ils l'occupent. Leurs femmes broient (la pierre) et en font mouture.

Lorsque, après avoir réduit le minerai en poudre, ils l’ont étalé sur des tables garnies de rainures contrariées et disposées en pente douce, ils y font couler de l'eau; la partie pulvérisée, légère et inutile, est entraînée par l'eau, tandis que la partie utile, retenue par son poids, est recueillie dans les rainures des planchettes. Alors, pour la cuisson, ils resserrent le dépôt, le placent dans un vase de terre cuite et, faisant un mélange selon la formule\textsuperscript{11}, ils luttent le vase et le font chauffer sur un fourneau, pendant cinq jours et cinq nuits; le vase a une issue pour l'extraction (des produits).

\textsuperscript{11} Chez Photios et Diodore sont indiquées des recettes de cémentation et coupellation. Pour la définition de ces opérations, cf. R. Halleux, «Méthode d'essai et d'affinage des alliages aurifères dans l’Antiquité et au Moyen-âge», dans N. Morrisson et alii (éd.), L’or monnayé I, Cahiers Ernest Babelon, Paris, CNRS, 1985, p. 39-77: la cémentation consiste «à chauffer un métal ou un alliage en présence d'une préparation qui modifie ses propriétés plus ou moins profondément à partir de la surface» (p. 45);
L’opération décrite consiste à « laver » le minerai réduit en poudre en faisant couler de l’eau qui entraîne la partie légère et inutile. Le minerai utile qui reste est placé ensuite dans un vase de terre cuite, qui est lité et chauffé. Les descriptions précises d’Agatharchide, dont cet abrégé est un échantillon, sur les quatre opérations techniques fondamentales de transformation du minerai: le concassage, le broyage, le lavage (ou lévigation) et l'affinage permettent de confirmer que le passage d’Olympiodore se référait à des procédures bien réelles, mises en place depuis longtemps et qui devaient constituer la base technique fondamentale par rapport à laquelle la réflexion théorique des alchimistes s’est développée aussi bien dans la théorisation des principes méthodologiques que dans les allégories de la transmutation.

3.3. Les mines ptolémaïques

Venons-en maintenant à un témoignage très récent et très concret sur la procédure d'extraction et de lavage du minerai d’or, qui constitue pour nous une autre pièce d'importance capitale pour la reconstruction du puzzle des opérations des alchimistes grecs. Il s'agit des résultats de fouilles conduites en 2013 en Égypte dans les sites miniers aurifères de l'époque ptolémaïque (fin du IVe s.-milieu du IIIe s. av. J.-C.) de Samut par la mission française du désert Oriental. Dans le compte-rendu nous lisons:

« Désireuse de se pencher sur l’âge d’or de l’exploitation des mines du désert Oriental, la mission française du désert Oriental a débuté ses travaux par l’exploration de la région de Samut, dont les vestiges semblent dater, pour les plus imposants, du début de l’époque ptolémaïque (fin du IVe s.-milieu du IIIe s. av. J.-C.) [...] La région de la coupellation «est une technique de séparation des métaux par oxydation qui possède son origine et sa principale application en métallurgie du plomb argentifère» (p. 49).

13 Cf. aussi : «Lévigation = séparation, par entraînement dans un courant d'eau, des constituant d'un mélange préalablement réduit en poudre»; «affinage = purification d'un métal par élimination des impuretés, par céméntation ou coupellation» (Ibid.).

Or, les premiers résultats de la fouille du site de Samut nord ont produit des informations d'importance fondamentale car elles permettent de reconstruire certaines des étapes de la chaîne de l'extraction du minerai et de son traitement jusqu'à la transformation en or. La grande clarté des vestiges en surface ont révélé des installations témoignant des différentes phases du travail: d'abord la phase mécanique du tri, concassage des blocs de quartz aurifère

Figure 1 : Une zone de concassage du minerai en contrebas de la cabane 404 du site de Samut nord (cliché J.-P. Brun, MAFDO)
puis la phase de transformation du minerai en farine (poudre de minerai) qui se pratiquait notamment grâce à deux grands moulins.

**Figure 2 :** Le moulin d'époque ptolémaïque à Compasi (Daghbag IV)(cliché J.-P. Brun)

**Figure 3 :** Vue des deux moulins de Samut nord (cliché A. Bülow-Jacobsen, 2014, MAFDO)
En revanche, contrairement aux premières hypothèses de l'équipe, les deux dernières étapes décrites par Agatharchide (le lavage et la fonte) n'ont pas été localisées sur le site de Samut nord, soit qu'elles aient été effectuées dans la Vallée, soit, mais c'est moins probable, qu'elles n'ont pas été repérées par les archéologues\textsuperscript{15}.

4. Nature et technê

Dans le compte-rendu des fouilles nous lisons: «Il existe deux types de gisements aurifères dans le désert Oriental. Le premier est un gisement de type filonien qui se caractérise par l’apparition en surface, souvent sur les crêtes des collines, de longs filons de quartz aurifère. Le second, le gisement alluvionnaire, est une conséquence du premier, puisqu’à une époque géologique, l’érosion du minerai de quartz a éparpillé ce dernier dans des placers\textsuperscript{16}, au bas des collines, qui se retrouvent maintenant dans les ouadis. L’or se trouve alors sous forme de paillettes ou encore dans une gangue de quartz». (Brun, 2013, p. 114, n. 17)

Il est évident que cette technique d'extraction de l'or nait de l'observation de la nature: le broyage du minéral de quartz aurifère et son lavage reproduit la situation naturelle des sables aurifères dans les fleuves.

Ce fait illustre bien la conception des rapports entre technê et nature qui émerge dans les textes alchimiques grecs. Conception qui est conforme à la vision aristotélicienne, selon laquelle le technités, tel le médecin, ne remplace pas la nature, mais crée les conditions pour que la nature agisse, pour que les processus naturels puissent se produire.

En effet, dans \textit{Metaph. Z, 7, 1032b 1 suiv.}, où Aristote analyse les productions (\textit{poieseis}) de l'art, dont la forme est présente dans la pensée du praticien, il donne l'exemple de la médecine. Il décrit le raisonnement du médecin qui cherche à produire la guérison en reliant le cas particulier à la forme de la santé qui est présente dans son esprit en tant que science: puisque la santé consiste en cela, si l'on veut obtenir la guérison, il faut que cette chose se réalise, par exemple, un certain équilibre

\textsuperscript{15} Cf. Th. Faucher et B. Redon, «The “heavy mineral processing plants” of Samut North are mills!», \textit{Egyptian Archaeology} 48, Printemps 2016, à paraître.

\textsuperscript{16} Par placer on désigne un gisement secondaire de roches sédimentaires, le plus souvent d'origine alluvionnaire, produisant des métaux et des minéraux lourds, notamment de l'or et des pierres précieuses.
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des fonctions du corps, ultérieurement, si l'on veut obtenir cet équilibre, il faut une
certaine chaleur.
Dans le commentaire même d'Olympiodore, on retrouve cette idée répétée à plusieurs
droits, partagée avec Zosime. La méthode correcte consiste à procéder selon nature,
et non en lui faisant violence ou opposition, car en fin de compte c'est la nature qui
agit.
Par exemple, en, 75, 15, à propos du «lavage», nous lisons:

Le lavage, disent-ils, est le lavage coagulant les substances fugaces qui s'écoulent
ensemble grâce à des paroles de bonne augure et à la nature seule, ou c'est la
corporification des esprits non-corporels, c'est-à-dire de leurs âmes, choses
accomplies par la seule nature et non par la main de l'homme, comme certains <le
croient> (αὐτῶν διὰ μόνης τῆς φύσεως τελούμενα καὶ ὦ διὰ χειρῶν ὡς τινὲς
νομίζουσιν)

Mais particulièrement significatif est un autre passage au sujet de l'«économie» de la
chrysocholla:

73, 20: Tu pourrais apprendre, ô ami des Muses, ce que veut dire le mot de
«économie». Ne va pas croire, comme le font certains, qu'il désigne une action
manuelle (74), mais (comprends) que c'est celle qui se fait par la nature, car c'est une
action qui dépasse l'homme (τὴν διὰ χειρῶν ἐνέργειαν μόνον ἄρκοοσαν ἐίναι, ἄλλα
καὶ τὴν διὰ τῆς φύσεως γινομένην, ὑψέρ ἄνθρωπον ὡς τινὲς
καὶ τὴν διὰ τῆς φύσεως γινομένην, ὑψέρ ἄνθρωπον οὕς
καὶ τὴν διὰ τῆς φύσεως γινομένην, ὑψέρ ἄνθρωπον οὕς)

et d'autres ingrédients végétaux (plantes), mais consacre ton temps à l'usage
mêmes de la nature (ἄλλα ὁτῇ τῇ φυσικῇ χρήσει), et tu auras l'objet cherché.
La méthode à suivre décrite ici de même que dans plusieurs passages du corpus
alchimiques, est celle qui laisse agir la nature, car l'homme ne peut pas se mettre à sa
place. Cette méthode demande, par conséquent, une connaissance approfondie des
propriétés spécifiques des corps, de manière à les faire réagir naturellement.
On remarquera que la liste des couples contraires des propriétés passives de Meteor.
IV, 8-9 d'Aristote, qui permettent de classer tous les corps homéomères, organiques et

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non organiques, sont toutes des propriétés révélées par la *technê*. Et on peut constater aussi qu'il s'agit, dans la presque totalité, de termes liés au travail minéralier ou métallurgique: solidifiab, fusible, flexible, friable, modelable, broyable, combustible etc.

La *technê* permet donc de connaître les propriétés naturelles des corps dont elle s'occupe. En effet, comme le dit très bien R. Halleux\(^{17}\), les anciennes techniques d'affinage constituent l'origine de la chimie analytique.

Il est par ailleurs intéressant que parmi les buts de la Mission du désert Oriental, sont mentionnées : (a) la connaissance des techniques d'extraction, de traitement et de fonte du minerai et (b) la caractérisation chimique de la composition de l’or égyptien\(^{18}\).

5. La reconstruction du *puzzle*

En mettant ensemble les pièces du *puzzle*, on peut avancer une hypothèse de reconstruction de ce que nous dit Olympiodore dans son commentaire. Il me semble que le résultat le plus important de cette enquête porte sur le fait qu'Olympiodore, ou Zosime, se réfèrent à des opérations bien concrètes et réelles.

Le cas de la *taricheia* illustre très bien la fécondité et l'exigence de l'application d'une méthode multidisciplinaire aux textes alchimiques grecs.

En effet, d'une part, l'appel à d'autres disciplines et témoignages, littéraires, archéologiques ou encore à la chimie, nous permet d'interpréter les textes alchimiques. De l'autre, les textes alchimiques jettent de la lumière sur les enquêtes historiques et archéologiques.

Un autre cas emblématique est la recette pour la fabrication du «bronze noir» que l'on trouve dans des fragments de Zosime en syriaque (manuscrit de Cambridge Mm.6.29)\(^{19}\).

Il s'agit de la seule recette antique que l'on possède sur ce célèbre et mystérieux bronze noir de Corinthe, très prisé par les Romains et dont parle Pline l'ancien (*Hist.*).

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\(^{17}\) R. Halleux, «Méthode d'essaï», art. cit., p. 39.

\(^{18}\) Cf. http://desorient.hypotheses.org/

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Nat. XXXIV 8) et qui constitue un véritable casse tête pour les archéologues et les chimistes. En effet, ils s'interrogent depuis longtemps sur le lien entre les allusions des auteurs classiques et certains objets conservés dans les musées qui présentent justement une étonnante patine noire. Des analyses menées en laboratoire ont permis de reconstituer l’histoire de cette technique qui consistait à enrichir un alliage cuivreux d’une petite quantité d’or et/ou d’argent, ce qui permettait ensuite, grâce à un traitement de surface par réaction chimique, d’obtenir la formation d’une patine artificielle noire particulièrement brillante et apte à faire ressortir la beauté des décorations. Or les recettes de Zosime syriaque sont très techniques et n’ont rien de mystique et les chercheurs cherchent à reproduire en laboratoire. Évidemment l’opération n’est pas facile, à cause de l’identification des ingrédients, mais celle-ci est une autre histoire.

Figure 4 : Encier de Vaison la Romaine, troisième quart du Ier siècle (cliché C2RMF Dominique Bagault). Cf. S. Descamps, avec la participation de M. Aucouturier, "L’encier de Vaison la Romaine et la patine volontaire des bronzes antiques," Monuments Piot, 24, 2005, 5-30
Stéphanos d’Alexandrie:
La tradition patristique dans son œuvre alchimique

Maria K. Papanthanassiou

Résumé
La plupart des Discours de l’œuvre alchimique de Stéphanos d’Alexandrie commencent et finissent par des prières. Stéphanos s’y réfère surtout à Logos, qui est la lumière, et à la sagesse de Dieu. Selon notre recherche, les sources de Stéphanos sont l’Évangile de saint Jean, les épîtres des Apôtres, le Credo, et les œuvres des Pères de l’Église (ex: Clément d’Alexandrie, Basile de Césarée, Grégoire de Nazianze, Grégoire de Nysse, Jean Chrysostome). On constate que ces prières ne contiennent pas de trace de doctrines hérétiques, soit des monophysites d’Alexandrie soit de Serge, patriarche de Constantinople (610-638). Stéphanos redigea son œuvre alchimique en 617 à Constantinople. Entre 616 et 618 le patriarche Serge proposa son “monoénérisme” et cherchait des textes en son appui; il continua ses efforts en 622/623 et aux années suivantes. Il paraît que Stéphanos, qui mourut peu de temps après 621, une fois converti du monophysisme en l’Orthodoxie par Eulogios, patriarche d’Alexandrie, il n’a pas suivi l’hérésie de Serge. Il est donc bien probable que la personnalité de Stéphanos est tombée dans l’oubli après sa mort, pendant le patriarchat de Serge et après lui, à cause de son insistance sur la foi orthodoxe.

Introduction

Selon la tradition, Stéphanos d’Alexandrie fut invité par l’empereur Héraclius (610-641) à Constantinople pour enseigner le quadrivium (c’est-à-dire, l’arithmétique, la géométrie, l’astronomie et l’harmonique). C’est pendant les premières années du règne de Héraclius, plus précisément pendant les années 617-619, que Stéphanos écrivit son *Commentaire sur les Tables manuelles de Théon*, comme on peut conclure des dates pour lesquelles il a calculé les positions des planètes (Neugebauer 1975:1040). D’après mes dernières recherches, c’est aussi en 617 que Stéphanos rédigea ses discours sur la Chrysopée (Papathanassiou 1996; 2006). Selon la tradition manuscrite et son édition par Ideler,1 cette œuvre se compose d’une série de neuf discours écrits en style rhétorique où Stéphanos commente sur quelques passages empruntés aux œuvres alchimiques antérieures. Mais comme nous avons démontré (Papathanassiou 1996), cette opinion est erronée et la partie finale du dernier discours de Stéphanos est définitivement perdue, et que deux discours originaux ont été plus loin divisés chacun en deux autres discours. Notre nouvelle division de l’œuvre de Stéphanos en discours, qui est peut-être plus proche à l’originale inconnue qui précède le Codex Marcianus et les autres MSS sauvés, est la suivante:2

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2 Dans notre exposé nous nous référons tant aux page(s) et line(s) de l’édition d’Ideler, autant qu’au numéro du Discours et son paragraphe de notre division. E.g. Id(eler). page,line(s); D(iscours) x.(§)y ou (§§)y-z.

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Les Prières au début et à la fin des Discours ne prouvent pas seulement la piété de Stéphanos; elles reflètent aussi ses idées concernant la personnalité et les qualités d’un philosophe pratique qui veut découvrir les secrets du monde matériel. Selon lui, “la philosophie n’est qu’une ressemblance à Dieu autant qu’il est possible à l’homme.” C’est ainsi que le philosophe, en tant qu’amoureux de la sagesse, tâche continuellement de ressembler à Dieu. Dans un tel contexte on doit examiner le contenu de ses Prières.

Notre exposé comprend trois parties: a) Une présentation générale du contenu des prières et leurs sources patristiques suivie des remarques concernant la foi orthodoxe de Stéphanos. b) La traduction en français des prières avec des références aux œuvres des Pères de l’Église. c) Le texte grec des prières avec les mêmes références aux œuvres patristiques accompagnées de leurs passages relatifs.

**Le contenu des Prières**

Pendant les longues années de ma recherche sur la “Chrysopée” de Stéphanos j’avais mis au second rang l’étude des “Prières” qui se trouvent en général au début et à la fin de ses Discours. Il est évident que mon objectif était l’étude et l’appréciation des principes philosophiques et des pratiques de la chrysopée, tels qu’ils se présentent dans son œuvre. D’ailleurs, j’avais pourtant en tête de m’en occuper dans la perspective de l’édition critique de l’œuvre. Aujourd’hui, je suis sure que les “Prières” constituent un argument précieux pour l’éclaircissement de la personnalité de Stéphanos ainsi que pour la compréhension de son œuvre.

Selon W. Wolska-Conus, Stéphanos d’Alexandrie (ou d’Athènes ou philosophe) était un chrétien orthodoxe d’Athènes, qui s’est rendu à Alexandrie pour étudier les sciences. À cause de ses études faites dans le milieu monophysite de Jean Philoponos et de Damianos, patriarche monophysite d’Alexandrie, lui aussi il s’est converti au

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3 Id. 224,27-28; L 4.5: Τί γάρ ἐστι φιλοσοφία, ἄλλʼ ἢ ὁμοίωσις Θεῷ κατὰ τὸ δυνάτον ἀνθρώπῳ;
4 Il y a très longtemps que le Père H. Saffrey a eu la bonté de me confier ses improvisations écrites sur les Discours de Stéphanos pour en faire usage selon mon avis. Parmi ses notes j’ai trouvé la traduction de quelques prières et j’en cite ici celles que je considère qu’elles sont en forme définitive. Elles sont signalées par un astérisque précédant le numéro du passage de la prière.
monophysisme. Plus tard, s’appuyant sur une méditation tout à fait théorique, il découvrit les contradictions de la Christologie monophysite. Il se mit donc à se faire des syllogismes qui détruisaient petit à petit les croyances auxquelles, lui-même, s’était autrefois converti. Désapprouvé par le patriarche Damianos, Stéphanos fut exclu de l’Église monophysite. Alors, reconsidérant ses nouvelles thèses, il aboutit à des conclusions définitives et il rejoint les Chalcédoniens; il trouve refuge auprès d’Euloge, patriarche orthodoxe d’Alexandrie, et il retourne aux seins de l’Orthodoxie. Enfin, quand il fut invité par l’empereur Héraclius à Constantinople, il s’est converti de nouveau au monothélisme par le patriarche Serge. Selon W. Wolska-Conus, ces conversions, notamment la dernière, sont selon toute probabilité, la raison pour laquelle le nom de Stéphanos est tombé à l’oubli. En outre, elle prétend que nous sommes dans l’ignorance par rapport aux conceptions de Stéphanos concernant la religion. W. Wolska-Conus soutient que cette ignorance est due au manque d’information et des textes théologiques de cet écrivain. (Wolska-Conus 1989, 66-68) Mais ces textes existent jusqu’à nos jours; ils ne sont pas autres que les “Prières,” qui n’ont été l’objet d’aucune étude jusqu’à nos jours. Pour comprendre le sens profond des “Prières” qui nous aideront à mieux connaître la personnalité de Stéphanos, nous devons essayer de faire revivre l’atmosphère de son époque et celle de la composition de son œuvre. Après avoir fait une étude approfondie sur un phénomène astronomique décrit dans un Discours, j’abouti à la conclusion que Stéphanos l’a écrit entre le 26 mai et le 3 juin de l’an 617 (Papathanassiou 1996, 258-264; 2006, 180-188). Par conséquent, l’an 617 est la date de la composition de ses Discours sur la Chrysopée. À cette époque-là il écrivait parallèlement son “Commentaire sur les tables faciles de Ptolemée,” où il donnait des exemples des calcules astronomiques pour les années 617-619. De plus, son “Traité apotélésmatique adressé à Timothéos,” c’est à dire l’Horoscope de l’Islam, calculé pour le 1er Septembre de 621, et le témoignage d’Ananias de Sirak, qui, lorsqu’il se rendit à Constantinople pour ses études, le fameux maître des sciences du quadrivium n’y existait plus, il en résulte que Stéphanos mourut peu après la composition de l’horoscope de l’Islam (Papathanassiou 1997, 117). Depuis l’an 610 sur le trône de Constantinople était l’empereur Héraclius (610-641) tandis que Serge Ier (610-638) était le patriarche œcuménique. Serge faisait tous ses efforts pour restaurer l’unité religieuse de l’empire byzantin, unité brisée par le
schisme entre les chrétiens orthodoxes qui suivaient la confession de la foi du concile de Chalcédoine de 451 et les monophysites qui appartenaient surtout à l’Église jacobite de Syrie et l’Église copte. Le but de ces efforts, encouragés par Héraclius, était le renforcement de l’empire en vue des expéditions de l’empereur contre les Perses et ensuite contre les Arabes. Pour atteindre son but, entre 616 et 618 Serge s’adressa à un moine copte d’Alexandrie (George Arvas) en lui écrivant une lettre où il a exposé sa proposition pour le “monoénergisme.” En plus, Serge demandait au moine de lui procurer des textes en appui de sa théorie du monoénergisme. Cela entraîna les protestations de Jean V le Miséricordieux (610-621), patriarche orthodoxe d’Alexandrie.

Par conséquent, la première question qui se pose est la suivante: Est-ce que les “Prières” des Discours de Stéphanos contiennent des éléments hérétiques soit du monophysisme soit du monoénergisme, nouvellement introduit par Serge? La réponse est Non!

Je vais me référer brièvement au contenu de ces “Prières” en utilisant quelques exemples caractéristiques.

Au début de son œuvre, Stéphanos chante Dieu et le supplie de l’illuminer par la lumière de son omniscience, à fin qu’il puisse arriver à sélectionner les meilleurs éléments du Traité qu’il avait en mains et le rendre digne de révéler la vérité.

Il s’adresse à Dieu triadique en nommant les trois personnes de la Sainte Trinité; par son mot introductif Stéphanos fait allusion au Père: “Après avoir chanté un hymne en l’honneur de l’Auteur de tous les biens, du Roi de l’univers et de son Fils unique, qui a procédé (rayonné) de Lui avant tous les siècles, avec le Saint Esprit.”

Il faut noter

5 La doctrine du monothélisme, une des deux variations du monophysisme, admettait les deux natures de Jésus-Christ, mais ne lui reconnaissait qu’une seule volonté. La volonté humaine est engloutie par la volonté divine. La doctrine du monoénergisme, l’autre variation du monophysisme, qui présuppose celle du monothélisme, admettait que Jésus-Christ est une personne à deux natures, mais que l’opération des deux natures est unique, c’est-à-dire que l’énergie qui manifeste les deux natures est unique. Par conséquent, il n’y a pas de distinction entre la nature humaine et la nature divine; il s’agit d’une confusion des deux natures, où celle de l’humanité reste passive devant l’action de la divinité. L’Église orthodoxe conçoit Jésus-Christ comme une personne à deux natures parfaite, et lui reconnaît deux opérations distinctes, même s’il y a un seul but à ces deux opérations, un seul acte, un seul résultat. Chaque nature coopère à l’acte unique, selon sa propre manière. http://christologicexceslogie.blogspot.gr/2014/03/monoenergisme-et-monothelisme.html

6 Id. 199,6-8 (D 1.1) Θεόν τὸν πάντων ἀγαθον ἀτιον καὶ βασιλέα τῶν ὄλων, καὶ τὸν ἐκ αὐτοῦ πρό τῶν αἰώνων ἐκλήμαντα μονογενὴ υἱὸν σὸν τῷ Ἁγίῳ Πνεύματι.
ici que sa référence à la seconde personne de la Sainte Trinité n’est pas loin de celle du Symbole de la foi: “le Fils unique de Dieu, né du Père avant tous les siècles.”

Stéphanos utilise le verbe “rayonner” (ἐκλάμπω) à l’imitation des Pères de l’Église. Par exemple Clément d’Alexandrie fait souvent allusion à “la lumière qui vient d’en haut” (ἄνωθεν φωτοδοσία) et qui émane du Père. Stéphanos se réfère surtout au “Fils-lumière” ou à la “lumière paternelle” (πατρικὸν φῶς) ou “rayonnement” (ἀπαύγασμα); par exemple, il écrit: “qui habite une lumière inaccessible, lumière qui éclaire tout homme venant dans le monde.” Ici il combine quelques mots d’un passage de la première Épître de Paul adressée à Timothé (Tm 6,16: le seul qui possède l’immortalité, qui habite une lumière inaccessible) avec un passage du premier chapitre de l’évangile selon Jean (Jn 1,9: Le Verbe était la lumière véritable, qui éclaire tout homme venant dans le monde.) Ces passages ont été l’objet des commentaires extensifs écrits par les grands Pères de l’Église (Dionysios d’Areopage, Athénagore, Origène, Clément d’Alexandrie, St Basile, Grégoire de Nysse, Grégoire de Nazianze, St Jean Chrysostome et d’autres.

Stéphanos écrit aussi que Jésus est “le Verbe divin de Dieu, … le Verbe vivant du Père; le Verbe était Dieu et le Verbe était toujours avec Dieu; tout fut par lui,” renvoyant ainsi au début de l’évangile selon Jean (Jn 1,1-4: Au commencement le Verbe était et le Verbe était avec Dieu et le Verbe était Dieu. Il était au commencement avec Dieu. Tout fut par lui et sans lui rien ne fut. De tout être il était la vie.) Il s’agit d’ailleurs, d’un passage commenté plusieurs fois par les Pères de l’Église.

Dans une autre prière à la fin d’un Discours, Stéphanos se réfère au “Seigneur de Tout … né du Père avant tous les siècles, Créateur de toute création, lumière vraie, née de la lumière, Dieu né de Dieu et étant toujours avec Dieu, et aux derniers jours le même engendré pour notre salut de Marie, la glorieuse Mère de Dieu et toujours

On doit remarquer ici qu’après le mot “engendré” (γεννηθέντα) dans son passage du Symbole de la foi Stéphanos ne cite pas la suite de la phrase: “non pas créé, de même nature que le Père.”16

Les références de Stéphanos à “la grande philanthropie de Dieu”17 et “la bonté sublime de Dieu”18 renvoient aussi aux œuvres des Pères de l’Église. Par exemple, la confession de Stéphanos, “Tout don excellent, toute donation parfaite vient d’en haut et descend du Père des lumières,”19 est un passage de l’Épître de St Jacques (1,17). Ce passage n’a pas été commenté seulement par les Pères, mais on le prononce aussi à la Liturgie de St Jean Chrysostome.

D’autres allusions de Stéphanos à “l’abîme” (ἀβυσσος) ou à “l’abîme de la sagesse du Créateur de tout”20 et à ses “indicibles” (ἀνέκφραστα) ou “insondables” (ἀνεξερεύνητα) mystères renvoient aux passages de l’Épître de Paul aux Romains (11:33): “Ô abîme de la richesse, de la sagesse et de la science de Dieu! Que ses décrets sont insondables et ses voies incompréhensibles!”21 et à sa première Épître aux Corinthiens (A, 2:8, “Ce dont nous parlons au contraire, c’est d’une sagesse de

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13 Id. 237,16-22 (D 5.22) pántos Δεσπότην … τὸν πρὸ αἰώναν ἐκ Πατρός γεννηθέντα, τὸν Δημιουργὸν πάσης κτίσεως, τὸ ἐκ τοῦ φωτὸς ἀληθινὸν φῶς, τὸν ἐκ Θεοῦ Θεόν καὶ πρὸς τὸν Θεόν ἀεὶ ἄντα, ἐκ’ ἐσχάτουν δὲ τῶν ἡμερῶν διὰ τῆς ἐνδόξου Θεοτόκου καὶ ἀειπαρθένου Μαρίας ἐνανθρεύνητα διὰ τὴν ἤμετραν σωτηρίαν, τὸν Κύριον ἡμῶν Ιησοῦν Χριστόν.
14 Ἰδ. 205,15-16 (D 1.11) τὴν εἰς ἡμᾶς μετατόμον φυλακαριστηκατ τοῦ Θεοῦ.
15 Ἰδ. 202,19 (D 1.11); 219,22-23 (D 3.1); 244,6-7 (D 7.3) τὴν ὑπεράγασθαν τοῦ Θεοῦ ἀγαθότητα.
16 Ἰδ. 213,9-10 (D 2.1) Πᾶσας δόσις ἀγάθη καὶ πᾶν δόριμα τέλειον, ἀνυψθὲν ἐστὶ καταβαίνων ἀπὸ τοῦ πατρὸς τῶν φῶντων.
17 Ἰδ. 219,20 (D 3.1) τὴν ὑπεράγασθαν σωμάτων τοῦ Δημιουργοῦ τῶν ὅλων.
18 Ἰδ. 219,20 (D 3.1) τὴν ὑπεράγασθαν σωμάτων τοῦ Δημιουργοῦ τῶν ὅλων.
19 Ἰδ. 219,20 (D 3.1) τὴν ὑπεράγασθαν σωμάτων τοῦ Δημιουργοῦ τῶν ὅλων.
20 Ἰδ. 219,20 (D 3.1) τὴν ὑπεράγασθαν σωμάτων τοῦ Δημιουργοῦ τῶν ὅλων.
21 Ἰδ. 219,20 (D 3.1) τὴν ὑπεράγασθαν σωμάτων τοῦ Δημιουργοῦ τῶν ὅλων.

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Dieu, mystérieuse, demeurée cachée.”; 2:9: “mais, comme il est écrit, [nous annonçons] ce que l’œil n’a pas vu, ce que l’oreille n’a pas entendu, ce qui n’est pas monté au cœur de l’homme, tout ce que Dieu a préparé pour ceux qui l’aiment.”)\(^{22}\)

Ces passages furent commentés par les Pères de l’Église.

Quant à la phrase, “Que tes œuvres sont en grand nombre, ô Éternel! Tu les as toutes faites avec sagesse,”\(^{23}\) c’est un passage du Psaume 103.

Stéphanos souhaite “que nous soyons rendus capables de faire jaillir des fleuves d’eau vive par la grâce de notre Seigneur Jésus Christ,”\(^{24}\) pour que ses auditeurs puissent comprendre ses discours. Ceci renvoie aussi au passage de l’évangile selon Jean (Jn 7,38: celui qui croit en moi; selon le mot de l’Écriture: De son sein couleront des fleuves d’eau vive.)\(^{25}\) Encore un passage commenté plusieurs fois par les Pères de l’Église.

On remarque, donc, que Stéphanos ne cite pas n’importe quels passages du Nouveau Testament, mais il en choisit ceux qui furent l’objet de commentaires extensifs par la plupart de Pères de l’Église qui précédèrent son époque; il en résulte que Stéphanos connaissait leurs œuvres principaux.

Le motif terminal des “Prières,” surtout à la fin de chaque Discours, est une phrase glorifiant les personnes de la Sainte Trinité, comme par exemple, “Afin qu’eux aussi glorifient avec nous ton Nom digne de tout honneur et de toute gloire, Père, Fils et Saint-Esprit, maintenant et toujours et dans les siècles des siècles.”\(^{26}\) Il s’agit d’une phrase prononcée à la Liturgie de St Jean Chrysostome.

Dans un de ses Discours Stéphanos s’adresse à son auditoire en le traitant “ouailles sacrées” (ἱερὰ ποίμνη). Avec ses paroles Stéphanos exhorte ces “amoureux de la sagesse” (σοφίας ἔρασται), de lutter contre eux-mêmes et de se parer avec les parures des vertus, de s’arroser par le flux abondant des larmes s’appuyant sur “la foi,
l’humilité et l’amour de Dieu.«

Tout cela indique un encouragement pour atteindre une perfection morale et s’est basé sur des passages relatifs des textes patristiques qui se réfèrent à ceux “qui luttent dans la vie” pour arriver à la perfection par l’acquisition de toutes les vertus, afin d’obtenir la sagesse parfaite. Les Pères considèrent comme de très grandes vertus l’humilité et les larmes, qui –comme ils disent– peuvent effacer de grands péchés.

Stéphanos s’adresse à ses auditeurs en les encourageant à contempler de leurs “yeux intellectuels … la lumière-là au dessus de chaque lumière” et aussi à s’écarter de “toutes les œuvres du monde;” de plus, il les exhorte à rechercher “la mort volontaire” par mortification de tout leur corps. Comment peut-on mortifier le corps? Comme St Grégoire de Nysse dit, “la mort du corps est l’extinction des organes de sensation et la dissolution aux éléments affines.” C’est-à-dire, Stéphanos appelle ses auditeurs à mener leur vie sans s’intéresser aux stimulations de leur organes de sensation. C’est ainsi qu’ils pourront s’échapper au niveau matériel de la destruction et remonter jusqu’au niveau spirituel de l’incorruptibilité, c’est-à-dire de l’immortalité; et s’y intégrer. Parce que, selon les Pères, il n’y a pas d’autre moyen pour que notre corps devienne immortel que par sa communion avec l’immortel.

Dans un autre passage Stéphanos souhaite “de s’unir et de s’approprier par la foi et l’amour à Dieu Verbe,” pour “que nous soyons remplis de la grâce divine et devenir ainsi la résidence de Dieu, que nous jouissions de la lumière douce de Dieu.” Dans son Épître St Barnabas dit que “la résidence de notre cœur est une église sainte de Dieu” et que “dans notre résidence Dieu réside vraiment en nous.”

Ici Stéphanos recommande encore: “et aimer le Seigneur notre Dieu de toute notre âme, de tout notre esprit et de tout notre cœur.” Il s’agit d’un passage de l’évangile

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27 Id. 214,8-15 (D 2.4) ὃ ἱερὰ ποίμνη καὶ σοφίας ἔρασται … διὰ τῆς τῶν ἄρτεων ἑπικοσμήσεως ἐν ἀνατολής ἀγωνίζονται, καὶ τῇ πολλῇ χορτίᾳ τῶν δακρύων ἐκδίδοντος ἐν πίστει καὶ ταπεινοφροσύνῃ καὶ ἐγκάτατον Θεοῦ.

28 Id. 241,33f. (D 6.13) Ἀν νοεροὶ δομασάτε τὰ ἀναρίθμητα καὶ ἀμήγανα τούτων κάλλη καὶ πρὸς τὸ φῶς ἐκέλευον τὸ ὑπάρ πᾶν φῶς ἀπεξίσθαι καὶ δυσμάς τὰ ἔργα τα χαίτα τοῦ χώς ἀποθέμενος καὶ τῶν προαιρετικῶν μελετήσας δάκρυντο, καὶ ὀλον τὸ ἐκατος σῶμα κατανεκρήσεις, ἐπὶ δὲ καὶ τὴν ἐκατος μυχῆν ἄρπημα τὸν ἔχον συγκομήσεις.

29 Gr. Nyss., Contra Eun. 2, M 45,545B: σῶματος … ἐστὶ πίστεως ἢ τῶν ἀιδεθηριῶν σβάτες καὶ ἢ πρὸς τὰ συγκεντρών σταυροῖς διάλυσις.

30 Id. 242,10-11 (D 6.14) διὰ πίστεως καὶ ἐγκάτατον ὑποληθήσει καὶ ἐκελεύθηκας τῷ Θεῷ Λόγῳ … τῇ συνοικίᾳ ἐμπληθήσεις κατοικητῆρι φίλοις ἀγαθοῖς, τῷ ἔχως τῷ ἐναπολαύσιμοις.

31 Barn. 6.15 νὰς ἄγος … τῷ κύρῳ τὸ κατοικητήριον ἡμῶν τῆς καρδίας 16.8 ἐν τῷ κατοικητῆρι ἡμῶν ἄλλος ὁ θεὸς κατοικεῖ ἐν ἡμῖν.

32 Id. 242,12-13 (D 6.14) καὶ αὐτὸν τὸν Κύριον καὶ Θεόν ἀγαπῆσαι ἐκ δόλης ψυχῆς καὶ ἐκ δόλης τῆς διανοίας καὶ ἐκ δόλης τῆς καρδίας.

THALES-DACALBO
Selon Matthieu qui renvoie à ceci du Deutéronome (Mt 22,37; Dt 6,5): “Jésus lui dit: Tu aimeras le Seigneur ton Dieu de tout ton cœur, de toute ton âme et de tout ton esprit.”

On se demande donc à quel titre Stéphanos adresse de tels conseils à son auditoire. D’après le récit de Jean Moschos dans son Pratum spirituale, lui-même et son ami, le Seigneur Sophronios, plus tard devenu patriarche orthodoxe de Jérusalem, pendant leur premier séjour à Alexandrie, ils sont allés “chez le philosophe Stéphanos, qui habitait à l’église de la Sainte Mère de Dieu, édifiée par le bienheureux Pape Euloge, surnommée de Dorothée.”

On peut donc se demander, à quel titre Stéphanos habitait dans un édifice appartenant à une église. Il est bien probable, qu’à cette époque-là Stéphanos était sous la protection du patriarche Euloge et c’est ainsi qu’on lui permit d’habiter là.

On doit mentionner ici, que la phrase initiale du texte final d’un Discours de Stéphanos “Trinité transcendant tous les êtres par ton excellence et ta suprême divinité” renvoie au commencement de la Prière de Sophrone à la cérémonie de la Grande bénédiction des eaux à la Théophanie.

Il en est de même pour un autre passage où Stéphanos dit: “tu glorifieras en trinité et unité le Fils Verbe Dieu, qui a accompli tout à fait sagement et convenablement le monde tout entier à partir des quatre éléments, et qui a paré le cycle de l’année avec les quatre conversions,” en le comparant à ceci de Sophrone: “Des quatre éléments tu composas la création, des quatre saisons tu couronnas le cycle de l’année.”

En outre, le passage de Stéphanos “Qui donc pourra chanter tes merveilles, Seigneur?” renvoie aussi à la Prière de Sophrone: “Tu es grand, Seigneur, tes œuvres sont admirables, et nulle parole ne suffira pour chanter tes merveilles.”

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33 Mt 22,37; Dt 6,5: ὁ δὲ (Ἰησοῦς) ἔφη αὐτῷ· ἀγαπήσεις κύριον τὸν θεόν σου ἐν ὅλῃ τῇ καρδίᾳ σου καὶ ἐν ὅλῃ τῇ ψυχῇ σου καὶ ἐν ὅλῃ τῇ δυναμίᾳ σου.
34 Jean Moschos, Pratum spirituale, ch. 77, M 87, 2929D: Απῆλθομεν ἐν μιᾷ εἰς τὸν οἶκον Στεφάνου τοῦ σοφίματος … ἔμεινεν δὲ εἰς τὴν ἀγίαν Θεοτόκον, ἣν ἐκοδόμησαν ὁ μακάριος πάπας Εὐλόγιος, τὴν ἐπομαξιμένην τῆς Δωροθέας.
35 Id. 207,37-208,1 (D 1.35) Τρίας ὑπερρύσεις καὶ ὑπερέραθες. Grande bénéédiction des eaux à la Théophanie, Prière de Sophrone, patriarche de Jérusalem: Τρίας ὑπερρύσεις, ὑπερέραθες. Τρίας ὑπερασπίζεται τῆς Δωροθέας.
36 Id. 223,11-15 (D 3.15) δοξάσεις τοὺς ἐν τριάδι καὶ μονάδι Υἱὸν Λόγον Θεόν, τὸν ἐκ τεσσάρων στοιχείων τὸν ἄπαντα κύριον τῶν τελεσιουργήσαντα παναύγωσε καὶ εὐφρενιζάτως, καὶ τετράσι τροπαίας κομίσαντα τὸν κύκλον τοῦ ἐναυτοῦ.
37 Bénédiction des eaux à la Théoph., Prière de Sophrone: Σύ ἐκ τεσσάρων στοιχείων τὴν κτίσιν συναρμόσας, τέταρτος καροῦ τὸν κύκλον τοῦ ἐναυτοῦ ἐστεφάνωσας.
38 Id. 237,8-9 (D 5.21) Τίς οὖν εἴπειν δυνήσεται πρὸς ὃμοιον τῶν θαυμασίων σου, Δέσποτα;
Le fait que Stéphanos s’inspira et emprunta le poème de Sophrone, pourrait signifier certaines choses:

Premièrement, Stéphanos d’Alexandrie est la même personne que Stéphanos le sophiste ou philosophe à Alexandrie.

Deuxièmement, il est bien probable que Sophrone écrivit son poème bien avant l’an 617, juste la date de la composition de l’œuvre de Stéphanos; et c’est ainsi que le poème de Sophrone lui fut connu. L’an 617 est donc un *terminus ante quem* pour le poème de Sophrone. Si Sophrone avait composé son poème pendant son premier séjour à Alexandrie avec Moschos et même plus tard, il aurait sûrement pu être connu à Stéphanos, qui alla à Constantinople vers l’an 612. Je suppose que tous les trois se trouvaient dans le milieu des patriarches orthodoxes d’Alexandrie, Euloge (581-608), Théodore Ier Scribon (608-610) et Jean V le Miséricordieux (610-621).

Troisièmement, Sophrone était très connu comme partisan ardent de l’Orthodoxie beaucoup d’années avant son élection comme patriarche de Jérusalem à la fin de sa vie (634-638): Par conséquent, Stéphanos, empruntant des passages du poème de Sophrone, il témoigne d’avantage de son attachement à l’Orthodoxie.

Quatrièmement, Stéphanos avait une forte inclination au mysticisme chrétien; c’est exactement cette qualité qui l’apparente encore plus à Sophrone.


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39 *Bénédiction des eaux à la Théoph., Prière de Sophrone: Μέγας εἶ, Κύριε, καὶ θαυμαστά τὰ ἔργα σου, καὶ οὐδεὶς λόγος ἐξαρκέσει πρὸς ὑμον τῶν θαυμάσιων σου.*
Maintenant on peut se poser une autre question: Est-ce que le patriarche de Jérusalem Sophrone s’identifie avec le personnage de Sophrone dont parla Stéphanos dans son *Traité apotélésmatique*?

Il faut se rappeler que Jean Moschos et Sophrone voyageaient ensemble pendant presque trente ans. Leur dernier lieu de résidence était Rome, où ils se réfugièrent après l’invasion des Perses en Égypte au mois de Septembre de l’an 616 et la résistance d’Alexandrie, qui avait comme résultat son siège pendant des mois et enfin sa chute par trahison.

Moschos mourut en Septembre de 619 à Rome. Son dernier souhait était que son corps soit transporté dans un cercueil en bois et qu’il soit enterré au Sinaï. En effet, Sophrone transporta le corps embaumé de Moschos de Rome à Ascalon, port de Palestine. Un tel voyage à travers la mer, au milieu de l’hiver, aurait pu durer au moins 20 jours. Sophrone, quand il arriva à Ascalon, constata qu’il était impossible de continuer son voyage jusqu’au Sinaï qui était déjà occupé par des barbares (l’Islam). Il continua donc son voyage aux Lieux saints occupés par les Perses, jusqu’au Monastère de St Théodose le Grand à Jérusalem, où il enterra le corps de Moschos en janvier de 620 et il resta là.

Questions importantes: Sophrone fit-il un voyage à Constantinople, où il se rencontra après bien des années (30 ans) avec Stéphanos, dont il fut l’un de ses disciples à Alexandrie en 581-584? Cette vieille relation entre maître et disciple, pourrait-elle expliquer l’intimité dont Stéphanos s’exprime en disant “j’ai mandé mon Sophrone” (τῷ ἐμῷ Σωφρονίῳ ἐνετειλάμην) dans son “*Traité apotélésmatique,*” quand Epiphanius, commerçant d’Arabie, demande à Stéphanos d’ordonner à un de ses disciples de “suspendre l’astrolabe” (τὸν ἀστρολάβον διαρτᾶν) et de noter les résultats de l’observation pour le calcul de l’horoscope de l’Islam? (Usener 1914, 272; Papathanassiou 1997; 2006, 189f.)

Je voudrais souligner ici que l’astrolabe était le meilleur instrument pour la détermination du temps avec grande précision aux observations astronomiques (Ptolémée, *Tetrabiblos*, III. 2); de plus, son usage était bien connu. En outre Sophrone suivi des leçons de médecine données par Stéphanos (le philosophe), commentateur des œuvres d’Hippocrate. Dans son œuvre “*Des airs, des eaux et des lieux*” Hippocrate explique l’influence des phénomènes astronomiques annuels à la santé et aux maladies des hommes et dit que la contribution de l’astronomie à la médecine est
On constate donc que l'utilisation de l'astrolabe n'était pas inconnue aux médecins et ce n'était pas du tout surprenant qu'un étudiant de la médecine s'en sert.

En tout cas, s'il s'agit vraiment de Sophrone, le futur patriarche de Jérusalem, est-ce que la connaissance de l'horoscope de l'Islam lui servirait-il, 16 ans après, en 637, à ses négociations avec le khaliph Omar pour la reddition de Jérusalem?

Après avoir étudié les "Prières" et prenant en considération les nouveaux éléments qui en résultent, je crois que l'opinion de W. Wolska-Conus, que j'avais, d'ailleurs, moi-même adoptée autrefois, selon laquelle Stéphanos renonça à l'Orthodoxie et se convertit au monothéisme du patriarche Serge, est erronée.

Ce qui s’est passé est exactement le contraire. Stéphanos a réussi à rester orthodoxe dans le milieu de Serge, quand celui-ci commençait ses activités pour introduire d’abord son “monoénergisme”. Il est évident que Stéphanos n’offrit pas son aide au patriarche Serge avec ses connaissances philosophiques, et c’est pour cela que Serge s’adressa à un moine d’Egypte. D’ailleurs, comment Stéphanos pourrait-il secourir Serge avec ses connaissances philosophiques et se convertir de nouveau, après avoir abandonné le monophysisme à cause des contradictions logiques qu’il a découvertes quand il était à Alexandrie?

On pourrait supposer que l’activité intense de Stéphanos, en tant qu’écritain, pendant ces années (Sur la chrysopée, Commentaire sur les tables faciles de Ptolémée éditées par Théon, et plus tard le Traité apotélésmatique) était assez dure pour son âge et il est bien probable que cela justifie la neutralité de son comportement. Donc, comme il évita de se convertir au monoénergisme d’une part et d’autre part il se rencontra probablement avec Sophrone, qui était toujours un adversaire ardent de Serge, tout cela aurait pu contribuer à l’omission de son nom après sa mort, étant donné que Serge resta au trône patriarchal encore seize ans.
PRIÈRES (Traduction)

Stéphanos d’Alexandrie, professeur œcuménique de philosophie et maître en ce grand et saint art “Sur la fabrication de l’or.” Avec l’aide de Dieu, premier discours.

1.1. [Id. 199,6-12] Après avoir chanté un hymne en l’honneur de l’Auteur de tous les biens, du Roi de l’univers et de son Fils unique, qui a procédé (rayonné) de Lui avant tous les siècles, avec le Saint Esprit, et après avoir supplié Dieu de nous illuminer avec la lumière de sa connaissance, nous commençons à cueillir les plus beaux fruits du traité de cette œuvre que nous avons entre les mains. Appliquons-nous à poursuivre les traces de la vérité. Pour l’instant, il faut construire le sujet en question à partir de la vraie science de la nature.

*1.6. [Id. 200,30-34] Je proclame la grâce du don de la lumière qui vient d’en-haut, qui nous est donnée de la part du Père des lumières. Écoutez, en tant qu’intellects égaux aux anges, rejetez la considération des choses matérielles, afin que vous soyez jugés dignes de voir avec les yeux de votre intelligence le mystère caché.

*1.10. [Id. 202,1-10] Écoutez, les amoureux de la sagesse, et vous connaîtrez les magnificences de Dieu Pantokrator (tout-puissant), car il est le pourvoyeur de toute sagesse, qui habite une lumière inaccessible; lumière, qui éclaire tout homme venant dans le monde. Car nous ne sommes rien sans sa puissance divine. Ce don que nous cherchons n’est absolument rien en comparaison de sa béatitude. Approchez-vous, ô amis de la vertu, de cet objet incorporel de votre désir. Apprenez comme elle est

2 Orig., Jo. 32.18, M 14.821C.
3 Clem. Rom., Epist. ad Corinth. I 23.1, M 1.199.
4 Dion. Areop., De div. nom. 1.4, M 3.464A.
5 Max., Schol. in Dion. Areop. Cœl. hier. 1.2, M 4.32A,B.
6 Euseb., Vita Const. 4.19, M 20.1168A.
7 1 Tim. 6,16: le seul qui possède l’immortalité, qui habite une lumière inaccessible, que nul d’entre les hommes n’a vu ni ne peut voir. Athénagore, Apologie des Chrétiens, trad. M. de Genoude: Car il (Dieu) est lui-même toutes choses, lumière inaccessible, monde parfait, esprit, puissance et raison. Gr. Naz., De filio orat. 30, 13.6, M 36.120; id. orat. 44.3, M 36.609B. Chrys., in Epist. I ad Timoth. orat. 18, M 62.595 et 62.597.
douce la lumière de Dieu. Les choses que l’on admire aujourd’hui ne sont rien à côté de cette merveilleuse bienheureuse destinée.

*1.11. [Id. 202,10-19] Apparentons-nous à Lui par l’amour, et de Lui nous recevrons notre part de la sagesse insondable qui jaillit de l’abîme, afin que par la grâce de notre Seigneur Jésus-Christ nous soyons rendus capables de faire jaillir des fleuves d’eau vive,10 si bien que, par admiration pour la si grande sagesse du Créateur, tu puisses chanter un hymne à sa grande philanthropie11. Pourquoi faut-il admirer la forme du corail d’or? Il faut admirer davantage la beauté incirconscriptible de Dieu. Cependant je remplirai votre désir, afin que vous soyez rendus dignes de L’aimer au point de prêcher avec des hymnes la bonté sublime12 de Dieu.

*1.34. [Id. 207,30-37] Ô mystères inexprimables de la sagesse de Dieu! Ô dons pleins de richesse pour ceux qui aiment le Seigneur! Ô abîme de la richesse, de la sagesse et de la science des mystères!13 Si ces choses du temps présent sont merveilleuses et extraordinaires, combien plus celles de l’éternité que nul intellect ne peut expliquer? Si cette opération matérielle est pour nous l’object d’un discours en quelque sorte ineffable, combien plus les biens absolument purs et les beautés inscrutables et que nulle force ne peut contempler?

*1.35. [Id. 207,37-208,3] Je te loue, je t’adore, je te glorifie, Trinité transcendant tout les êtres par ton excellence et ta suprême divinité.14 Qui peut proclamer quelque chose qui approche de la louange de tes merveilles? Que tes œuvres sont en grand nombre, ô Eternel! Tu les as toutes faites avec sagesse.

10 Jn 7,38: celui qui croit en moi; selon le mot de l’Écriture: De son sein couleront des fleuves d’eau vive. Gr. Nyss., In Cant. canticorum, hom. 9, M 44.977B.
11 Chrys., Hom. 78.4 in Mt., M 58.756A. Clem. Alex., Protr. 10, M 8.204B.
12 Dion. Areop., De div. nom. 2.4, M 3.641A.
13 Épitre aux Romains 11:33 Ô abîme de la richesse, de la sagesse et de la science de Dieu! Que ses décrets sont insondables et ses voies incompréhensibles! Clem. Alex., Strom., 5,12,80,4, M 9.120A. Corinth. I, 2:6-8, Pourtant c’est bien de sagesse que nous parlons parmi les parfaits, mais non d’une sagesse de ce monde … Ce dont nous parlons au contraire, c’est d’une sagesse de Dieu, mystérieuse, demeurée cachée. Theodoret., De providentia, or. 10, M 83.740.
14 Bénédiction des eaux à la Théop., Prière de Sophrone: Trinité transcendant tous les êtres par ton excellence et ta suprême divinité, Tout-puissant qui vois tout, Invisible que nul ne peut saisir, Créateur des êtres spirituels et doué de raison, pure essence du Bien, Lumière inaccessible qui, venant dans le monde, illumine tout homme, éclaire-moi aussi, ton indigne serviteur; illumine les yeux de mon intelligence, afin que j’ose célébrer tes bienfaits et ta puissance infinis…
15 Ps. 104,24: Que tes œuvres sont en grand nombre, ô Eternel! Tu les as toutes faites avec sagesse.
Du même Stéphanos sur l’œuvre intitulé “En l’action;” avec l’aide de Dieu, deuxième discours.

2.1. [Id. 213,9-27] Tout don excellent, toute donation parfaite vient d’en haut et descend du Père des lumières. Eh bien, nous avons invoqué Jésus, lumière paternelle, Étre vrai, lumière de lumière, qui éclaire tout homme venant dans le monde. Car c’est Lui qui est la lumière, la vérité et la vie, le Verbe divin de Dieu, la sagesse et la force, capable de tout faire et indicible de Dieu, le Verbe vivant du Père, le Verbe était Dieu et le Verbe était toujours avec Dieu, tout fut par lui. C’est Lui qui confère la lumière aux croyants pour qu’ils aient la connaissance des êtres et qu’ils chantent les merveilles de Dieu pantokrâtor; car c’est Lui le bienfaiteur et le Sauveur du monde. Qu’Il illumine notre esprit et notre cœur et qu’Il fasse rallumer le flambeau en nous, resplendissant en nous les profondeurs inextricables de sa connaissance et de sa sagesse en vue de la vraie et droite connaissance qui consiste à Te connaître, Toi, notre seul Dieu vivant et vrai, la sainte et consubstantielle Trinité et le Père vivifiant tout, le Fils et le Saint Esprit, maintenant et toujours et pour les siècles des siècles. Amen.

2.4. [Id. 214,8-15] Mais, ô ouailles sacrées et vous amoureux de la sagesse, vous qui voulez découvrir ce mystère tâchant de concevoir Dieu, luttez contre vous-mêmes par la parure des vertus, et arrosez-vous par le flux abondant des larmes.

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17 Orig., Hom. 9.4 in Jer., M 13.337A. Gr. Nyss., Contra Eun. 8, M 45.775B.

18 Orig., De cœl. hier., 1.2, M 3.121A.

19 Clem. Alex., Strom. 5.13, M 9.125A; ib. 1.4, M 8.717A. Gr. Nyss., Contra Eun. 3, M 45.612D.

20 Orig., Exp. in Pr. 9.1, M 17.185B; id. adnot. in Dt. 16:19f., M 17.28B. Clem. Alex., Strom. 7.2, M 9.412A.


22 Symbole de la foi: et par lui tout a été fait.


24 Basil., De spiritu sancto, 18,47,1-7,17-19, M 32.153A,B.

25 Orig., orat. 11.2, M 11.449A.

26 Orig., Jo. 32.15, M 14.780D.
s’appuyant sur la foi, l’humilité et l’amour de Dieu, pour que rien des choses matérielles ne vous étonne ni n’attire votre admiration, sauf Dieu qui vous a aimés.

2.20. [Id. 219,1-14] Il y a un grand mystère en cela et on voit se produire des choses extraordinaires. Pleins d’admiration on chantera Dieu Père pantokratôr, ainsi que sa sagesse toute puissante, et son Esprit vivifiant. Car le Verbe de Dieu tout parfait et dominant porte en soi tout par la force de sa parole. Que ce Verbe illumine notre intelligence et notre cœur, afin de nous approprier à la lumière vraie de sa connaissance et nous appartenir à elle par son amour. Illuminés ainsi par la vraie lumière nous puissions connaître les êtres, et contempler les œuvres de Dieu de l’univers, afin qu’il soit glorifié ton Nom digne de tout honneur et de toute gloire, Père, Fils et Saint-Esprit, maintenant et toujours et dans les siècles des siècles. Amen.


3.1. [Id. 219,18-220,6] Qui est le bienheureux qui puisse agréer les jugements de Dieu pantokratôr? Qui est si savant et sage pour raconter la sagesse insondable du Créateur de tout? Qui est si heureux pour comprendre les puissances de Dieu universel qui surveille tout et le glorifier pour sa bonté sublime? D’une part, il m’est bien évident de parler facilement, infailliblement et aisément; j’examine clairement les idées énigmatiques des prédécesseurs à l’aide de Dieu pantokratôr. D’autre part, il semblerait bon pour vous, en tant que prudents, de reconsidérer vos idées pour adhérer à ce qui a été admis par nombre de savants, pour pouvoir agréer leurs idées. Vous pourrez ainsi passer à mon petit œuvre très bref, demandant à notre unique vrai

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27 Athan., De virgin. 17, M 28.272B. Just. dial. 90,5, M 6.692A. Chrys., Anna 3.1, M 54.721E; id. hom. in Mt, M 57.68.
28 Athan., Exp. Ps. 85:1, M 27.373C.
30 Pss. Sal. 18.3. Gr. Nyss., Contra Eun. 3, M 45.601D.
31 Dion. Areop., De div. nom. 4.1, M 3.693B. Gr. Nyss., Vita Mos. 7, M 44.301A. Chrys., Hom. 13.6 in Mt, M 57.215; id. hom. 78.4 in Mt, M 58.715.

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Dieu d’illuminer l’œil de votre intelligence\textsuperscript{32} et faire briller vos cœurs par sa lumière immatérielle dans le but de connaître la domination de Dieu pantokrатор et sa gloire, souhaiter de Le rencontrer dans votre cœur purifié et de chanter les magnificences de Dieu de tout et glorifier le Nom très saint et digne de toute gloire, du Père, du Fils et du Saint-Esprit, maintenant et toujours et dans les immenses siècles des siècles. Amen.

3.15. [Id. 223,5-19] Car, si tu transformes les corps incorporels en corporels et les corporels en incorporels, tu travailleras efficacement, facilement et admirablement; c’est-à-dire, tu dois atteindre le but de ton désir au prix de ta peine: étudier le corps qui se compose de quatre éléments,\textsuperscript{33} le traitement ternaire et le mouvement des conversions aux douze signes du zodiaque. Ils existent sept astres appelés planètes dans une unique union extrême des corps, des formes et des contemplations. Tu glorifieras pour cela le Fils Verbe Dieu en trinité et unité, qui a accompli tout à fait sagement et convenablement le monde tout entier à partir des quatre éléments, et qui a paré le cycle de l’année avec les quatre conversions,\textsuperscript{34} et qui après les sept aions il fera entrer ceux qui ont vécu de manière digne, à son repos\textsuperscript{35} au royaume infini du ciel, faisant l’hymne de la lumière unique et inconcevable de la Trinité, dans le Père, le Fils et le Saint-Esprit, maintenant et toujours et dans les siècles des siècles. Amen.

Du même Stéphanos philosophe; avec l’aide de Dieu, quatrième discours.

4.29. [Id. 231,1-5] Ayant acquis cette vertu nous viendrons à la lumière douce de Dieu et apprendrons la si grande sagesse de la grâce à partir de Lui, qui étonne et brille en ceux qui ont cru à Lui, Jésus notre Dieu.

Du même Stéphanos philosophe; avec l’aide de Dieu, cinquième discours.

*5.1. [Id. 231,8-14] Je chante, je glorifie et je rends grâces à Dieu l’indicible, le Père de la sagesse et de la vérité, le dispensateur de la vie et de la lumière, la cause de tout

\textsuperscript{32} Chrys., Or. 54 in Mt., M 58.536. Bénédiction des eaux à la Théoph., Prière de Sophrone: illumine les yeux de mon intelligence.
\textsuperscript{33} Gr. Nyss., Imag., M 44.1328B.
\textsuperscript{34} Grande bénédiction des eaux à la Théophanie, Prière de Sophrone: Des quatre éléments tu composas la création, des quatre saisons tu couronnas le cycle de l’année
\textsuperscript{35} Bas. h. myst. 60.
et au delà de tout,

et à son Fils unique (monogène) qui est issu de Lui, ainsi qu’à l’Esprit divin de la vérité qui procède de Lui, pour terminer sous sa guidance ce sixième ouvrage qui est entre nos mains.

5.2. [Id. 231,8-14] Que cela soit le préambule selon notre coûtume. Les leçons qui nous conduisent des choses matérielles aux choses immatérielles, et des choses composées aux choses simples et non composées parées par l’inspiration divine, sont des exercices de l’âme; car ce sont des pensées et des sujets de philosophie. Telle est la méthode, telles sont les leçons. Tel est le but, tel est la proposition qui maintenant met fin aux idées théoriques. Tel est le discours qui accomplit la pratique. Telle est la méthode, telles sont les leçons. Que la richesse de la grâce est grande! Que les trésors de la sagesse indicible sont nombreux! Que les dons sont inénarrables! Que les eaux de cette pratique sont des fleuves d’eau vive! Que l’abîme est source de la sagesse de Dieu! Que la venue du Saint Esprit est une lumière très pure!

5.3. [Id. 231,26-232,3] Rien n’est supérieur à la sagesse; car c’est par elle que le Verbe dominant de Dieu a tout créé; c’est par elle qu’Il a paré les illuminations nobles des intelligences célestes; c’est par elle que le paradis spirituel a été préparé pour la jouissance des êtres qui vivent éternellement; c’est par elle qu’Il a préparé pour nous le Royaume des Cieux. Comment donc pourrons-nous nous élever vers la sagesse? Comment pourrons-nous nous apparaître à elle? Comment revêtirons-nous sa tunique incorruptible? Seule l’amour de Dieu nous attire vers la passion de la sagesse.


36 Clem. Alex., Strom., 1.28.177, M 8.924A,B.
38 Dion. Areop., De cœl. hier. 10.1, M 3.273A.
39 Bénédiction des eaux à la Théoph., Prière de Sophron: Tu es grand, Seigneur, tes œuvres sont admirables, et nulle parole ne suffira pour chanter tes merveilles.

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magnificences sont grandes, Sauveur! Que ta philanthropie est grande, Seigneur! Que la pitié de ta bonté est riche! Que tes dons sont source de toute sagesse!

5.22. [Id. 237,16-31] Je te chante et te glorifie Seigneur de tout, né du Père avant tous les siècles, Créateur de toute création, lumière vraie, née de la lumière, Dieu né de Dieu et étant toujours avec Dieu, et aux derniers jours le même engendré pour notre salut de Marie, la glorieuse Mère de Dieu et toujours vierge, notre Seigneur Jésus Christ, notre vrai Dieu. Car il n’y a plus rien à ajouter à Toi, qui es complet et qui veux toujours faire du bien à tous. Ni vie, ni mort, ni ange, ni les choses présentes dont il est question, ni principes, ni puissances, ni encore les choses présentes et celles à venir ne nous sépareront pas de ton amour, Jésus Christ, notre Dieu. C’est par celui-ci que nous adressons au Père gloire, honneur, louange, et majesté, avec son très saint et adorable et vivifiant Esprit, dans tous les immenses siècles des siècles. Amen.

Du même Stéphanos philosophe œcuménique; sixième discours sur l’œuvre intitulé “Sur la division de l’art sacré.”


6.12. [Id. 241,24-33] Des contemplations sensibles passe maintenant aux contemplations intellectuelles et vois le bon ordre immatériel des êtres célestes. Toi, ayant contemplé leurs nobles apparences et ayant levé la pensée au dessus de la matière, ayant compris la grande et très brillante gloire et félicité des anges, ne retourne plus à la formation matérielle d’une vulgaire fabrication d’or, mais attache ce

40 Symbole de la foi: ... créateur du ciel et de la terre, de l’univers visible et invisible. Je crois en un seul Seigneur, Jésus-Christ, le Fils unique de Dieu, né du Père avant tous les siècles; Il est Dieu, né de Dieu, lumière, née de la lumière, vrai Dieu, né du vrai Dieu, Engendré, non pas créé, de même nature que le Père, et par lui tout a été fait. Pour nous les hommes, et pour notre salut, il descendit du ciel; Par l’Esprit Saint, il a pris chair de la Vièrge Marie, et s’est fait homme.
travail aux principes de la philosophie et découvre cette technique dans le traité que tu as devant les yeux. Pourtant élève tout ton intellect en haut et fais-le s’envoler lumineux, ressemblable aux substances les plus élevées.

6.13. [Id. 241,33-242,9] Si toi, après avoir contemplé et admiré par des yeux intellectuels leur beautés innombrables et extraordinaires et vers cette lumière-là au dessus de chaque lumière, et après avoir écarté de toi toutes les œuvres du monde et avoir recherché la mort\footnote{Gr. Nyss., \textit{Contra Eun.} 2, M 45.545B.} volontaire, après avoir fait mourir tout ton corps, et en plus avoir nié tout ton âme\footnote{Gr. Nyss., \textit{De hom. opif.} 29.3, M 44.236B; id. \textit{Orat. catech.} 37, M 45.93C; id. \textit{De anim. et res.}, M 46.29B.}\footnote{Basil., \textit{Hom. in Ps.} 44, M 29.392A. Gr. Nyss., \textit{Hom. 5 in Cant.}, M 44.857D.}, avoir chanté et glorifié avec des hymnes incessants le Roi de tout et Seigneur de la gloire, après avoir frissonné de peur extrême devant la force toute-puissante, tu comprendras sa bonté sublime. La langue est saisie de vertige et l’intelligence ne peut pas expliquer du tout, comment tout est produit par sa sagesse indicible; et tu ne pourras pas assumer ni explorer du tout ni exprimer les magnificences de Pantokratôr.

6.14. [Id. 242,9-21] Ayant conçu tout cela en nous-mêmes, hâtons-nous, mes frères, de s’unir et de s’approprier par la foi et l’amour\footnote{Mt 22,37 (Dt 6,5): Jésus lui dit: Tu aimeras le Seigneur ton Dieu de tout ton cœur, de toute ton âme et de tout ton esprit.} à Dieu Verbe, qui nous a aimés; et aimer le Seigneur notre Dieu de toute notre âme, de tout notre esprit et de tout notre cœur.\footnote{Barn. 6.15; ib. 16.7; ib. 16.8.} Ayant admiré ce trésor de la vie que nous glorifions toujours sous n’importe quelle condition ou lieu, nous pourrons ainsi nous réjouir de la théologie et nous serons dignes de la relation avec Dieu. Nous serons remplis de la grâce et constituerons la résidence de Dieu\footnote{Clem. Alex., \textit{Protr.} 9, M 8.197A. Euseb., \textit{Dem. evang.} 4.6, M 22.214C. Lit. Marc. (Brightman p. 135.19).}; par conséquent nous jouirons de sa douce lumière. Précipitons-nous vers cette lumière qui illumine toute créature rationnelle, qui brille et éclaire\footnote{Clem. Alex., \textit{Protr.} 9, M 8.197A. Euseb., \textit{Dem. evang.} 4.6, M 22.214C. Lit. Marc. (Brightman p. 135.19).} les sens, les cœurs et les intelligences de tous ceux qui aiment le Seigneur.
6.15. [Id. 242,22-32] Plaise à Dieu que nous aboutissions au port de sa volonté par la foi et l’amour de Dieu, afin de jouir de biens éternels, par la grâce et la philanthropie du Fils unique de Dieu, avec Lui, l’incorruptible, qui est la cause de tout, Dieu Roi et Père de tout, ainsi que l’Esprit très saint, adorable et vivifiant, inspirant de sa grandeur, respect, domination, adoration, honneur, gloire, magnificence, hymne éternel avant le début de tous les siècles et après toute l’éternité, et maintenant et toujours et dans tous les siècles éternels des siècles. Amen. 

Du même philosophe Stéphanos, Enseignement en présence de l’Empereur Héraclius; avec l’aide de Dieu, septième discours.

7.1. [Id. 243,4-23] Dieu sans commencement et Tout-dominant, bon par nature au dessus de la bonté, au caractère bienveillant, inconcevable et incompréhensible, Dieu universel et Pantokratôr, le Démiurge de toute la création, après avoir fait passer tout de l’inexistance à l’existence et avoir construit tout par sa gloire, sa volonté, sa puissance et sa sagesse, Il a crée l’homme à son image et à sa ressemblance, raisonnable, intellectuel et libre, et Il l’a établi comme roi de toute la création. Dieu Pantokratôr et Souverain des souverains, t’a établi empereur œcuménique sur la terre entière pour détenir le pouvoir sur toutes les autres créatures bienveillement et scrupuleusement. Ce Dieu pantokratôr t’a accordé sa faveur faisant un signe de sa main droite compréhensive et créatrice. De sa source inépuisable ont germé à toi toutes les joies et tous les dons benevoles. Il t’a inspiré des idées multiformes de bienfaisance et t’a révélé ainsi la sérénité bénie et la piété exprimée par des activités variées, te rendant son serviteur digne et confesseur de foi en Dieu vrai et unique et en Jésus Christ, le Fils de Dieu vivant, qu’Il a envoyé sur terre.

7.2. [Id. 243,23-244,3] Il est donc vraiment équitable, ô roi couronné par Dieu, d’accourir avec bienveillance, amour sincere et crainte de Dieu, pour pouvoir par la

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47 Clem. Alex. fr. 44. Jo. D., Hom. 2.7, M 96.588B.
50 Basil., De struct. hom. 1.16, M. 30.24D.
51 Gr. Nyss., Orat. catech. 21, M. 45.57C.
grâce de notre Seigneur Jésus Christ faire jaillir des fleuves d’eau vive et hériter ce grand désir de s’installer à droite de Dieu. Aucune créature qui est à présent vue et admirée n’est digne dans tel aboutissement serein. Pourvue qu’on s’apparête à Lui par l’amour et recevoir de la source insondable qui sort de l’abîme d’où jaillit la pitié de nous. Ce que l’œil n’a pas vu, ce que l’oreille n’a pas entendu, ce qui n’est pas monté au cœur de l’homme, tout ce que Dieu a préparé pour toi et tes ressemblants, ainsi que pour ceux qui l’aiment depuis la création du monde. Dieu qui est digne de glorification, d’honneur et de magnificence, Père, Fils et Saint-Esprit, dans les siècles des siècles et au-delà de l’éternité. Amen.

7.3. [Id. 244,3-9] Je reviendrai de nouveau à ce sujet et je m’efforcerai d’accomplir ton désir, ô roi excellent en tout. Je manifesterai mon discours, pour que tu sois jugé digne d’aimer, de disserter de la divinité et de chanter la bonté sublime de Dieu, après avoir rejété la multitude des choses matérielles pour t’orienter compatissant vers la passion pour Dieu.

52 1 Épître aux Corinthiens 1, 2:9: mais, comme il est écrit, [nous annonçons] ce que l’œil n’a pas vu, ce que l’oreille n’a pas entendu, ce qui n’est pas monté au cœur de l’homme, tout ce que Dieu a préparé pour ceux qui l’aiment. Basil., De paradiso orat. 3, 7B, M 30.68C.
PRIÈRES (Texte grec)

Στεφάνου Αλεξιμάθης οἰκουμενικός φιλοσόφος και διδασκάλου τῆς μεγάλης καὶ ἱερᾶς ταύτης τέχνης Περὶ χρυσοποιίας: πράξεις σὸν Θεὸ πρῶτη.

1.1. [Id. 199,6-12] Θεὸν τὸν πάντων ἁγαθῶν αἰτιόν καὶ βασιλέα τῶν ὅλων, καὶ τὸν ἐξ αὐτοῦ πρὸ τῶν αἰῶνων ἐκλάμψαντα 1 μονογενῆ υἱὸν σὺν τῷ Ἁγῷ Πνεύματι ὑμνήσαντες, καὶ τὸ τῆς αὐτοῦ γνώσεως φῶς ἑλλαμφθήναι ἡμῖν καθικετεῦσαντες, τῆς ἐν χερσὶ πραγματείας τοῦτο τοῦ συγγράμματος ἀπαρξώμεθα τὰ κάλλιστα δρέπεσθαι καὶ τὰ ἀληθῆ ἀνιχνεύειν ἐπιστοσάμεθα. Νυνὶ δὲ ἐκ τῆς ἀληθοῦς φυσικῆς θεωρίας κατασκευαστέον τὸ πρόβλημα.

1.6. [Id. 200,30-34] Όμολογῶ 2 τῆς ἀνωθέν φωτοδοσίας 3 τὴν χάριν, 4 ἕπερ τοῦ πατρὸς τῶν φῶτον ἡμῖν διδόμει. Ακούσατε ὡς ἵσαγγελοι 5 νόες. Απόθεσε τὴν ὑλώδη θεωρίαν, ὅπως τοῖς νοεροῖς 6 ύμων ὀφθαλμοῖς ἱδεῖν ἀξιωθῆτε τὸ ἀποκεκρυμμένον μυστήριον.

1.10. [Id. 202,1-10] Ακούσατε οἱ τῆς σοφίας ἐρασται, καὶ εἴσερθε τὰ μεγαλεία τοῦ παντοκράτορος Θεοῦ: αὐτὸς γὰρ ἐστὶν ὁ πάσης σοφίας χορηγός: φῶς οἰκῶν ἀπρόσιτον 7 φῶς, ὃ φωτίζει πάντα ἀνθρωπον ἐρχόμενον εἰς τὸν κόσμον; 8 οὐδέν γὰρ

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2 Orig., Jo. 32.18, M 14.821C: χάριτας ὁμολογούμεν τῷ Θεῷ οὕσι πολλῷ μετίσσει τῆς ἡμετέρας αἰξίας.
3 Dion. Areop., De div. nom. 1.4, M 3.464A: τῆς ... νοετῆς αὐτοῦ φωτοδοσίας ἐν ἀπαθεί καὶ ἀδύν τῷ νόσ μετέχοντες.
ἐσμέν ἄτερ τῆς αὐτῶν θεαρχίας. Οὐδὲν διὸς ἔστι τὸ ζητοῦμεν τούτῳ δόρον πρὸς τὴν αὐτῶν μακριότητα. Προσεγγίσατε, ὃ φιλοὶ ἄρετῆς, πρὸς τὴν άουλον ἐκείνην ἐφεσιν. Μάθετε ὡς γλυκὸ Θεοῦ φῶς. Οὐκ ἀξία τὰ νῦν θαυμαζόμενα πρὸς τὴν μακριάν ἐκείνην λήξιν.

1.11. [Id. 202,10-19] Μόνον οἰκειωθόμενοι αὐτῷ δι’ ἀγάπης καὶ ληψόμεθα παρ᾿ αὐτῶ τὴν ἐξ ἀβύσσου ἄριστου πηγάζουσαν σοφίαν, ἵνα δυνηθῶμεν διὰ τῆς χάριτος τοῦ κυρίου ἤμων Ἱησοῦ Χριστοῦ ποταμοῦ ἀναβλύσαι ὄδας τοῦ ζῶντος. Όπως θαυμάσας τὸν Δημιουργὸ τὴν τοσαύτην ὑμνήσας αὐτῶ τὴν εἰς θέμας μεγάλην φιλανθρωπίαν. Τι θαυμάζεις δεῖ χρυσοκόραλλον εἶδος; Θαυμάζεις δε δεῖ πλέον τὸ ἀπερήγατον κάλλος. Ὅμοιος καὶ τὸν πόθον ήμῶν πληρόως, ἵνα τοσοῦτον ἐρὰν ἀξιωθῆτε μεθ’ ὑμνοδιας θεολογεῖν τὴν ὑπεράγαθον τοῦ Θεοῦ ἀγαθότητα.

1.34. [Id. 207,30-37] Ω σοφίας Θεοῦ ἀνέκφραστα μυστήρια! Ω πλούσια δωρεαί τοῖς ἡγασμῆσι τὸν Κύριον! Ω βάθος πλούτου καὶ σοφίας καὶ γνώσεως μυστηρίων! Εἰ τὰ

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Χριστοῦ ... ὃς μακριός καὶ μόνος δυνάστης, ὁ βασιλεύς τῶν βασιλευόντων, καὶ Κύριος τῶν κυριεύοντων, ὁ μόνος ἔχον ἀθανασίαν, φῶς οὐκών ἀπρόσιτον, διὰ εἰδων οὐδεὶς ἀνθρώπων, οὐδὲ ἐπετί δύναται, ὃ τιμὴ καὶ κράτος αἰώνιον, Λεμ. id. orat. 18.1, M 62.597, ἵνα τὸ ἀκατάληπτον τῆς θείας φύσεως παρατηρήσῃ, φῶς οὐκίκεν αὐτῶν εἶπεν ἀπρόσιτον.


10 In 7.38: ὃς πιστεύει εἰς ἐμέ, καθὼς εἶπεν ἣ γραφή, ποταμὶ ἕκα τῆς κοιλίας αὐτοῦ ἐκυψοῦσαν ὄδας τὸ ζῶντος. Gr. Nyss., In Cant. canticorum, hom. 9, M 44.977B: τὸν μὲν τῆς προφητείας λέγοντος ἐκ προσψίν τοῦ Θεοῦ ἄγατον κατατάξαν τηγὴν ὄδας τὸ ζῶντος, πῶλον δὲ τοῦ Κυρίου πρὸς τὴν Σαμαρείτικα παλάντος Εἰ ἄφθειας τὴν δοξαλίαν τοῦ Θεοῦ καὶ τὸς ἐστὶν τὸ λέγων σου. Δός μοι παίδων, καὶ εἰ ἔσταις αὐτῶν καὶ ἐδύνασθαι εἰς ζῶντας καὶ ἐπὶ τῆς νύμφης, ἀργυρίῳ πρὸς μὲ καὶ πετάνω ὁ γὰρ πιστεύων εἰς ἐμέ, καθὼς εἶπεν ἦ γραφή. ποταμὶ ἕκα τῆς κοιλίας αὐτοῦ ἐκυψοῦσαν ὄδας τὸ ζῶντος. Τούτῳ δὲ ἔλεγε περὶ τοῦ Πνεύματος τοῦ ἑμελλόν λαμβάνειν οἱ πιστεύουσαι εἰς αὐτόν. Chrys., Hom. 78.4 in Mt., M 58.756A: φαλάνθρωπός γὰρ ἐστιν ὁ δοσότης, καὶ τῆς ἐσθίατος αὐτοῦ τὸ δόρον γίνεται. Clem. Alex., Protr. 10, M 8.204B: Ὁ γὰρ θεὸς ἐκ πολλῆς τῆς φαλάνθρωπιας ἀνέχεται τοῦ ἀνθρώπου.

12 Dion. Areop., De div. nom. 2.4, M 3.641A: οὖν ἐπὶ τῆς ἐνόσσεως τῆς θείας ἦν τῆς ὑπερουσιότητος, ἤνιμον μὲν ἔστι τῇ ἐναρχῇ Τριάδι, καὶ κοινὸν ἡ ὑπερουσία υπαρξεῖ, ἡ ὑπερεύσεως θέλεσις, ἡ ὑπεράγαθος ἀγαθότης.

13 Épître aux Romains 11:33: Ω βάθος πλούτου καὶ σοφίας καὶ γνώσεως Θεοῦ ως ανεξερεύνητα τὰ κρίματα αὐτοῦ καὶ ανεξήγεισαι αἱ ὁδοὶ αὐτοῦ. Clem. Alex., Strom., 5.12,80,4, M 9.120A: βεβαιοῦ ταῦτα ἐν τῇ πρὸς Κορινθίους ἐπιστολῆς ὁ Απόστολος ἀναφάνων ἐφηκεν: Σοφίαν δὲ λαλοῦμεν ἐν τοῖς

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μή μη δώσαις ἄγαθη καὶ πᾶν δόριμα τέλειον, ἀνωθεν ἐστι καταβαίνοιν ἀπὸ τοῦ πατρὸς τῶν φῶτων. ὡς ἦσαν Ἑσοῦν ἐπικαλεσάμενοι, τὸ πατρικόν φῶς, τὸ ὅν τὸ ἀληθινόν, φωτὸς ἀπαύγασμα, φωτίζων πάντα ἀνθρώπων ἐρχόμενον εἰς τὸν κόσμον. Ἀπὸς γάρ ἐστὶ τὸ φῶς καὶ ἡ ἀλήθεια καὶ ἡ ἡμέρα, θεαρχικὸς τοῦ Θεοῦ Λόγος, ἡ σοφία καὶ δύναμις, ἡ παντοποίος καὶ ἄρρητος τοῦ Θεοῦ σοφία, ὁ ζῶν τελείος, σοφίαν δὲ αυτῷ τοῦ αἰῶνος τοῦτον τοῦ καταρρημένον τῆς λαλομένης τοῦ θεοῦ σοφίαν ἐν μοισείῳ, τὴν ἀποκεκρυμμένην, Théodore, De providentia, οτ. 10, M 83.740.

16. Ὅσοι παίσσονται μεταξὺ των παραθεωρημένων, αἰῶνας ἐν τῷ χρόνῳ τοῦ πατρὸς τῶν φῶτων. Θεόστροφος, de providentia, 1.7, M 1210B. Athanas., Epist. II ad Castorem, 3D, M 28.905, Basil., Liturgie, Chrys., Orat. in Ps. 118, M 55.683, Chrys., Liturgie, Τὸ Ἱεροῦ; ἦσαν δέσις ἀγαθή καὶ πάν δόριμα τέλειον, ἀνωθεν ἐστι καταβαίνοιν ἀπὸ τοῦ Πατρὸς τῶν φῶτων.

17. Ὅσοι περιφέροιν, ὅσοι υπεράγαθοι καὶ ἐπικαλεσάμενοι τὸ πατρικὸν φῶς, τὸ ὅν τὸ ἀληθινόν, φωτὸς ἀπαύγασιν, φωτίζων πάντα ἀνθρώπων ἐρχόμενον εἰς τὸν κόσμον, λάμπουν καὶ ἐν τῷ δίκαιῳ δυνάμει, λόγος, ἡ σοφία καὶ δύναμις, ἡ παντοποίος καὶ ἄρρητος τοῦ Θεοῦ λόγος, ἡ σοφία καὶ δύναμις, ἡ παντοποίος καὶ ἄρρητος τοῦ Θεοῦ σοφία, ὁ ζῶν τελείος, σοφίαν δὲ αυτῷ τοῦ αἰῶνος τοῦτον τοῦ καταρρημένον τῆς λαλομένης τοῦ θεοῦ σοφίαν ἐν μοισείῳ, τὴν ἀποκεκρυμμένην, Théodore, De providentia, οτ. 10, M 83.740.

18. Ὅσοι παίσσονται μεταξὺ των παραθεωρημένων, αἰῶνας ἐν τῷ χρόνῳ τοῦ πατρὸς τῶν φῶτων. Θεόστροφος, de providentia, 1.7, M 1210B. Athanas., Epist. II ad Castorem, 3D, M 28.905, Basil., Liturgie, Chrys., Orat. in Ps. 118, M 55.683, Chrys., Liturgie, Τὸ Ἱεροῦ; ἦσαν δέσις ἀγαθή καὶ πάν δόριμα τέλειον, ἀνωθεν ἐστι καταβαίνοιν ἀπὸ τοῦ Πατρὸς τῶν φῶτων.

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αὐτός φοιτήσεις ἡμῶν τὸν νοῦν καὶ τὰς καρδίας καὶ ἀναλάμβανη ἡμῖν λαμπάδα, καταλάμπουσαν ἡμῖν τὰ ἀνέξερεύνητα βάθη τῆς αὐτοῦ γνώσεως καὶ σοφίας πρὸς τὴν ἀλήθη καὶ ἀπλανή γνώσιν τοῦ γνώσκειν σε τὸν μόνον ζῶντα ἀληθινὸν Θεόν ἡμῶν, τὴν ἁγίαν καὶ ὀμοούσιον Τριάδα καὶ πάν ζωοπάρχον Πατέρα καὶ Υἱόν καὶ Ἁγιον Πνεῦμα, νῦν καὶ ἄει καὶ εἰς τοὺς αἰῶνας τῶν αἰώνων, ἀμήν.

2.4. [Id. 214.8-15] Ἀλλ’, ὃς ἑαυτὸς δίδακτος, οἱ τούτῳ ἀρχεῖ βουλόμενοι τῇ πρὸς τὸν Θεόν ἐννοήσει διὰ τῆς τῶν ἀρετῶν ἐπικοσμήσεως ἐν ἐαυτοῖς ἀγωνιζόμεθα, καὶ τῇ πολλῇ ροή τῶν ἀκρούν ἐαυτοῦ ἀρδευέτωσαν, ἐν ὁ παντοκράτωρ θεός ... λόγος τοῦ πατρός, καὶ σοφία αὐτοῦ. Cf. Θεὸν τὸν ἀρρητόν, Idelet, 231.8; πηλίκος εστίν ἡ τῆς σοφίας ἁλοσσος, 232.5, διὰ τῆς ἀρρητοῦ αὐτοῦ σοφίας πάντα παρῆρήθη, 242.6.

ἐπικοσμήσεως ἐν ἐαυτοῖς ἀγωνιζόμεθα, καὶ τῇ πολλῇ ροή τῶν ἀκρούν ἐαυτοῦ ἀρδευέτωσαν, ἐν ὁ παντοκράτωρ θεός ... λόγος τοῦ πατρός, καὶ σοφία αὐτοῦ. Cf. Θεὸν τὸν ἀρρητόν, Idelet, 231.8; πηλίκος εστίν ἡ τῆς σοφίας ἁλοσσος, 232.5, διὰ τῆς ἀρρητοῦ αὐτοῦ σοφίας πάντα παρῆρήθη, 242.6.

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22 Symbole de la foi: δι’ οὗ τὰ πάντα ἐγένετο.
μήτε καρδίαν χωρὶς δοξάζηται τὸ πάντιμον καὶ μεγαλοπρεπὲς ἅγιον ὄνομα τοῦ Πατρὸς καὶ τοῦ Ηνίου κατάληψιν εἰς τὸν ζωοιόντα, ψαλμοδικαστάνει τούτῳ κατά τὸν ἑαυτοῦ διὸ τοῦ ἁγίου καταδεχόμενοι δυνατοῦ, τῆς ἐκ τὴν ἀληθινῶς ἡμῶν πρώτῳ ἑνωθῆναι καὶ ἑνωθῆναι τῷ ἁληθινῷ φωτὶ τῆς αὐτοῦ θεογνωσίας, ἐν διὰ τοῦ ἁληθινοῦ φωτὸς καταναλωμένου δυνηθείμεν τὴν τῶν δύνασιν καταλαβένειν, καὶ θεάσασθαι τὰ ἐργά τοῦ Θεοῦ τῶν ὀλον, ὅπως δοξάζηται τὸ πάντιμον καὶ μεγαλοπρεπὲς ἄγιον ὄνομα τοῦ Πατρὸς καὶ τοῦ Υἱοῦ καὶ τοῦ Ἁγίου Πνεύματος, νῦν καὶ ἀεὶ καὶ εἰς τοὺς αἰώνας τῶν αἰώνων. Ἀμήν. 29

Τοῦ αὐτοῦ Στεφάνου φιλοσόφου εἰς τὸ Κατ’ ἐνέργειαν τῆς θείας τέχνης πράξεις σὺν θεῷ ὁρίσι).

3.1. [Id. 219,18-220,6] Τίς μακάριος καὶ συνήσει τὰ κρίματα30 τοῦ παντοκράτορος Θεοῦ; Τίς σοφός καὶ συνετός καὶ διηγήσεται τὴν ὑπεράνυσσον σοφίαν τοῦ Δημιουργοῦ τῶν ὀλων; Τίς εὐμορφος καὶ κατανοήσει τὰς δυναστείας τοῦ παντεπόπτου καὶ καθολικοῦ Θεοῦ καὶ δοξάσετε τὴν ὑπεράγαθον αὐτοῦ ἀγαθότητα31; Ἔμοι μὲν ῥάδιος καὶ ἀπτότως καὶ εὐχρέως ὅμως ἐκείνον ἔστι καὶ τὰς γρίφους ἐννοιας τῶν προγενεστέρων εἰμιφανῶς τὰς πεύσεις πουόμαι συνεργοῦντος τοῦ παντοκράτορος Θεοῦ. Ὕμιν δὲ ἔχοικεν ὡς ἐξέφρασον ἀναχαίτισασθαι καὶ σφετερίζειν τὰ ὑπὸ πολλὸν σοφῶν ἱδρυμένα καὶ καταντήσας τὰς ἑκείνοις ἐννοιας, καὶ οὕτως πρὸς τὸ βραχύτατον μου πόνημα ἀπιέναι αἰτούμενοι τὸν μόνον ἀληθινὸν Θεόν ἡμῶν, ἴνα ὑμῖν φιλική τὸ

28 Athan., Exp. Ps. 85:1, M 27.373C: μέγα ... ἐφόδιον πρὸς τὸ εὐχόμενον ἐπακούεσθαι ἡ ταπεινοφοροῦσθη.
29 Chrys., Liturgie: ἦν καὶ αὐτοῦ σὺν ἡμῖν δοξάζομεν τὸ πάντιμον καὶ μεγαλοπρεπές ὄνομα Σου, τὸν Πατρὸς καὶ τὸν Ἁγίο Πνεύματος, νῦν καὶ ἀεὶ καὶ εἰς τοὺς αἰῶνας τῶν αἰώνων. Ἀμήν.
31 Dion. Areop., De div. nom. 4.1, M 3.693B: τὴν θεαρχήτην ὑπαρξίν, ἀγαθότητα λέγοντες. Gr. Nyss., Vita Mos. 7, M 44.301A: τὸ πρῶτον καὶ κυρίος ἀγαθόν, ὅ ἀγαθός ἀγαθότατος ἐστιν, αὐτὸ τὸ θεόν. Chrys., Hom. 13.6 in Mt, M 57.215: ἤ δὲ ἄπειρος ἀγαθότητας, ὁ θεός, ἢ ἄρατος φιλανθρωπία. id. hom., 78.4 in Mt, M 58.715: φιλανθρωπία γὰρ ἐστὶν ὁ δεσπότης, καὶ τῆς ἀγαθότητος αὐτοῦ τὸ δόρον γίνεται.
τῆς διανοίας ὀμματα32 καὶ κατανυκτήσῃ τῷ ἀθλοῦ αὐτοῦ φωτὶ τὰς καρδίας ύμῶν πρὸς τὸ εἰδέναι τὰς δυναστείας τοῦ παντοκράτορος Θεοῦ καὶ τῆς δόξης αὐτοῦ, ἢς γένοιτο ἡμᾶς ἐν καθαρᾷ ἐπιτυχεῖν καρδία καὶ ὑμιᾶν τὰς καρδίας ὑμῶν πρὸς τὸ ἐμπλούσθην καρδία καὶ ὑμιᾶν τὰς καρδίας τοῦ Θεοῦ τῶν ὅλων καὶ δοξάζειν τὸ πανάγιον καὶ μεγαλοπρεπὲς ὄνομα τοῦ Πατρός καὶ τοῦ Υἱοῦ καὶ τοῦ Ἁγίου Πνεύματος, νῦν καὶ ἀεὶ καὶ εἰς τοὺς ἀπεράντους αἰῶνας τῶν αἰώνων, ἀμήν.

3.15. [Id. 223,5-19] Εἰ γὰρ ποιήσεις τὰ σώματα ἀσώματα καὶ τὰ ἀσώματα σώματα, μεγάλας καὶ εὐπαραγωγοὺς καὶ θαυμασίως ἐργάσῃ. Ἐπιτευχόμενος δηλονότι τῆς ἐφέσεως δι᾿ ὧν στενοῦμεν τετραστοίχῳ33 σώματι τριαδικῇ οἰκονομίᾳ32 δωδεκαζωδιακῇ τροπῶν κινήσει. Ἑπτὰ δὴ τῶν ἀστερῶν λεγομένων πλανητῶν σώμασί τε καὶ εἴδεσι καὶ θεωρίαις μοναδικῇ τινὶ ἑνιαίᾳ ἄκρᾳ ἑνώσει δοξάσεις τὸν ἐν τριάδι καὶ μονάδι Υἱὸν Λόγον Θεόν, τὸν ἐκ τεσσάρων στοιχείων τὸν ἅπαντα κόσμον ἐλεσιουργήσαντα πανσόφως καὶ εὐπρεπῶς, καὶ τετράσι τροπαῖς κοσμήσαντα τὸν κύκλον τοῦ ἐνιαυτοῦ.34 καὶ μετὰ τοὺς ἑπτὰ αἰῶνας εἰσάξοντας τοὺς ἀξίως πολιτευσαμένους εἰς τὴν αὐτοῦ κατάπαυσιν ἐν τῇ τῶν οὐρανῶν ἀλήκτῳ βασιλείᾳ, ύμνοῦντας τὸ τῆς Τριάδος ἑνιαῖον καὶ ἀκατάληπτον φῶς, ἐν Πατρὶ καὶ Υἱῷ καὶ Ἁγίῳ Πνεύματι, νῦν καὶ ἀεὶ καὶ εἰς τοὺς αἰῶνας τῶν αἰώνων, ἀμήν.

Τοῦ αὐτοῦ Στεφάνου φιλοσόφου· πρᾶξεις σὺν Θεῷ τετάρτῃ.

4.29. [Id. 231,1-5] Καὶ διὰ ταύτης μᾶλλον τῆς ἀρετῆς διαπεράσαντες ἐλθοῦμεν ἐπὶ τὸ ἡδὺ τοῦ Θεοῦ φῶς καὶ μάθομεν τὴν ἐξ αὐτοῦ τοσαύτην τῆς χάριτος σοφίαν ἐκπλήττουσαν καὶ ἐκλάμπουσαν ἐπὶ τοὺς εἰς αὐτὸν πεποιθότας, τὸν Ἰησοῦν Θεὸν ἡμῶν.

32 Chrys., Orat. 54 in Mt., M 58.536: Διὰ τούτο καὶ ἐνδιατρίβει (ὁ Ἰησοῦς) τοῖς δυσχερέσι, καὶ ἐμπλατύνει τὸν λόγον, ἵνα διανοεῖ αὐτῶν (τῶν μαθητῶν) τὴν διάνοιαν, καὶ συνώσει τι ποτέ ἐστι τὸ λεγόμενον. Bénédiction des eaux à la Théoph., Prière de Sophrone: φοίτησον μου τῆς διανοίας τῆς ὀμματα.
33 Gr. Nyss., Imag., M 44.1328B: Συντελέσας γὰρ ὁ Κτίστης τὸν ἅπαν καὶ ἀοράτους δυνάμεις κόσμον, μεθ’ ὃν καὶ τὸν ὅλον τοὺς καὶ ὅρομεν, τὸν ἐκ τεσσάρων στοιχείων συναρμόσας.
34 Bénédiction des eaux à la Théoph., Prière de Sophrone: Σὺ ἐκ τεσσάρων στοιχείων τῆς κτίσεως συναρμόσας, τέταρτοι καὶ κατάπαυσιν τὸν κύκλον τοῦ ἐνιαυτοῦ ἐστεφάνωσας.
35 Basil., Hist. myst. 60: μεταστάντας ἐνθάδε πρὸς τὰς ἐκείθεν μονάς καὶ κατάπαυσιν.
Τὸ οὕτω Στεφάνου φιλοσόφου· πρᾶξις σὸν Θεῷ πέμπτη.

5.1. [Id. 231,8-14] Θεὸν τὸν ἄρρητον, τὸν σοφὸς καὶ ἀληθείας πατέρα, τὸν ζωὴς καὶ φωτὸς δοτῆρα, τὸν τῶν ὅλων αἴτιο καὶ πάντων ἐπέκεινα, καὶ τὸν εὖ αὐτοῦ μονογενῆς. Υἱὸν τὸν ἄρρητον τῆς ἀληθείας Πνεύματι, τῷ παρ᾿ αὐτῷ ἐκπορευομένῳ, ἱμνῶ καὶ δοξολογῶ καὶ εὐχαριστῶ, ἵνα καὶ τὸ μετὰ χεῖρας τοῦτο ἐκτὸν σύγγραμμα συνοδηγίᾳ τῇ παρ᾿ αὐτῷ ἐκπεράνω.

5.2. [Id. 231,14-26] Κατὰ δὲ τὸ ἔθος ἡμῶν ἐχέτω τὸ προοίμιον. Γυμνάσια μὲν εἰσὶ τῆς ψυχῆς τὰ μαθήματα ἐκ τῶν ἐνύλων ἡμᾶς ἐπὶ τὰ ἄϋλα ἀνάγοντα, καὶ ἐκ τῶν συνθέτων ἐπὶ τὰ ἁπλὰ καὶ ἀσύνθετα ἀγλαΐζοντα· σοφίας γὰρ εἰσὶ νοήματα καὶ φιλοσοφίας πράγματα. Ἀλλ᾿ οὗτος ὁ τρόπος καὶ ταῦτα τὰ μαθήματα, οὗτος ὁ σκοπὸς καὶ αὕτη ἡ πρότασις, ἣ νῦν τὰς θεωρητικὰς ἀποκόπτει ἀκτῖνας καὶ ὁ λόγος τὰς πρακτικὰς ἀποπληροῖ περατώσεις. Οὗτος τοῦτο, ταῦτα τὰ μαθήματα, μέγας ὁ πλοῦτος τῆς χάριτος, πολλοὶ τῆς ἀρρήτου σοφίας οἱ θησαυροὶ, ἀνεκδιήγητα τὰ χαρίσματα, ποταμοὶ ὕδατος ζῶντος τὰ τοιαῦτα ὕδατα, πηγὴ σοφίας τοῦ Θεοῦ ἡ ἀβυσσὸς, φῶς καθαρώτατον τοῦ Ἁγίου Πνεύματος ἡ ἐπιφοίτησις.

5.3. [Id. 231,26-232,3] Οὐδὲν σοφίας ἀνώτερον· δι᾿ αὐτῆς γὰρ ὁ ὑπεράρχιος τοῦ Θεοῦ Λόγος τὰ πάντα ἐδημιουργήσει, δι᾿ αὐτῆς τὰς τῶν οὐρανίων νόων εὐπρεπεῖς ἐλλάμψεις ἐκόσμησε, δι᾿ αὐτῆς ὁ νοητὸς παράδεισος εἰς ἀπόλαυσιν τῶν ἀεὶ ζώντων εὐτρέπισται, δι᾿ αὐτῆς τὴν τῶν οὐρανῶν βασιλείαν ἡμῖν προητοίμασε. Πόθεν οὖν ἡμῖν πρὸς τὴν σοφίαν ἡ ἄνοδος; Πῶς αὐτὴν οἰκειωσόμεθα; Πῶς αὐτῆς τὸν ἄφθαρτον χιτῶνα περιβαλλόμεθα; Μόνη τοῦ Θεοῦ ἡ ἀγάπη πρὸς τὸν πόθον αὐτῆς ἕλκει.

5.21. [Id. 237,5-16] Ὡ σοφίας χάρις, ὦ συνέσεως ἔργον, ὦ νοήματος πρᾶγμα, ὦ λόγων συμπλήρωσις, ὦ χαρίσματα παρὰ τοῦ Δημιουργοῦ τῶν ὅλων, ὦ πλούσιαι δωρεαὶ παρὰ τοῦ πατρὸς τῶν φώτων. Τίς οὖν εἰπεῖν δυνήσηται πρὸς ὕμνον τῶν τῶν ὅλων κρατίστην οὐσίαν, τολμᾷ τε ἐπέκεινα ἐπὶ τὸν τῶν ὅλων Θεόν, οὐκ ἐμπειρῶν τῶν θησειμῶν, ἀλλ᾿ ἐπιστήμην τῶν θείων καὶ οὐρανίων ἐπαγγελμένην ἡ σύνεται καὶ ὁ(perí) τῶν ἀνθρωπισεῖν, περὶ τὸς λόγους καὶ τῶν πράξεως, οὐκείκη χρήσις.

36 Clem. Alex., Strom., 1.28.177, M 8.924A,B: μικτῇ δὲ φιλοσοφία τῇ ἀληθείᾳ καὶ ἀληθῆς διαλεκτικῇ, ἐπισκοποῦσα τὰ πράγματα, καὶ τῆς δυνάμεις καὶ τῆς ἐξουσίας δοκιμαζομένη, ὑπεξαναβείνει ἐπὶ τὸν πάντων κρατίστην οὐσίαν, τολμᾶ τε ἐπέκεινα ἐπὶ τὸν τῶν ὅλων Θεόν, οὐκ ἐμπειρῶν τῶν θησειμῶν, ἀλλ᾿ ἐπιστήμην τῶν θείων καὶ οὐρανίων ἐπαγγελμένην ἡ σύνεται καὶ ὁ (perí) τῶν ἀνθρωπισεῖν, περὶ τοῦ λόγους καὶ τῶν πράξεως, οὐκείκη χρήσις.
38 Dion. Areop., De cœl. hier. 10.1, M 3.273A.
θαυμασίων σου, Δέσποτα; Ποίον στόμα ἱκανὸ πρὸς ἀξίαν ὑμνῆσαι σε, τὸν πάντων δεσπότην καὶ κύριον; Ποίος νοῦς μεθ’ ύμνωδίας οὐκ ἐκπλαγήσεται, τῶν ζητημάτων σου τὰς εὐκοσμίας θεωρῶν; Τίς μὴ ύμνησι τὰ μεγαλεῖα τοῦ Παντοκράτορος Θεοῦ; Μεγάλα τὰ θαυμασιά σου, Σωτήρ· πολλὴ ἡ φιλανθρωπία σου, δέσποτα· πλούσιον τὸ ἔλεος τῆς σῆς ἀγαθότητος, πηγὴ πάσης σοφίας τὰ σὰ χαρίσματα.

5.22. [Id. 237,16-31] Σὲ ὑμνῶ, τὸν πάντων Δεσπότην, καὶ σὲ δοξολογῶ τὸν πρὸ αἰώνων ἐκ Πατρὸς γεννηθέντα, τὸν Λημιουργόν πάσης κτίσεως, τὸ ἐκ τοῦ φωτὸς ἄληθινον φῶς, τὸν ἐκ Θεοῦ Θεόν καὶ πρὸς τὸν Θεόν ἀεὶ ὄντα, ἐπὶ ἐσχάτων δὲ τῶν ἁμαρτιῶν διὰ τῆς ἐνδόξου Θεοτόκου καὶ ἀειπαρθένου Μαρίας ἐνανθρωπήσαντα ἐνανθρωπίσατα. Τις μὴ υμνήσει τὰ μεγαλεῖα τοῦ Παντοκράτορος Θεοῦ, μεγάλα τὰ θαυμάσιά σου, Σωτήρ· πολλὴ ἡ φιλανθρωπία σου, δέσποτα· πλούσιον τὸ ἔλεος τῆς σῆς ἀγαθότητος, πηγὴ πάσης σοφίας τὰ σὰ χαρίσματα.

6.1. [Id. 238,1-13] Ἐξομολογοῦμαι σοι, Πάτερ ἅγιε, Κύριε ὁ Θεὸς τοῦ οὐρανοῦ καὶ τῆς γῆς· ὁ καθολικὸς Θεὸς καὶ Παντοκράτωρ, ὁ τῶν πάντων ἀγαθῶν αἴτιος καὶ δοτήρ, ὃν οἱ οὐρανοὶ ἐξομολογοῦνται καὶ διηγοῦνται τὰ θαυμάσια σοῦ τοῦ Παντοκράτορος Θεοῦ καὶ τῆς δόξης σου, ἧς γένοιτο καὶ ἡμᾶς ἐν καθαρᾷ καρδίᾳ ὑμνεῖν, αἰνεῖν, δοξολογεῖν καὶ λατρεύειν τὰ μεγαλεῖα σοῦ τοῦ Θεοῦ τῶν ὅλων· τούτων ὄντως ἀγαθῶν αἴτιος καὶ διὰ τῆς ἁμαρτιάς αἰνεῖν τὸ μεγαλοπρεπὲς καὶ πανάγιον καὶ ζωαρχικόν σου

Bénédiction des eaux à la Théoph., Prière de Sophrone:
Μέγας Κύριε, καὶ θαυμαστα τῆς ἐράς τέχνης.

Symbole de la foi:
... ποιητὴν οὐρανοῦ καὶ γῆς, ὅμοιον τῶν πάνω καὶ ἀοράτων. Καὶ εἰς ἕνα Κύριον Ἰησοῦν Χριστόν, τὸν Γενὸς τοῦ Θεοῦ τοῦ Μονογενοῦς, τὸν ἐκ Πατρὸς γεννηθέντα πρὸ πάνω τῶν αἰώνων· Φῶς ἐκ φωτός, Θεόν ἀληθινὸν, ἐκ Θεοῦ ἀληθινὸν γεννηθέντα, οὐ ποιηθέντα, ὁμοούσιον τῷ Πατρὶ, δι’ οὗ τὰ πάντα ἐγένετο. Τὸν δὲ ζωογονοῦντα καὶ ἀνθρωπίσαντα ἐκ τῶν οὐρανῶν, καὶ σαρκοθέντα ἐκ Πνεύματος Αγίου καὶ Μαρίας τῆς Παρθένου καὶ ἐνανθρωπίσαντα.
ὄνομα τοῦ Πατρὸς καὶ τοῦ Υἱοῦ καὶ τοῦ Ἁγίου Πνεύματος, νῦν καὶ άει καὶ εἰς τοὺς ἅγιους αἰῶνας τοῦ αἰώνον, ἀμήν.

6.12. [Id. 241,24-33] Ἐκ τῶν αἰσθητῶν μετάβητι ἐπί τὰ νοητὰ θεάματα καὶ ίδε τῶν οὐρανίων τὴν πολλὴν εὐκοσμίαν καὶ άξολόν. Ο τὰς τούτων εὐπρεπεῖας θεασάμενος, ἐπέκεινα τὸν νοῦν ἄνωτα καὶ τὴν πολλὴν καὶ υπεραστράπτουσαν τῆς δόξης καὶ χαρᾶς τοσαύτης τῶν άγγέλων ἐννοοῦν, μὴ παρατραπῇς τὸ λοιπὸν ἐπί τὴν ἐνυλον μόρφωσιν τῆς χαμαιζήλου ταύτῃ τῆς μετὰ χεῖρα ζητουμένου καὶ ἀνακαλυπτομένου τῆς ἐμφιλοσόφου χρυσοποιίας. Ἀλλ᾿ ὅλον σεαυτὸν τὸν νοῦν ἐπὶ τὰ ἄνω αἴρε καὶ φωτοειδῆ τῶν ὑπερτάτων οὐσιῶν ἀναπτερώσαθαι.

6.13. [Id. 241,33-242,9] Ἀν νοεροὶ δημασί τά ἀναρίθμητα καὶ ἄμηχα τούτων κάλλη καὶ πρὸς τὸ φῶς ἐκεῖνο τὸ ὑπέρ πάν ψυχής ταύτης καὶ θαυμάσας τὰ τούτων καλλή καὶ πρὸς τὸ φῶς ἐκεῖνο τὸ ὑπὲρ πάνθενος καὶ τὸν προαιρετικὸν μελετήσας θάνατον, καὶ ὅλον τὸ σῶμα κατανεκρώσας, ἔτι δὲ καὶ τὴν θανατικὴν ἀνακαλυπτομένου τῆς ἐμφιλοσόφου χρυσοποιίας. Ἀλλ᾿ ὅλον σεαυτὸν τὸν νοῦν ἐπὶ τὰ ἄνω αἴρε καὶ φωτοειδῆ τῶν ὑπερτάτων οὐσιῶν ἀναπτερώσαθαι.

6.14. [Id. 242,9-21] Ταῦτα δὲ πάντα ἐν ἑαυτοῖς κατανοήσαντες, σπουδάσωμεν καὶ ἡμείς, ὁ ἀδελφοί, διὰ πίστεως καὶ ἀγάπης ἑνώθηνε καὶ οἰκειώθηνε τῷ Θεῷ Λόγῳ, τῷ θεῷ ἀγαπηθαντι καὶ αὐτόν τὸν Κύριον καὶ Θεόν ἀγαπῆσαι ἐξ ὅλης ψυχῆς καὶ ἐξ ὅλης τῆς καρδίας καὶ αὐτὸν τὸν τῆς ζωῆς θησαυρὸν ὑμνῆσαι. Πῶς τὰ πάντα παρῆχθη διὰ τῆς ἀρρήτου αὐτοῦ σοφίας ἰλιγγίας δὲ γλῶττα καὶ νοῦς οὐκ ἰσχύει φέρειν ἢ ὅλως ἐξερευνῆσαι καὶ εἰπεῖν τὰ μέγα τοῦ Παντοκράτορος.
ţῆς χάριτος ἐμπλησθῶμεν ἢ ὑοῦ ἔμπληθον Θεοῦ γενόμενοι, τῆς χάριτος ἐμπλησθῶμεν, τῆς χάριτος ἐμπλησθῶμεν κατοικητήριον.45 Θεοῦ γενόμενοι τὸ ἁδυ φῶς τοῦ Θεοῦ ἐναπολαύσωμεν. Πρὸς ἐκεῖνο τὸ φῶς ἐπεδόντες τὸ φωτιστικὸν πάσης τῆς λογικῆς φύσεως, τὸ φωτίζον καὶ καταγάζον46 τὰς αἰσθήσεις καὶ καρδίας καὶ διανοίας πάντων τῶν ἀγαπώντων τὸν Κύριον.

6.15. [Id. 242.22-32] Ἡς γένοιτο ἡμᾶς διὰ πίστεως καὶ ἀγάπης Θεοῦ ἐπὶ τὸν λιμένα47 καταντήσας τοῦ θελήματος αὐτοῦ καὶ τῶν αἰονίων ἀπολαύσαι ἀγαθῶν, χάριτι καὶ φυλανθρωπίᾳ τοῦ μονογενοῦς Υἱοῦ τοῦ Θεοῦ, μεθ’ οὖ τῷ πάντων αἰτίω καὶ Παμβασιλεί καὶ ἀφθάρτῳ Θεῷ καὶ Πατρὶ τῶν ὅλων, σὺν τῷ θείῳ καὶ προσκυνητῷ καὶ ζωοποιῷ τῆς μεγαλοσύνης αὐτοῦ Πνεύματι, σέβας, κράτος, λατρεία, τιμή, δόξα, μεγαλοπρέπεια, ὑμνὸς αἰώνιος πρὸ πάντων τῶν αἰώνων καὶ μετὰ πάντας τοὺς αἰώνας, καὶ νῦν καὶ ἀεὶ καὶ εἰς τοὺς σύμπαντας καὶ αἰώνων διωσύνων αἰώνας τῶν αἰώνων. Ἀμήν.48

Τοῦ αὐτοῦ Στεφάνου φιλοσόφου. Διδασκαλία πρὸς Ἡράκλειον τὸν βασιλέα: πράξεις σὺν Θεῷ ἐξομίλῃ.

7.1. [Id. 243.4-23] Ὁ ἄναρχος καὶ ὑπέραρχος Θεός, ὁ ἀγαθὸς καὶ ὑπεράγαθος τῇ φύσει, καὶ φυλανθρωπός τῷ τρόπῳ, ὁ ἀπερίγματος καὶ ἀκατάληπτος, ὁ καθολικὸς Θεὸς καὶ Παντοκράτωρ, ὁ Δημιουργὸς πάσης τῆς κτίσεως, ὁ ἐκ τοῦ μὴ ὑπόκτος εἰς τὸ εἶναι παραγαγόν τὰ πάντα,49 ὁ τῇ ἰδίᾳ δόξῃ καὶ βουλήσει καὶ δυνάμει καὶ σοφίᾳ κτίσας τὰ σύμπαντα, καὶ καθ’ ὑμοίωσιν καὶ κατ’ εἰκόνα50 πλάσας τὸν ἄνθρωπον

45 Barn. 6.15: ναὸς ἡμῶν ... τῷ κυρίῳ τὸ κατοικητήριον ἡμῶν τῆς καρδίας. ib. 16.7: πρὸ τοῦ ἡμᾶς πιστεύει τῷ θείῳ ἡμῶν τοῦ κατοικητήριον τῆς καρδίας φθαρτόν καὶ ἀσθενές: ib. 16.8: ἐν τῷ κατοικητήριῳ ἡμῶν ἀλήθεια ὁ θεός κατοικεῖ ἐν ἡμῖν.
46 Clem. Alex., Progr. 9, M 8.197A: φῶς ... ὁ λόγος ... δί’ οὗ καταγαζομάθα τοῦ θείου. Euseb., Dem. evang. 4.6, M 22.214C: τὰς ἁσματίους δυνάμεις ὁ τῷ θείῳ καταγαζόν τέλειος λόγος. Lit. Marc. (Brightman p. 135.19): διὰ τῆς ἐπιροτήσεως τοῦ ... πνεύματος καταγομένων τοὺς ὀφθαλμοὺς τῆς διανοίας ἡμῶν.
47 Clem. Alex. fr. 44: ὅσπερ ἐν λαμβάνει ... τῷ θείῳ φωτὶ τοῦ σωτῆρος. Jo. D., Hom. 2.7, M 96.588B: ὁδηγῆσες σε ἐπὶ λαμμάθις θελήματος αὐτοῦ.
λογικόν τε καὶ νοερόν καὶ αὐτεξούσιον51, καὶ ποιήσας αὐτὸν βασιλέα πάσης τῆς αὐτοῦ κτίσεως, αὐτὸς σὲ ὁ Παντοκράτωρ καὶ Βασιλεὺς τῶν βασιλευόντων οἰκουμενικόν καὶ αὐτοκράτορα βασιλέα κατέστησεν ἐπὶ πάσης τῆς γῆς καὶ ἄρχειν πάσης τῆς αὐτοῦ κτίσεως μετ᾽ εὐμενείας καὶ συνειδήσεως ἀνέδειξε· καὶ ύπὸ τῆς αὐτοῦ συνεκτικῆς τε καὶ ποιητικῆς δεξιᾶς τὸ νεῦμα ἐχαρίσατο· καὶ ὑπὸ τῆς αὐτοῦ συνεκτικῆς τε καὶ ποιητικῆς δεξιᾶς τὸ νεῦμα ἐχαρίσατο· καὶ ἐκ τῆς ἀειναύτου πηγῆς πᾶσα εὐφροσύνη καὶ δώρημα ἀγαθὸν ἐν σοὶ ἐβλάστησε, καὶ τὰς πολυμερεῖς ἰδέας τῶν ἀγαθοεργίων τῆς θεοστέφου σου γαλήνης καὶ πολυτρόπου εὐσεβείας ὑπέδειξε καὶ λάτρην καὶ ὁμολογητήν, τὸν μόνον ἀληθινὸν Θεὸν καὶ ὃν ἀπέστειλεν Ἰησοῦν Χριστὸν τὸν Υἱὸν τοῦ Θεοῦ τοῦ ζῶντος, ἀνέδειξε.

7.2. [Id. 243,23-244,3] Δίκαιον οὖν σοί ἐστιν ὡς ἀληθῶς, ὦ θεόστεπτε βασιλεῦ, προσδραμεῖν μετ᾽ εὐμενείας καὶ φόβου Θεοῦ καὶ ἀνυποκρίτου ἀγάπης, ἵνα δυνηθῇς διὰ τῆς χάριτος τοῦ Κυρίου ἡμῶν Ἰησοῦ Χριστοῦ ποταμοὺς ἀναβλῦσαι ὕδατος ζῶντος καὶ κληρονομῆσαι τῆς μεγάλης ἐκείνης ἐφέσεως τῆς ἐκ δεξιῶν τοῦ Θεοῦ παραστάσεως, ὧν οὐκ ἄξια τὰ νῦν ὁρώμενα καὶ θαυμαζόμενα πρὸς τὴν μακαρίαν ἐκείνην λῆξιν. Μόνον οἰκειωθῶμεν αὐτῷ δι᾽ ἀγάπης καὶ ληψόμεθα παρ᾽ αὐτοῦ τὴν ἐξ ἀβύσσου πηγήν ἔλεος· ἃ ὀφθαλμὸς οὐκ εἶδε καὶ οὖς οὐκ ἤκουσε, καὶ ἐπὶ καρδίαν ἀνθρώπου οὐκ ἀνέβη, ἃ ἡτοίμασεν ὁ Θεὸς τοῖς κατὰ σὲ καὶ τοῖς ἀγαπῶσιν αὐτὸν ἀπὸ καταβολῆς κόσμου. Ἀμήν τε καὶ μεγαλοπρέπεια τῷ Πατρὶ καὶ τῷ Υἱῷ καὶ τῷ Ἁγίῳ Πνεύματι, εἰς τοὺς αἰῶνας τῶν αἰώνων καὶ ἐπαιῶνων καὶ ἄμην.

7.3. [Id. 244,3-9] Πάλιν ἐπὶ τὸ προκείμενον ἐπανελεύσομαι καὶ τὸν πόθον σου, ὦ πανάριστε βασιλεῦ, ἀναπληρῶσον καὶ ἐπιφανῶς τὰς ῥήσεις ποιήσομαι, ἵνα τοσοῦτον ἀξιωθῇς μεθ᾽ ὑμνωδίας θεολογεῖν τὴν ὑπεράγαθον τοῦ θεοῦ ἀγαθότητα, τὴν πολυπληθείαν τῶν ἐνύλων ἀπωσάμενος καὶ ὑπὸ τῆς εὐσπλαχνίας τοῦ πάθους ἐπειγόμενος.

51 Gr. Nyss., Orat. catech., 21, M. 45.57C: μίμημα τῆς θείας φύσεως κατεσκευάσθη ὁ ἄνθρωπος, τοις τε λοιποῖς τὸν ἄγαθον καὶ τὸ αὐτεξούσιον τῆς προαίρεσις τῆς πρός τὸ θεῖον διασώζονον ὁμοίωσιν

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Byzantine Alchemy
in two recently discovered manuscripts
(Saint Stephen’s (Meteora) and Olympiotissa (Elassona) Monasteries)

Matteo Martelli

The manuscript n. 97 in the library of Saint Stephen’s monastery in Meteora (Meteora MS hereafter) and the manuscript n. 197 in the library of Olympiotissa monastery in Elassona (Elassona MS hereafter) rank among the earliest alchemical codices nowadays kept in Greece. These testimonies were not taken into account by M. Berthelot and C.É. Ruelle in their pioneering edition of the Greek alchemical collection, neither they were described or discussed in the more recent catalogue of the Greek alchemical manuscripts published between 1924 and 1932 under the aegis of the Union Académique Internationale.¹ In this chapter, I shall first present a short description of the two manuscripts; then I shall compare their contents and investigate more in depth specific sections, which, when necessary, will be illustrated by taking into account the other know testimonies of the Corpus alchemicum – in particular, the MSS Marcianus gr. 299 (10th century AD), Parisini gr. 2325 (13th c.) and 2327 (1478), and Laurentianus gr. 86.16 (1492).² Finally, special attention will be devoted to the last section of the Meteora MS, which preserves a long Byzantine book of recipes on the art of goldsmiths, which until now was only known in the recensio preserved in the MS Parisinus gr. 2327 (= CAAG II 321-337).

¹ In particular the fifth volume of the Catalogue des manuscrits alchimiques grecs is devoted to the manuscripts of Athens (see, in particular, pp. 143-173). In the introduction, the author A. Severyns (1928, 144) explained the difficulties he encountered in describing the alchemical codices kept in Greece outside Athens: “Devant le résultat de mes recherché à Athènes, j’avais d’abord formé le projet d’étendre mes investigations à tous les manuscrits conserves en territoire grec. Plusieurs raisons m’ont forcé à y renoncer. Etant donné le peu de temps dont je disposais, je ne pouvais songer à éplucher tous les catalogues imprimés ou manuscrits, non plus qu’à visiter les nombreuses bibliothèques de monastères […] D’un autre côté, l’expérience m’a appris qu’il est pratiquement impossible de faire venir à Athènes un manuscrit conserve en province”. This ambitious aim has been now achieved by the members of the DACALBO project, whom I warmly thank for the precious information they shared with me.
² For an introduction to these manuscripts, see Martelli 2012, 3-54; Mertens 1995, xx-1xxviii.
1. A Short Description of the Two Manuscripts

The Meteora MS -- bearing the n. 97 in the third volume of Sophianos’ catalogue describing all the manuscripts kept in the Meteora monasteries -- is a small size paper codex (160 x 105 mm) that counts 203 folia. Two colophons at fol. 203v mention the name of its scribe and the year when he finished copying the manuscript:

(fol. 203v1-5; red ink) ἐτελειώθη τῷ παρόν βιβλίῳ [lege τὸ παρὸν βιβλίον] διὰ χειρὸς κάμου Γεωργίου [lege Γεώ-] ἐπὶ ἔτους ζβʹ (a second hand added: ἐν τοῦ Ληπίου Στεφάνου)

ἀθλήως Γεώργης [lege ἀθλίως Γεώργης] ὁ ξήσας ἑρμηνείαν περὶ χρυσοποιίας

“I Georgios finished handwriting myself this book in the year 7012, i.e. 1503/1504 AD [2nd hand: in Saint Stephen’s (monastery)].

Georgios who humble wrote (lit. scratched out) the explanation of the making of gold”.

A few lines above, a similar, yet less detailed information is given in a monokyndylion:

(fol. 203v6-8) ἐγράφη τῷ παρόν βιβλίῳ [lege βιβλίῳ] διὰ χειρὸς Γεωργίου [lege -γίου] περὶ αποικίας [i.e. χρυσοποιίας] καὶ σποιδάς [i.e. ἀργυροποιίας].

“Georgios handwrote this book on the making of gold and on the making of silver”.

Regrettably, it is difficult to judge the reliability of the additional information provided by an anonymous reader, who integrated the first colophon with a reference to the place where the codex had been supposedly produced. If we rely on this information and infer that Georgios completed his work in Saint Stephen’s monastery, we might be tempted to identify the copyist with the homonymous Giorgios.

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3 Sophianos 1986, 305-309. I was able to study the manuscript during a stay in Saint Stephen’s monastery in 2010. I would like to warmly thank the sisters of the monastery, who provided me with all the necessary help and support to carry out my investigation.

4 The second part of the sentence is written with a cryptographic alphabet: εϡξβνθκεϡβ ακβλιθω, that is, ερμηνέα περὶ χρυσοπηοιας. A second hand partly added the solution above the line: ερμηνέα περὶ [lacuna]. Another anonymous copyist (the same who added ‘In Saint Stephen’s (monastery)’ in the colophon) copied again the cryptography after the colophon (fol. 203v8; black ink). The system used to encode the information is quite simple and widespread in Byzantine manuscripts. The Greek letters were divided into three groups of nine letters (stigma, koppa and sampi included) and in each group the first letter corresponded to the last one, the second letter to the second last one, and so on. For instance, the first group includes α, β, γ, δ, ε, ζ, η, and θ, where α = θ, β = η, γ = ζ, δ = ε, and ε = ε.
mentioned in one of the possession’s notes scattered in the manuscript. Many marginal notes, indeed, make clear that the codex was property of Saint Stephen’s monastery; among them the note at the margin of fol. 179v reads:


“Father Giorgios donated this book to Saint Stephen’s (monastery); whoever takes it away from this monastery, may he be damned and may God cut his life short. Woe to him. Amen.”

On the other hand, we must note that an almost identical note (yet written by a different hand) occurs in the flysheet of the manuscript, where the patriarch of Constantinople (rather than the priest Giorgios) is mentioned as donor of the codex. Regrettably, the other possession’s notes do not add further information about the exact time or the specific circumstances under which the manuscript entered the library of the monastery, so that it remains difficult to understand whether the book was originally produced in the monastery or was donated as a gift by a later possessor.

The Elassona MS is a paper codex (145 x 100 mm) written by three different copyists. It currently counts 105 folia, yet some original pages or quires of the manuscript went probably missing. The 18th century monk Margarites transcribed the first section of the codex (fol. α-ζ), as clearly recorded in a short note at fol. 1r:

ὑπαρχὴ τοῦ Μαργαρίτη ἱερέως x 1741,

“The opening section is by the monk Margarites, (year) 1741”.

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5 See Sophianos 1986, 308-309, where all the possession’s notes are recorded.
6 The first segment of the sentence (τὸ παρόν βιβλίον τὸ ἀφιέρωσεν) occurs twice in this folium; it was first written by Georgios, who copied down the rest of the page (containing a list of alchemical signs); then a second scribe wrote the sentence again and completed the note in the form reported above.
7 At the bottom of the flysheet the following note is transcribed: τὸ παρόν βιβλίον ταφιέρωσεν (sic) ὁ μακάριος πατριάρχης ἀπὸ κωστινόπολη (sic) κτλ.
This first part includes short texts dealing with various topics related to alchemy, medicine, and natural philosophy, such as the seven planets and the zodiac (fol. α')\(^8\), the association between seasons, human humours (blood, phlegm, black and yellow bile) and natural elements (identified with air, ether, water and fire; see fol. Β')\(^9\), the correspondences between planets and metals (fol. στ'), and the seven ages of human beings (fol. γ'-δ')\(^10\). The same copyist Margarites also compiled the last part of the codex, namely fol. 104r-110v.

These two parts somehow enclose the earlier section of the manuscript, which counts 66 folia progressively paginated from 1 to 103. It is evident that some folia went lost, probably after that the current foliation had been introduced (in each folium, the recto is marked by an Arabic number and the verso by the correspondent Greek number).

This earlier section was copied by two anonymous scribes in the 16\(^{th}\) century. The first scribe finished copying the folia 1-98r in 1507, as a short notes at fol. 98r reports: after the explicit of a treatise entitled Περὶ λευκώσεως (On Whitening, fol. 98r4-14), someone recorded the date 1507 in Greek (i.e. ͵αφζ') and Arabic numbers. A second, more or less contemporary copyist wrote the fol. 98v-103v.

2. The contents of the two manuscripts: a comparison

The contents of the Meteora MS largely overlap with the contents of the earliest section of the Elassona MS (i.e. the section written in 1507, that is, foll. 1-98r). In both manuscripts two anonymous short passages serve as introductory texts to the collection, which opens with a section devoted to the alchemical lectures (πρᾶξεις) by Stephanus of Alexandria (7\(^{th}\) c. AD).\(^11\) The Meteora MS hands down ten lectures: the first without title, the following five lectures progressively numbered from 2 to 6,\(^12\) and the last four lectures numbered from 6 (again!) to 9. The loss of some quires (fol. 9-51) in the Elassona MS does not allow us to see whether it followed the same order: in fact, it only preserves the first two lectures and the last one, which lacks of title and

\(^8\) The MS, fol. α'r1-2 reads (a diplomatic transcription is provided): Περὶ τὸν επά το πλανίτων καὶ τῇ ζώδια ἔχουν.

\(^9\) The MS, fol. β'r1-2 reads (a diplomatic transcription is provided): Περὶ τῶν τεσσάρον κερῶν τοῦ χρόνου καὶ τοῦ σταυροῦ τοῦ ἀνθρώπου πόνος εἶναι.

\(^10\) For instance, fol. γ'v9 reads (a diplomatic transcription is provided): ἐπὶ ἥσυν καὶ ἡ ἠλυκία τοῦ σώματος τοῦ ἀνθρώπου ἔσται το γύρας.

\(^11\) An uncritical edition of Stephanus of Alexandria’s alchemical lectures is available in Ideler 1842, 199-253. A few lectures has been reedited by Taylor 1937 (Lectures 1-2); idem 1938 (Letter to Theodoros + Lecture 3). On Stephanus, see Papaathanasiou 2006.

\(^12\) The Meteora MS introduces here three different works -- one by Pelagius and two by Zosimus (see below).
incipit. Despite this lacuna, we must note that the sequence attested in the Meteora MS differs from what we find in the other known testimonies of Stephanus’ work, in particular in the MSS Marcianus gr. 299 (= M), Parisinus gr. 2325 (= B), Parisinus gr. 2327 (= A) and Laurentianus 86.16 (= L). All these manuscripts preserve nine lectures and a letter addressed to a certain Theodoros, whereas the Meteora MS hands down ten praxeis. Thus read their titles in the different testimonies:

First text = II 199-202 Ideler
Meteora MS (1v9-7r4) = Elassona MS (1v1-4r14): Sine titulo
Other MSS: (M) Στεφάνου Ἀλεξάνδρεως οἰκουμενικοῦ φιλοσόφου καὶ διδασκάλου τῆς μεγάλης καὶ ιερᾶς ταύτης τέχνης περὶ χρυσοποιίας. πρᾶξις σὺν θεῷ πρώτη; (BAL) Στεφάνου Ἀλεξάνδρεως οἰκουμενικοῦ φιλοσόφου περὶ τῆς ιερᾶς καὶ θείας τέχνης τῆς τοῦ χρυσοῦ ποιήσεως· πρᾶξις πρώτη

Second text = II 203-208.3 Ideler
Meteora MS (7r5-15v15): Στεφάνου σὺν θεῷ πρᾶξις βʹ = Elassona MS (4r14-8v) πρᾶξις βʹ (in mg. Στεφάνου)
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου σὺν θεῷ πρᾶξις δευτέρα

Third Text = II 208.4-34 Ideler
Meteora MS (15r15-17r11): τοῦ αὐτοῦ Στεφάνου, πρᾶξις ἐνύλου κόσμου σὺν θεῷ τρίτη(η)
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου ἐπιστολὴ πρὸς Θεόδωρον

Fourth Text = II 209-213,6 Ideler
Meteora MS (17r11-24v1) τοῦ αὐτοῦ Στεφάνου φιλοσόφου διὰ τὸ κατενέργειαν (sic) τῆς θείας καὶ ιερᾶς τέχνης· πρᾶξις σὺν θεῷ δʹ
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου περὶ τοῦ ἐνύλου κόσμου πρᾶξις σὺν θεῷ τρίτη

Fifth text = II 213,7-219,14 Ideler
Meteora MS (24v2-34r4) τοῦ αὐτοῦ Στεφάνου σὺν θεῷ πρᾶξις εʹ

On the structure of Stephanus’ lectures in these manuscripts, see Papathanassiou 1996 (who maintains that Stephanus’ writings were originally divided into 7 lectures).
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου εἰς τὸ κατ’ ἐνέργειαν πράξεις σὺν θεῷ τετάρτη

Sixth text = 219,15-223,19 Ideler
Meteora MS (34r4-40v7) τοῦ αὐτοῦ Στεφάνου εἰς τὸ κατενέργειαν (sic) τῆς θείας καὶ ιερᾶς τέχνης πράξεις σὺν θεῷ στ’
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου εἰς τὸ κατ’ ἐνέργειαν τῆς θείας τέχνης πράξεις σὺν θεῷ πέμπτη

Seventh text = II 223,20-231,5 Ideler
Meteora MS (57v9-70v11) τοῦ αὐτοῦ(οῦ) στεφάνου πράξεις σὺν θεῷ στ’·14 ἔρμου· (sic) ἀγαθοδαίμονος
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου φιλοσόφου πράξεις σὺν θεῷ ἐκτη

Eighth text = II 231,6-237 Ideler
Meteora MS (70v12-80v) τοῦ αὐτοῦ(οῦ) Στεφάνου πράξεις σὺν θεῷ ζ’
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου φιλοσόφου πράξεις σὺν θεῷ ἐβδόμη (M; ζ’· A)

Ninth text = II 238-242 Ideler
Meteora MS (81r1-88r) τοῦ αὐτοῦ Στεφάνου πράξεις σὺν θεῷ η’· περὶ τομῆς τῆς ιερᾶς τέχνης
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου οἰκουμενικοῦ φιλοσόφου πράξεις ὁγδόη περὶ τομῆς τῆς ιερᾶς τέχνης.

Tenth text = II 243-253 Ideler
Meteora MS (88v-107v) [= Elassona MS, fol. 52r-60v; titulum et incipit deficiunt] τοῦ αὐτοῦ Στεφάνου διδασκαλία πρὸς Ἡράκλειον τὸν βασιλέα· πράξεις σὺν θεῷ θ’
Other MSS (MBAL): τοῦ αὐτοῦ Στεφάνου φιλοσόφου διδασκαλία πρὸς Ἡράκλειον τὸν βασιλέα· πράξεις σὺν θεῷ ἐννατῆ.

14 This lecture bears the same title 'sixth lecture' than the precedent one.
After Stephanus’ lectures both the Meteora and the Elassona MSS hand down Synesius’s commentary on Ps.-Democritus alchemical books (4th century AD),\textsuperscript{15} two works by the so-called Philosopher Anonymous (8th-9th century AD),\textsuperscript{16} and a selection of excerpts attributed to the Graeco-Egyptian alchemist Zosimus of Panopolis (3rd-4th century AD). The overlapping between the two testimonies is shown in the following synoptic table:

\textsuperscript{15} On Synesius, see Martelli 2014, 52-56.
\textsuperscript{16} According to Letrouit (1995,63-65), two different authors may be recognized behind the general ‘title’ of philosopher Anonymous, both active in the 8th/9th century. Letrouit distinguishes between ‘le philosophe anépigraphe 1’, who composed a long work (without title) that Berthelot-Ruelle published in different sections of their edition (i.e. CAAG II 433,11-436,18 + 219,13-220,10 + 436,20-441,25), and ‘le phisophe anépigraphe 2’, who composed the two works handed down in the Meteora and the Elassona MSS.
<table>
<thead>
<tr>
<th>Fol. 1r</th>
<th>Meteora MS</th>
<th>Elssona MS</th>
</tr>
</thead>
<tbody>
<tr>
<td> </td>
<td>Short passage from Psellus (red ink)</td>
<td> </td>
</tr>
<tr>
<td>1v</td>
<td>Title of a recipe-book (red ink) = CAAG II 220,</td>
<td>Title of a recipe-book = CAAG II 220</td>
</tr>
<tr>
<td>2r-17r</td>
<td>Stephanus, <em>Lectures I-II</em> = II 199-208,3 Ideler</td>
<td>Stephanus, <em>Lectures I-II</em> = II 199-208,3 Ideler</td>
</tr>
<tr>
<td>17r-88r</td>
<td>Stephanus, <em>Lectures III-VI</em> = II 208,4-223,19 Ideler</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pelagius, <em>On this Divine and Holy Art</em> = CAAG II 253-262</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zosimus, <em>On Virtue</em> = X 39-42 Mertens</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zosimus, <em>On Lime</em> = XIII 48-49 Mertens</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stephanus, <em>Lectures VI-VIII</em> = II 223,20-237 Ideler</td>
<td></td>
</tr>
<tr>
<td>122v-132r</td>
<td>Anonymous, <em>On the Making of Gold</em> = CAAG II 424,3-433,10&lt;sup&gt;17&lt;/sup&gt;</td>
<td>70r-75r</td>
</tr>
</tbody>
</table>

<sup>17</sup> On this treatise and its tradition, see Lagercrantz 1927, 18-19 and Letrouit 1995, 64
The text of Synesius’ commentary on Ps.-Democritus alchemical books deserves particular attention, since some discrepancies are detectable in the two collections. Whereas the Elassona MS accommodates the complete treatise by Synesius between Stephanus’ last lecture and an alchemical work ascribed to the so-called philosopher Anonymous, the Meteora MS splits Synesius’ treatise into two parts, which are divided by the insertion of philosopher Anonymous’s work.

Synesius’ treatise is a dialogue between the philosopher Synesius and Dioscorus, a priest of the Alexandrian temple of Serapis. The main topic of their conversation is the alchemical teaching of Democritus, which they effort to interpret by commenting on a selection of passages taken from the four books on dyeing, which the alchemical tradition ascribes to him. In both MSS the dialogue is introduced by the title:

(Meteora MS, fol.108r-1-3 = Elassona MS, fol. 61r-1-3) Συνεσίου φιλοσόφου πρὸς Διόσκορον εἰς τὴν βιβλίον [βύβλον MetMS] Δημοκρίτου ὡς ἐν ἀχολίοις [sic MSS; lege σχολίοις]. Διοσκόρῳ ιερεῖ τοῦ μεγάλου Σεραπίδος [sic MSS; lege σχολίοις] τοῦ ἐν Ἀλεξάνδρεια θεοῦ τε ἅ ἐνδοκοῦντος Συνέσιος ὁ φιλόσοφος χαῖροι.

In the central part of the dialogue Synesius explains to Dioscorus the nature of quicksilver (ὑδράργυρος), its main properties, and the role it plays in the dyeing processes. Whereas the Elassona MS preserves this section without any gap, in the Meteora MS the discussion between the two characters suddenly breaks off, since we find philosopher Anonymous’ work On the Whitening of Sulphur in the middle of the following passage (= Syn. § 11,174-182 Martelli = CAAG II 63,18-64,1; I marked the interruption we find in the Meteora MS with the sign ‖):

Διόσκορος. Μή ἄρα τοῦτο ἔλεγεν ὁ φιλόσοφος· ὡ φύσεις συράνια φύσεων ὅμοιοι, ταῖς μεταβολαῖς νικῶσα τὰς φύσεις; Συνέσιος. Ναί, διὰ τοῦτο εἶπεν· εἰ μὴ ἐκστραφῇ, ἀδύνατον γενέσθαι τὸ προσδοκόμενον καὶ μάτην κάμνουσιν18 I οἱ τὰς ὅλας ἐξευρόντες καὶ μὴ φύσεις τῶν σωμάτων μαγνησίας ζητοῦντες. Ἐξέστι γὰρ τοῖς ποιηταῖς καὶ συγγραφεῖσι τὰς

18 The Elassona and Meteora MSS read καὶ μάτην ἐνοῦσιν.
αὐτὰς λέξεις ἄλλως τε καὶ ἄλλως σχηματίζειν. Σῶμα οὖν τῆς μαγνησίας εἰρηκεν, τούτοστιν τὴν μίξιν τὸν οὐσιῶν κτλ.

“Dioscorus. Did not the philosopher say these words: “O celestial natures, artificers of natures, which conquer natures with your transformations”? Synesius. Yes, he did, and that is why he said: “if you do not turn (the natures) inside out, it will be impossible to reach what is expected; those who examine the natures and do not investigate the natures of the bodies of magnēsia wear themselves out in vain”. Indeed, poets and prose-writers are allowed to fashion the same speeches using different figurative expressions. Therefore he said: “the body of magnēsia”, that is, the mixing of the substances” (Martelli 2014,137).

In order to better illustrate the situations in the two manuscripts, in the following table I provide a diplomatic transcription of the passage quoted above as it stands in the two testimonies:
In the Meteora MS a note in red ink is introduced after the point in which the first part of Synesius’ treatise suddenly stops (i.e. after καὶ μάτην ἐνούσιν). The note reads:

“According to the sequence of the argument, the term ‘ἐνούσιν’ seeks for (i.e. is connected with) the expression ‘εἰς [lege oi] τὰς ὅλας ἔξερευνόντες’. Here there is
THALES- DACALBO

this precious (treatise ?)\textsuperscript{19}: the Philosopher Anonymous, \textit{On the Whitening of Sulphur Water}.\textsuperscript{20}

The copyist of the Meteora MS (or an anonymous reader who annotated its antigraph) was aware of the fact that Synesius’ treatise continues with the words οἱ τὰς ὅλας ἔξωρφνωντες\textsuperscript{21}, that are precisely the words by which the second part of Synesius’ treatise is opened in the Meteora MS, fol. 117r11. On the other hand, the copyist of the Elassona MS added a marginal note after the expression ‘καὶ μάτην ἔνοδον’, in which he claims: “here something is written: “. These words correspond to the \textit{incipit} of philosopher Anonymous’ treatise, which the Meteora MS hands down between the first and the second part of Synesius’ treatise. Moreover, after the marginal note the copyist of the Elassona MS adds a sign (¥, i.e. a stroke with two dots above), which is used as reference to philosopher Anonymous’ treatise \textit{On the Whitening of Sulphur Water}. The same sign, in fact, occurs in the margin of fol. 68v3-4, where we find the \textit{incipit} of Anonymous’ treatise in the Elassona MS:

[in the left margin: ¥] Ἀνεπιγράφου φιλοσόφου περὶ θείου ΧΖ τῆς λευκόσ(εω)ς.

(inc.) Καθόσον καὶ χρεία καλεῖ τοσούτων προδήδωτε (sic)

It seems quite clear that the scribe of the Elassona MS copied from an antigraph, where the treatise \textit{On the Whitening of Sulphur Water} occupied the same position than in the Meteora MS. We may wonder whether the Meteora MS itself may be identified with the source of the Elassona MS. In that case, the above-mentioned note in the Meteora MS, which introduces the insertion of philosopher Anonymous’ treatise, would have left no sign in the Elassona MS. Probably only a complete collation of the two manuscripts will allow us to answer this question. For the moment, we can certainly draw the preliminary conclusion that the Elassona MS is based on an antigraph that followed the same order of treatises that we find in the Meteora MS.

\textsuperscript{19} The exact meaning of the sign (¥) after τὸ τίμιον τόδε is not evident. It does not seem to correspond to an alchemical ingredient (it is not recorded in the explanatory table transcribed at fol. 177v-179v of the Meteora MS). It could be interpreted just as a reference to the following treatise by the philosopher Anonymous.

\textsuperscript{20} The expression ‘sulphur water’ is rendered in the MS with the alchemical signs: X (i.e. ‘sulphur’) and Z (i.e. ‘water’).

\textsuperscript{21} That is, ‘those who investigate the matter’, who are the subject of the verb ἐνοδοῖν.
Further evidence, in fact, can be provided to confirm this point. In the Meteora MS the two treatises by the philosopher Anonymous are not consecutive, since the second part of Synesius’ commentary divides them. At fol. 114v the title of the above mentioned work *On the Whitening of Sulphur Water* is introduced, and the treatise ends at fol. 117r10, where the second part of Synesius’ dialogue starts. The dialogue ends at fol. 122v, where the second work *On the Making of Gold* by the philosopher Anonymous begins:

Meteora MS, fol. 122v14-17

[explicit of Synesius’ commentary] θ<εο>ῦ δὲ βοηθοῦντος ἀρξομαι ὑπομνηματίζειν [title of the second treatise by the philosopher Anonymous] ἀνεπιγράφου φιλοσόφου κατὰ ἀκολουθείας χρήσεως ἐμφενῶν τὴν τῆς αποείας συνεπηγμένος σύν θεῷ

On the contrary, the Elassona MS hands down the two works by the philosopher Anonymous one after the other. However, the use of marginal signs shows that the copyist of the Elassona MS relied on a source, where the second treatise by the philosopher Anonymous came after the explicit of Synesius’ work (i.e. in the same position attested in the Meteora MS). The copyist, in fact, added an interesting marginal sign at the end of Synesius’ treatise (Elassona MS, fol. 68v1-2):

Θεοῦ (with the sign Ř above the line) δὲ βοηθοῦντος ἀρξομαι ὑπομνηματίζειν (sic)

This explicit, introduced by the same marginal sign (Ŵ) is copied again at fol. 70r1, in the upper margin above the *incipit* of philosopher Anonymous’ second treatise (that is, the treatise that comes after the end of Synesius’ dialogue in the Meteora MS):

(Elassona MS, fol. 70r1-2): [upper margin: Ř θεοῦ δὲ βοηθοῦντος ἀρξομαι ύπομνηματίζειν] Ἀνεπιγράφου φιλοσόφου κατὰ ἀκολουθείας χρήσεως ἐμφενῶν τὸν τῆς αποείας συνεπηγμένος σύν θεῷ

The repetition of the *explicit* of Synesius’ treatise in the upper margin and the use of the marginal sign clearly show that the copyist of the Elassona MS was reading a source, in which Synesius’ treatise and philosopher Anonymous’ treatise *On the Making of Gold* were one after the other.
In the section following the treatise *On the Making of Gold*, it is possible to find further correspondences between the two manuscripts, although the Meteora MS seems to preserve a richer and more complete selection of texts. Both the MSS preserve some writings attributed to Zosimus of Panopolis; on the other hand, the Elassona MS omits a few technical sections that are available in the other manuscript:
<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>CAAG ID</th>
<th>Title</th>
<th>CAAG ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>159v-163r</td>
<td><em>(sine titlo) inc. Take eggs etc.</em></td>
<td>IX 1-81 Mertens</td>
<td><em>(sine titlo) inc. Take eggs etc.</em></td>
<td>IX 1-81 Mertens</td>
</tr>
<tr>
<td>163v-165r</td>
<td><em>On the Composition of Waters</em></td>
<td>X 1-16 Mertens</td>
<td><em>On the Composition of Waters</em></td>
<td>X 1-16 Mertens</td>
</tr>
<tr>
<td>163v-165r</td>
<td><em>On Fires</em></td>
<td>CAAG II 144,10-145,14</td>
<td><em>On Fires</em></td>
<td>CAAG II 144,10-145,14</td>
</tr>
<tr>
<td>169v</td>
<td><em>On Whitening</em></td>
<td>CAAG II 211,3-12</td>
<td><em>On Whitening</em></td>
<td>CAAG II 211,3-12</td>
</tr>
<tr>
<td>169v-171r</td>
<td><em>Tinctures discovered by the Persians</em></td>
<td>CAAG II 346,1-347,7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>171v</td>
<td>Originally blank</td>
<td></td>
<td>[a later hand added two texts on the tincture of iron]</td>
<td></td>
</tr>
<tr>
<td>172r-173r</td>
<td><em>Thus did the Ancients speak about Eggs</em></td>
<td>CAAG II 18-19,17</td>
<td><em>Thus did the Ancients speak about Eggs</em> (lacking of the end)</td>
<td>CAAG II 18,1-6</td>
</tr>
</tbody>
</table>

The last excerpt on eggs lacks of the final part in the Elassona MS. This omission is not easily understandable: a mechanical loss of folia or squires (although not to be

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22 This work ascribed to Zosimus represents the second part of philosopher Anonymous’ treatise *On the Making of Gold*; see see Lagercrantz 1927, 18-19.
23 The last paragraph of the text (CAAG II 140,9-20) is omitted in the Meteora and Elassona MSS.
24 This section is probably part of Synesius’ treatise; see Martelli 2014,150-151.
25 §§ 11-13 of the text in Berthelot’s edition (CAAG II 19,18-20,15) are omitted in the Meteora MS.
excluded) would not be a sufficient explanation for the incompleteness of this writing. A second scribe, in fact, started writing a new section on fol. 98v, which had been probably left blank by the earlier copyist. In any case, after the excerpt on eggs, the two manuscripts preserve two different selections of texts. In the Elassona MS, at the fol. 98v a different section begins (as already seen, written by another copyist), which hands down a short collection of pharmaceutical and magical recipes. On the other hand, the Meteora MS includes a richer selection of alchemical texts in its last part:

<table>
<thead>
<tr>
<th>Meteora MS</th>
</tr>
</thead>
</table>
| 173r-175v  | *On the Making of Quicksilver*  
  = CAAG II 220,17-222,17 |
| 175v-177r  | *On Measures and Weights* |
| 177v-179v  | Alchemical signs  
  = CAAG I 104 and 108 |
| 180r-180v  | List of Alchemists  
  = CAAG II 25,5-26,6 |
| 180v-202v  | Collection of recipes  
  ≈ CAAG II 321-337 |

3. The two introductory passages in the Meteora and Elassona MSS

The opening sections of the two manuscripts deserve a special attention, since they preserve an interesting selection of passages serving as introductory texts. Both, in fact, hand down two short texts that seem to provide the reader with a preliminary description of the contents of the collection of alchemical writings copied in the two codices. The first passage does not occur in any other alchemical testimony known so far (such as the above-mentioned Marcianus gr. 299, Parisini gr. 2325 and 2327, and Laurentianus 86,16):

[Meteora MS, fol. 1r1-13 (red ink) = Elassona MS, fol. 1r1-9]^{27} Θαυμάζω τοὺς εὐρόντας τὰ γράμ(μ)ατα καὶ τοὺς κτισμένους τὰς τέχνας

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^{26} See below, § 4.

^{27} It is worth mentioning that both the MSS hand down the following note in the upper margin: ἄρχη τῆς ἱερᾶς καὶ θείας τέχνης.
“I admire people who discovered these writings and I kindly welcome who laid the foundations of these techniques, and I like people who love this topic. We must praise this writing on the metallic art which has a spiral form: in fact, the beginning of the writing resembles coiled snakes; they conceal their head inside the coils and thrusts the rest of their body forward; so the book makes a beginning of its middle, and the onset of the story, which it has, so to speak, inherited, slips through (to end up) in the middle”.

The anonymous composer refers to a book on μεταλλικὴ τέχνη (‘the art of metals’), an expression that seems to summarizes the contents of the collection of texts copied in the two testimonies. He focuses his attention especially on the structure of this collection, which is described as a ‘spiral-shaped writing’ (ἐλικοειδὴς γραφή). The expression introduces the reader to the second part of the passage, which clearly echoes the words used by Psellus to praise the plot-construction of the Hellenistic novel Aethiopica in his essay on Heliodorus’ and Achilles Tatius’ novels. In the short treatise What is the Difference between the Novels which Deal with Chariclea and Leucippe? (Τίς ἡ διάκρισις τῶν συγγραμμάτων, ὃν τῷ μὲν Χαρίκλεια, τῷ δὲ Λευκίππῃ ὑποθέσεις καθεστήκατον), Psellus takes part in a contemporary debate on the artistic merits of the two novels28 and defends the value of the Aethiopica, whose stylistic features are highlighted in different respects. The first point made by the Byzantine scholar regards the plot of the story: Heliodorus did not only open his tale in medias res, but he also constructed a complicated plot, in which the prior events are revealed only in the middle of the story. In order to emphasize the merits of such a

28 See Dick 1986, 83.
sequence of events, Psellus introduces the comparison with a coiled snake, which reads as follows (p. 92, ll. 24-28 Dyck):

Καὶ αὐτὴ ἡ ἀρχὴ τοῦ συγγράμματος ἔοικε τοῖς ἐλικτοῖς δφεσὶ οὗτοι τε γὰρ τὴν κεφαλὴν εἰσώ τῆς σπείρας κατακαλύψαντες, τὸ λοιπὸν σῶμα προβέβληνται, καὶ τὸ βιβλίον τὴν τῆς ὑποθέσεως εἰσβολὴν ἐν μέσῳ διολισθήσασαν ὡσπερ κληροσάμενον ἄρχην πεποίηται τὴν μεσότητα.

“The beginning of the work itself resembles a coiled snake: the snake conceals its head inside the coils and thrusts the rest of its body forward; so the book makes a beginning of its middle, and the onset of the story, which it has, so to speak, inherited, slips though (to end up) in the middle”.  

The connection between such a stylistic analysis of a novel and the structure of an alchemical compendium is not completely transparent. We may certainly suppose that the anonymous writer of the above-mentioned introductory passage wanted to emphasize the difficulty of the alchemical opus, which could be accomplished only after a long investigation on the copied treatises. The reader of the alchemical collection had not to limit himself to study only the opening treatises, yet he had to carry on a deep investigation in order to fully understand the core of the preserved alchemical teaching. On the other hand, the choice of the anonymous writer could have depended on the authority that Psellus had gained in the field of alchemy. Many alchemical collections, in fact, include a short treatise that the Byzantine scholar wrote on the art of gold-making.  

Moreover, we must note that the expression μεταλλικὴ τέχνη (‘the art of metals’) is rare in the collection of Greek alchemical texts. It is therefore noteworthy the its occurs again in the second introductory text preserved by the Meteora and the Elassona MSS, which read:

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29 Transl. by Dyck 1986, 93.
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This passage occurs in other alchemical manuscripts as well: it seems to work as an erratic textual block moving in different positions within four different collections. In MSS Parisinus gr. 2327 (fol. 240r24-240v5) and Laurentianus 86,16 (fol. 219v8-17) - that are, the oldest MSS preserving this short text -- it is copied immediately after an excerpt from the work of the above-mentioned philosopher Anonymous (CAAG II 436,19-437,13). In their edition, Berthelot-Ruelle arbitrarily published this passage within the section devoted to Zosimus’ writings (CAAG II 220,11-16). However, in a footnote, Berthelot suggested identifying the text with either the title or the preface of a Byzantine handbook of practical chemistry dating between the eight and the ten century, which probably included several recipes on a wide set of techniques (such as gold-making, silver-making, the making of precious stones, and so on).31 The opening position of this passage in the Meteora and Elassona MSS seems to confirm this interpretation: in the two manuscripts the text introduces to an extent the technical information preserved in the collection, whose structure was praised in the previous passage taken by Psellus. The two texts seem to complement each other, providing a

31 See CAAG III 360.
general description of the structure and the practical contents of the alchemical ‘book’ that was copied down in the two manuscripts.

4. The recipe-book in the Meteora manuscript

Some of the techniques mentioned in the introductory passages analyzed above (especially in the second one) are clearly described in the long collections of recipes, which is handed down in the last part of the Meteora MS. This collection largely overlaps with the recipe-book published in CAAG II 321,1-337,13, which was based on MS Parisinus gr. 2327, the only testimony of this book known so far. The manuscript hands down 57 metallurgical recipes under the general heading: ἑρμηνεία σῶν θεῶ τῆς τιμωτάτης καὶ πολυφήμου χρυσοχοικῆς, “With the help of God, explanation of the very precious and famous art of goldsmiths”. A few of these recipes occur in a third manuscript as well, the Laurentianus 86,16 (= L), at fol. 253v-256r and fol. 286v-290v.32 The first section includes two recipes which coincide with CAAG II 336,12-337,9 (= L, fol. 253v1-254r12 ὑδωρ πιστῆς οἰκουμίας) and CAAG II 337,10ff. (= L, fol. 254r12-256r9 καὶ ἄλλος φησίν); the second section includes 15 recipes, six of which coincide with six recipes edited in CAAG: (1) L, fol. 286v1-16, ἄλλος μέθοδος μυστικῆ = CAAG II 332,1-11 (2) L, fol. 286v15-187r20 ἐτέρων ὑδωρ θείων = CAAG II 332,12-333,6 (3) L, fol.287r21-287v12 ὑδωρ ἵνα ἐκβάλησι χρύσομαν ἀπὸ ἀσήμην = CAAG II 333,7-17 (4) L, fol. 287v12-288r3 ἐτέρων ἀσαίτος = CAAG II 334,18-27 (5) L, 288r3-12 λαγάρισμαν χρυσαφίου = CAAG II 333,28-334,6 (6) L, 288r12-288v3 περὶ τοῦ ποιήσαι γράμματα χρυσά = CAAG II 334,22-335,2. The remaining 9 recipes of this section (fol. 288v3-290r16) do not coincide with any of the CAAG recipes and have not been edited so far.33 Against this picture the Meteora MS stands out as the testimony preserving the richest selection of recipes, which is opened by five recipes (not grouped under any general heading) that are not handed down in the Parisinus and that only in one case overlap

32 See Mertens 1995, xl-xl.i. 33 For an introduction to this section, see the preliminary description by Hammer-Jensen in Zuretti 1927, 57-58 (where not all the recipes are recorded): (1) L, 288v3-10 περὶ τοῦ ποιήσαι κόλισιν καλῆν ; (2) 288v10-13 ἄλλον; (3) 288v13-289v3 ἐτέρων; (4) 289r3-17 ἐτέρων κόλισις; (5) 289r18-289v3 ἐτέρων; (6) 289r3-10 ἐπέρα κόλισις ; (7) 289v10-21 ἑρμηνεία τῆς ἐλαιοκοινιας; (8) 289v21-290r16 ἄλλον; (9) 290r9-16 ἄλλον
with the selection preserved in the *Laurentianus*. A preliminary edition of these five texts is provided below:

(1) 180v10-181r4 Περὶ χρυσογραμμίας σιδήρου
Melánissoν <ἐν> ἀρχῇ 34 τὸ σίδηρον· πῦρωσον αὐτὸ καὶ τρίψον τὸ σίδηρον μετὰ στέατα αἰγείων καὶ ἄλεσον αὐτὸ μὲ χρυσέλαιον καὶ γίνεται μελανόν· εἰδὶ οὔτως σκίασον κλαδίν ἢ γράμματα καὶ καθάρισαι αὐτὰ μετὰ τὸ ὑπερον· καὶ στυψίσαι τὰ γράμματα με τὴν στύψιν· εἰδὶ οὔτως χρίσον [χρύσον MS] αὐτὰ ὀσπερ τὸ ἄσημν μὲ τὸν ὑδράργυρον καὶ ἄκρος πῦρων· καὶ βουρτζίζει 35 καὶ χρύσωνε. 36

How to write golden letters on iron
First make the iron black: set it on fire, break iron into pieces with fat of goats, and anoint it with the oil of Christ, and it will turn black. Then use it to sketch a twig 37 or letters and cleanse them (the drawings?) with a pestle; mordant the letters with alum 38; then smear mercury on them as you do for silver; set (them) on an intense fire, brush (them) off, and gild (them).

(2) 181r5-181v2 ἐρμηνεία τῆς λυκο[...]ας = Laur. Plut. 86.16, fol. 289v10-21 (ἐρμηνεία τῆς ἔλαιοκόν<ι>ν<ι>ς) 39

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34 The MS reads μελάνησον ἀρχῇ. The standard meaning of μελανίζω in classical Greek is ‘to be black or blackish’ (LSJ 1095), which seems to be maintained in Byzantine and Modern Greek too (see Trapp 991, s.v. μελανίζομαι, and Dimitrakos 4540 respectively). An active sense, on the contrary, seems to be necessary in the recipe.
35 Trapp 292, s.v. βουρτζίζω, ‘(ab)bürsten’; DuCange I 222, s.v. βουρτζίζειν, *polire*; see CAAG II 329,19: θὲς εἰς ὅδον ψυχρόν καθαρὸν καὶ βουρτζίζουσαν, “mets dans l’eau froide et brossé” (CAAG III 315); CAAG II 331,23 ἐπάτα τὸ ἄσημν καὶ βουρτζίζουσαν τὰ ἀχείροτα (sic), “ensuite, blanchis et polis ce qui n’a pas été travaillé” (CAAG III 317).
36 The forms πορόναν and χρυσόναν are Byzantine (and Modern Greek) equivalents for πυρόνα and χρυσόν (see Colinet 2010, xxxvii). The MS reads πῦρων and χρύσων; the spelling with omicron is maintained by Berthelot in his editions of late alchemical texts: for πυρόναν see CAAG II 392,15 (cf. DuCange I 1277, s.v. πορόναν, *urere*; for χρυσόναν, see CAAG II 328,4 and 10; 329,1 and 10.
37 On this practice, see below, recipes n. # (= CAAG II 327,26) Περὶ τοῦ χρυσόναν ἃς εἰς κούπαν ἢ κλαδίν ἢ ἄλλον ἄποιν καὶ τὸ ἄλλον ἁργόσουντος, to be translated as suggested by Stephanides 1922, 307: “Sur la manière de tracer dans une coupe des animaux ou un rameau ou toute autre chose dorée et de laisser le fond non doré”; recipe n. # (in CAAG II 331,7): ἐπάτα τὸ ποιήμα πυρές καὶ φύλλα καὶ κλαδία καὶ ἄσημα κλ., “puis, fais-en des fils, des feuilles, des rameaux, des étoiles, etc.” (CAAG III 316).
38 In the earlier alchemical texts, the term στύψις referred to the process of in an astringent substance (see Halleux 1981, 44-45); on the other hand, in later alchemical texts, στύψις is often used to refer to the astringent substance itself (see, e.g., Colinet 2010, 140 *s.v.* στύψις).
39 The term ἔλαιοκόννα refers to a ‘plaster made from lime and oil’ (LSJ 527), which is mentioned by Zosimus among other substances used to seal the different parts of distillatory devices (Zos. IX 13
Λαβῶν ἄσβεστον ὅσον χρίζης· θές αὐτήν εἰς σκάφην [σκάνψη MS]40, καὶ βα<μ>-βάκην στίβασμένον, καὶ λινέλι καὶ δέρνε [δύρε MS]41 το ὅσον νὰ γένῃ ξυμάριν· ἐπ<ί>τα ἄλειψον τὰς μάζας τὸν μαρμάρον· εἰθ' οὐτὸς θές ὕδωρ [sic L: ὕδατι MS] ἐν λέβητι, καὶ τὸν ἀπέσω φλοῦν τοῦ πτελαίας<ζ> [φθε: MS], καὶ κρίθαριν, καὶ λινόσπερμα καὶ ἅ βράσουν καλὸς· ἐπ<ί>τα ἔπαρον τὸν χύλον καὶ μίζον καὶ ἄσβεστον καὶ μὲ κεραμίδιν τετριμμένον καὶ κοσκινισμένον, μὲ ὕδων ὄρνιθειον καὶ κάν<ν>αβίν ἢ λύκον [?; λόν L; ft. λίνον], καὶ μίξας ὁμοῖ τὰ πάντα· εἰθ' οὐτὸς ἄλειψον καὶ μυστροσθλίβωσον [μυστροκλήβοσον MS]42 παράνω μὲ λινέλιν.

Explanation of (how to prepare) a plaster made from lime and oil

Take as much lime as you need; put it in a washbasin along with cotton – which has been pressed to the bottom – and linseed oil, and pound it until it becomes a mush; then anoint the lumps of marble. Then put water, the internal bark of elm, barley, and linseeds in a pan, and make them boil well. Take this decoction and mix lime with crushed and sifted bricks, with hen eggs, and hemp or flax (?), mix well all the ingredients together. Then anoint (the distillatory device?) and use a spoon to rub the surface (of it) with linseed oil.

Mertens). Stephanus too mentions this compound in his commentary on Hippocrates’ Aphorisms (in Aph. IV 1 = II 208,24-26 Westerink): οὔτος οὖν <καὶ> οἱ ὄδραγοι ποὺσιν τοὺς γὰρ σιδηράς καταφαλίζοντας καὶ ἐμπυκοῦσαν οὕτως ἐλαιοκοινίαν ἢ κηρομαρμάρῳ καὶ τοῖς τοιούτοις, ἵνα μὴ ἀπόληται τὸ ὕδωρ, "Hydraulic engineers do the same: when connecting water-pipes, they caulk them with a mixture of oil and lime, or wax and ground marble, etc., so that no water is lost." A Graeco-Latin glossary records the term ἐλαιοκοινίαν, which is interpreted as mauta (II 294 Loewe).

40 In this passage L reads εἰς κόψην.
41 The same reading occurs in L (ὄδρα). My correction (δέρνε; see Trapp 348, s.v. δέρνε, ‘schlagen, peitschen’) is based on the comparison with the recipe 11 of the MS Holkamicus 109 (Colinet 2010, 44, Η11, § 3, ll. 15-17): καὶ δέρνε το καλά έν ποὺν νὰ γένη ἐναν ξυμαρίν, ‘et battez bien le mélange jusqu’à ce qu’il se forme une sorte de pâte’.
42 In this passage L reads μυστροστιβάσσων. I suggested to read the verb μυστροσθλίβωσον, from μύστρον, ‘spoon’, and στιβάν, ‘to rub’ (see LSJ9 suppl. 274, s.v. στιβάνον; DuCange II 1363, s.v. στιβάνον). For στιβάνον, see, e.g., CAAG II 323,4 εἰθ’ οὕτως στιβάσσον αὐτὸ μετὰ ἐλάκκον, “et frotte avec de la cendre d’olivier” (CAAG II 307); CAAG II 323,17 καὶ στιβάσσον μετὰ κάλαμον, “puis frotte avec un plume” (CAAG III 310); CAAG II 334,26 στιβάσσον με λαθάριν ή με λινούδοντα, “polis avec une petite pierre ponce, ou une dent de loup” (CAAG III 320).
43 The expression ἡ λύκον [λύκον L] seems to refer either to a different name for hemp or to an equivalent substance (substitute); many Byzantine lexica often link λύκον to κάνναβις; see Pollux, Onom. VII 72,6-7 καὶ ή κάνναβις δ’ ὤμοιον ἔστι λίνο; Hesych. κ 673,1 κάνναβις ἔστι δὲ φυτὸν τι λίνω ὤμοιον.
181v3-15 εἰς τὸ χρυσάφαι γράμματα

(3) 181v3-15 eis to xrysäfai grammata

Θές πάμπανυ πετάλην αέραν’ ξυλόκουκα γ’ καὶ υδάργυρον [ξυλόκουκον] α’ τρίγον πρῶτον τὸ χρυσάφην εἰς μάρμαρον κοκκίνον’ καὶ στάζε

πρῶτον χριστέλαιον καθαρὸν ἀδόλον [ἀδόλο- MS’] μία ἢ δύο στάλαγμοὺς’ καὶ ἑπετια θές τὸν υδάργυρον καὶ ἐνωσόν ἁμα’ καὶ τρίγον ἀμφότερα’ πλὴν μετὰ προσοχῆς’ καὶ εἰς τόπον νὰ μηδὲν πνεύει ἁμα’ θές δὲ καὶ κρομμυδίον [κρομμι-] ζυμών’ εῖτα βαλὼν ὅπου θέλεις θέςει’ σύνασε

44 αὐτὸ μὲ πτερόν’ καὶ ὅταν θέλης γράφε καὶ χρύσονε.

To gild letters

Set a leaf completely made of copper; silique, 3 parts and mercury, 1 part; first break the gold into pieces on a scarlet marble; and first drip (shed drop by drop) unadulterated pure oil of Christ, 1 or 2 drops; then set the mercury and amalgamate together; break both ingredients into pieces, but be careful, do not do it in an ventilated place. Put the juice of a small onion as well; apply it in the point (of the leaf) that you prefer, collect it with a feather and, when you want, write with golden letters.

(4) 181v16-182v9 ἄλλον

Lambda ἀσβεστον κίτρινον ὅσον θέλης’ καὶ ἄλας ἁμμονιακὸν’ καμπάνου ἄλλο τὸσον’ καὶ τρίγον αὐτὰ λεπτῶς’ καὶ θές το ἐν φουρνε[λίον] 45 μικρόν’ καὶ σκέπασέ τα μὲ πηλὸν τῆς σοφίας’ καὶ θές ὅν φουρνε[λίον] λίω καὶ ὅσον θέλην νόκταν’ καὶ τὸ πρῶι ἄρον αὐτόν καὶ ἐωσον ἵνα [_HELIA] ψυχρανθῇ’ καὶ ἄρον ἐκ τὸ τζουκάλιν καὶ ζύμωσέ το’ καὶ πρόσθες ἄλας ἁμμονιακὸν τετριμμένον ἄλλο τὸσον’ καὶ ποίησέ το πάλιν ὥσπερ πρῶιν μὲ τὸ πυλόν ἵνα μὴ εὐγή[46] οὐδεμία ἁμα’ ἁμα’ καὶ πάλιν θές το ἐν φουρνε[λίον] λίω καὶ οὕτως ποίησε τὸ σάλον φοράν ὥστε να στραφῇ εἰς τὸν καμπάνον τὸν πρῶιν’ καὶ τότε ἔξηβαλε καὶ θές το εἰς ἁγγείον γύψιναν νὰ (ἐ)ργ(άσης) [ναρ’ MS’] καὶ θές το εἰς ἰσκιον νόκτα μία’ καὶ ἀπ’ ἐκείνα τὰ νερὰ πίξον 47 εἰς ἀργυρον ἀπάνω εἰς κάρβουνα’ καὶ

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44 σύνασε as well as σύναζε are byzantine forms for σύναγε.
45 The term (from Latin zucca) refers to an earthen pot; see DuCange II 1574, s.v. τζουκάλι (τζουκάλι τζουκάλιν) olla fictilis; Colinet 2010, xlv.
46 οὐδεμία ἁμα’ ή μη εὐγή[46] οὐδεμία ἁμα’ ή μη εὐγή[46] οὐδεμία ἁμα’ (ἐκβαίνω) ’herausgehen’.
47 This form is an aorist imperative from ῥίχνω (DuCange II 1302), Byzantine cognate of ῥίπτω, ‘to throw, to cast’ (Colinet 2010, xxxvi). The form ῥίξε occurs in an alchemical recipe preserved in MS
ὅταν ἴδῃς ὅτι φυρῄνην τὰ νερὰ, ῥίξον νερὸν πλεότερον ὡστε νὰ σκεπάσῃ ὁ ἄργυρος· ῥήξον νερὸν πλεότερον ὡστε νὰ φυράσῃ τὸ νερὸν ὅλον· καὶ ἄργυρος καὶ χάλκος καθαρὰ· καὶ φυραίνω ὅλον· καὶ ἐξούσιον ἡμεῖς μὲ χάλκῳ· καὶ ἔφεσθαί τις καὶ χύσον αὐτὸ· ὣστε νὰ ὑποθεσίν.

Another (recipe)

Take as much yellow lime as you want, and ammoniac salt, and the same amount of kampanon; grind them finely; the put them in a small earthen pot; cover them with the lutum sapientiae and set them in a small furnace and left it there for one night. In the morning take it and let it get cold. Take (the substance) out of the pot and knead it, and add another equal amount of ground ammoniac salt; perform the same operation you did before with the lutum (sapientiae), so that no vapour gets out, and set again (the pot) in a small furnace; perform the entire process so that it turns into the previous kampanon. Then take it and put in in a vessel made of gypsum in order to work it; put it in shady place for one night, then pour part of these waters on silver (placed) on charcoals; when you notice that the waters evaporate, pour more water so that the silver remains covered; (do it) until all the water has evaporated, then mix the silver with pure copper, and melt them together in a melting-pot; collect them and melt them in an ingot mould; take it and it will be suitable for any purpose.

(5) 182v9-13 ἄλλον

λάβε κασσίτερον καὶ θές εἰς τὰ χωνία ὑπὸ τοῦ ἄλλου νοείτω· καὶ ὅταν τὸ νλυθῇ, χύσον αὐτὸ εἰς τὸ καθαρὸν, "jetez-le dans le ballon qui contient le liquide pur").

48 DuCange II 1292 records the form ῥηγλίον, "vas chymicum in regulae forman diductum, in quo liquatum metallum effunditur". Also see Trapp 1502, s.v. "Stange, Leiste'.

49 The verb φυράω (‘to knead’ in ancient Greek; see LSJ: "abeat", cf. ngr. φυραίνω· ἀπομειοῦμαι, ὑφιστάμαι ἀπομείωσιν φύρα ἐλάττωσις ποσοῦ, βάρους ἢ ἄξις (Hépitès, Lexicon). Exemplum vetustius non novi."
After this point, 59 recipes follow in the Meteora MS, which are grouped under the general title (fol. 183v13-15): ἐρμηνεία σὺν Θεῷ τῆς τιμιωτάτης καὶ πολυφήμου χρυσοχοικῆς [χρυσοχοικῆς MS]. This recipe-book substantially overlaps with the version edited by Berthelot-Ruelle, except for the omission of four recipes – namely, CAAG II 323, 19-26; 324,1-6; 336,15-337,9; 337,10-11 – and the inclusion of a few texts that are not in the Parisinus. I list below the titles of the Meteora MS recipes and provide a preliminary transcription of two complete recipes (rec. 3 and 29), whose differences with respect to the versions edited by Berthelot-Ruelle are recorded in footnotes.

(1) 182v15-183v3 ἀρχ(η) εἰς λαγάρισμα χρυσαφίου [χρυσαφήου MS], “Incipit. To purify gold” (= Recipe 1 in CAAG II 321,3-322,3: Περὶ τοῦ λαγαρίσαι τὸ χρυσίον).

(2) 183v4-15 Εἰς τὸ λαγάρισμα τοῦ ἀσημίου [ἀσημείου MS], “To purify silver” (= Rec. 2 in CAAG II 322,4-10: εἰς τὰ λαγαρίσαι ἄργυρον).

(3) 183v16-184v4 ἐρμηνεία τοῦ χρυσόματος (= Rec. 3 in CAAG II 322,11-23: same title).
Λαβὼν χρυσάφιν 50 εξάγιον αʹ, σφύρισον αὐτό ἐν τῷ ἁκμών ὀσπερ λεπτόν, καὶ κατάκοψον, καὶ θέσετε ἐν τῷ χονιῷ ἐν τῇ πυρᾷ ὀσπερ ἐρυθριᾷ. 51 Καὶ ἔκτοτε βάλε 52 μέσον τὸ χρυσάφιον 53 νὰ ποιήσης ἢ ὧς άργυρον [ἄργυρα MS] πατερ ἡμῶν. Καὶ βάλλων διάργυρον εἰς τὸ χωνὶν 54, καὶ μίξον, καὶ ἄρον ἐκ τοῦ πυρός· καὶ βαλὼν ὁδὸν εἰς χηβάδιν [χυ-MS], θέσες εἰς ἤς MS κάρβουνα ξοντανά μέσον· καὶ σβέσον αὐτά· ἐλθον νὸς τοῦ χρυσάφιον μέσον τοῦ κογχύλιου ἢ εἰς τὸ χηβάδιν [χυ-MS] 56 καὶ ἄρον αὐτό, καὶ πλῦνον καλῶς ἐν τῇ χειρὶ σου· καὶ βαλὼν

50 CAAG II 322,11: χρυσίον.
51 CAAG II 322,13: ἐρυθρίασῃ.
52 CAAG II 322,13: τότε βάλλων.
53 CAAG II 322,13 τοῦ χρυσίου.
54 CAAG II 322,14-15: ἐν τῷ χωνὶ.
55 CAAG II 322,15: ἀπὸ.
56 The sentence θέσες εἰς κάρβουνα — ἢ εἰς τὸ χηβάδιν is missing in CAAG; however in the MS Parisinus gr. 2325, fol. 280v, we read: θέσες εἰς κάρβουνα ξοντανά μέσον τοῦ κογχύλιου εἰς τὸ χηβάδιν. As a
ΤΑΛΕΣ - ΔΑΚΑΛΒΟ

Explanation of (how to make) a gold object

Tale gold, one exagion; hammer it on an anvil to make it thin, cut it into pieces and put it in a melting-pot on fire, so that it turns reddish. From this moment put the gold in the middle of the crucible, so that you work it for the time of a Pater Noster. Then add mercury in the melting-pot, mix, and take it away from the fire. Pour water in a container, place it on burning charcoals, and quench them. Then melt the gold in the shell or container. Remove it and wash it in your hands. Add further mercury, pour it in the water of the shell and apply this mercury on silver with an orange (?); then gild it with a gilding tool. After setting it on fire for five or six times, when you see that the color comes out, burn it a bit longer, then put it in water; then rub it, burn it again, and put it in water.

(4) 184v5-185r2 χρύσωμα [χρύσωμα MS] ἄλλον κλαπωτόν [κλαπόντων MS], “Another gold object suitable for gold wires” (= Rec. 4 in CAAG II 322,24-323,6: same title).

(5) 185r2-185v7 ἑρμηνεία εἰς τὴν ἔγκαψιν, “Explanation of an enameling technique” (= Rec. 5 in CAAG II 323,7-18: ἐρ. εἰς τὴν ἔγκωψις).

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58 CAAG II 322,18-19: τότε χρύσωσαι αὐτὸ.

59 At this point the text as edited by Berthelot–Ruelle has a sentence that is missing in the Meteora MS: ἄρον αὐτὸ καὶ τρίψον μετὰ βρούτζων χοιρείαν. Καὶ πάλιν βαλὼν αὐτὸ ἐν τῇ πύρῳ, “take it away from the fire, and polish it with a brush of pig’s hairs; then set it again on fire”. The lacuna may be justified as an instance of saut du même au même.

60 CAAG II 322,23: πυρώσας.

61 See Trapp 835, s.v. κλαπωτός, ‘(gold)bestickt für Golddraht’; DuCange I 659.

THALES-DACALBO
(6) 185v7-18 ἑρμηνεία ἐτέρα τοῦ σαπουνίου, "Another explanation of (how to make) soap" (= Rec. 8 in CAAG II 324,7-13: ἑρμηνεία ἐτέρου σαπουνίου).

(7) 186r1-9 ἑρμηνεία τῆς βασιλικῆς κολλήσεως [κόλλησις MS] τῆς χρυσῆς, "Explanation of the imperial technique to solder gold" (= Rec. 9 in CAAG II 324,14-18: same title, except for the omission of τῆς χρυσῆς)

(8) 186r10-186v2 περὶ τῆς βασιλικῆς κολλήσεως [κόλλησις MS] τῆς ἀργυρῆς [-είς MS], “Explanation of the imperial technique to sold silver” (= Rec. 10 in CAAG II 324,19-24: same title)

(9) 186v3-12 ἄλλη ἑρμηνεῖα (εἰς τὴν ἀργυροκόλλησιν [ἀργυροκόλλησις MS], "Another explanation of how to sold silver" (= Rec. 11 in CAAG II 324,25 – 325,2: ἄλ. ἐρ. τῆς ἀργυροκόλλησιν)

(10) 186v12-187r16 ἄλλη κόλλησις [κόλλησις MS] ἐγρηγόρη [ἐγρηγόρη MS]· ἡ ἀλαμάρσα, “Another quick soldering, the alamarsa” (= Rec. 12 CAAG II 325,3-13 ἄλλη κόλλησις περὶ τῆς ἀργυροκόλλησιν)

(11) 187r17-187v7 ἑρμηνεία νὰ ποιήσῃς χρῶαν [χρῶαν MS] χρυσαφίου, “Explanation of how to produce the colour of gold” (= Rec. 13 in CAAG II 325,14-18: ἐρ. εἰς τὸ ποιῆσαι χρ. χρω.).

(12) 187v7-5 εἰς τὸ ποιῆσαι χρῶαν [χρῶαν MS] ἐν ἀργυρῷ σκεῦει χρυσωμ(ἐνη) [χρυσωμ- MS], “To give a golden colour to an silver object” (= Rec. 14/1 in CAAG II 325,19-24)

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62 We must note that the Parisinus gr. 2325, fol. 281r14 reads τὴν ἐγκαψην. In the comment on this recipe (CAAG III 309, n. 3) we read: “Il s’agit sans doute d’une operation d’émaillage, désignée par le mot ἐγκαψην, ἐγκαψην ou ἐγκαψην”.

63 Rec. 6 (CAAG II 323,19-26: ἑρμηνεία τοῦ σμάρθου) and rec. 7 (CAAG II 324,1-6: ἑρμηνεία τοῦ σαπουνίου) are omitted in the Meteora MS.

64 The genitive κολλήσης would be possible as well, at least for the form κολλήση (Dimitrakos 4000, s.v. κόλλησις).
(13) 187v15-188r3 εἰς τὴν ἐγκαψιν (-ην MS), “To enamel” (= Rec. 14/2 in CAAG II 325,24-26)

(14) 188r3-7 εἰς τὸ γανόσαι [τῷ λανεῖσε MS] ἀργυρον, “To make silver shiny” (= Rec. 15 in CAAG II 325,27-326,2: same title).

(15) 188r7-16 σημείωσις [-εις MS], “Indication” (= Rec. 16 in CAAG II 326,3-7: same title)

(16) 188r16-188v5 εἰς στάλαγμα, To produce a distilled substance (= Rec. 17 in CAAG II 326,8-11: εἰς μάλαγμα)

(17) 188v5-189r13 νὰ ποιῆσῃ [-εις MS] φουρμάς, “To make hollow moulds” (= Rec. 18 in CAAG II 326,12-26: περὶ τοῦ ποιῆσαι φ.)

(18) 189r13-189v7 Περὶ χρυσογραμμίας, “On gold writings” (= Rec. 19 in CAAG II 32327,1-8: Π. χρ. ἔτερον

(19) 189v8-190v1 διήγησις νὰ ποιῆσῃ [-εις MS] χρυσὰ κεφάλα(ια) εἰς βιβλίον, “Description of how to write gold capital letters in a book” (= Rec. 20 in CAAG II 327,9-25: Περὶ τοῦ ποιῆσαι χρ. κεφ. ἐν β.)

(20) 190v2-10 διήγησις ὅτι νὰ θέλ(ης) χρυσώσαι [-όση MS] ζῶα· ἡ κούπ(αν) ἢ κλαδήν· ἢ ἄλλον ἔτερον· καὶ τὸ ἄλ<λ>ον ἄχρυσοτον, “Description of how to draw golden animals, or a (golden) coup, or a golden twig, or something else, without gilding the rest (of the object)” (= Rec. 21 in CAAG II 327,26-328,4: περὶ τοῦ χρυσώσαι ζῶα εἰς κούπαν κτλ.)

65 The reading Στάμ in the MS has been interpreted on the basis of the last sentence of the recipe, which reads: καὶ γίνεται ἀληθινὸν στάλαγμα (CAAG II 326,10-11 reads καὶ γίνεται ἀληθινὸν μάλαγμαν).

66 On the term φουρμά (and other Byzantine technical terms related to metallurgy), see Merianos 2014, 252, and Papathanassiou 2002, 123-125.

67 See above.
(21) 190v10-11 Περὶ τῆς ἐγκαύσεως, “On enameling”68 (= Rec. 22 in CAAG II 328,5-6: same title)

(22) 190v12-191r1 εἰς τὸ χρυσὸδσαι [-όσε MS] ζῶα εἰς κούπαν· καὶ ὁ κάμπος νᾶ ἔναι ἀσπ(ρος), “To draw golden animals on a coup by leaving its bottom white” (= Rec. 23 in CAAG II 328,7-10: same title)

(23) 191r2-5 εἰς τὴν χρυσὴν τὴν κόλλησιν [κόλλυσιν MS], “To solder gold” (= Rec. 24 in CAAG II 328,11-13: εἰς τὴν χρυσοκόλλησιν)

(24) 191r6-16 περὶ τοῦ χρυσὸδσαι χαλκὸν μετὰ ἀσήμιν, “On how to gild copper with silver” (= Rec. 25 in CAAG II 328,14-20: Π. τ. χ. χ. μὲ τὸν ἀσημὸν)

(25) 191r17-191v11 εἰς τὸ χρύσωμαν τὸν ἀέρος τοῦ μαλάγματος, “To (make) a gold object made of a amalgam of bronze (?)”69 (= Rec. 26 in CAAG II 328,21 – 329,1: περὶ τοῦ χρυσώματος τοῦ ἀ. τοῦ μ.)

(26) 191v12-192r3 κόλλησις [κόλλυσιν MS] εἶνα κοπῆ ῥίνη [-οί MS], “Soldering if (?)” (= Rec. 27 in CAAG II 329,2-7: κόλλησις ἀνκοπυρίνη)

(27) 192r3-7 ὅταν χρυσώνῃς ἀσήμιν [-ήμην MS] καὶ οὐδὲν πιάνῃ [-εί MS], “If you gild solver and nothing holds” (= Rec. 28 in CAAG II 329,8-10: no title)

(28) 192r8-13 εἰς τὸ χρυσὸδσαι [-όσε MS] ζῶα εἰς κούπαν· καὶ ὁ κάμπος ἄχρυσωτος, “To draw golden animals in a coup and keeping its bottom not gilded” (= Rec. 29 in CAAG II 329,11-14: εἰς τὸ χρ. ζ. εἰς κάμπον κούπας καὶ ὁ κ. ἔναι ἄχ.)

68 See above.
69 See Stéphanidès 1922, 308, who explains: “le ἀὴρ μαλάγματος est le ἀὴρ χρυσός (CAAG II 324, 22), c’est-à-dire des feuilles très minces (aériennes) d’or (l’oripeau)”.
(29) 192r13-192v5 eις το δοσια χροαν [χρω- MS] ευμορφην (sic) eις ἀσημιν [-ήμην MS] χρυσωμενου (= Rec. 30 in CAAG II 329,15-19. περι τοι ποιησαι χροαν ώραιοτατην eις ἀσημων χρυσωμενων)

Ἐπαρον ταιφην μερη γ', και τρυγιαν καθαραν απο Μονοβασιας μερη β', και άλας μερος α', και τρυγιον καλος ας βρασουν καλος μετα οδατος. Ελο' ουτως βαλε το ἀσημιν70 μεσον <ε>ως άραν πατερ ήμουν. 'Επειτα έκβαλον τοτο, θες εις νερον κριον71 καθαρον, και βούρτζισον [-ηζον MS].

To give a beautiful colour to silver.

Take sulphur, 3 parts, pure lees of Monemvasian wine, 2 parts, and salt, 1 part; grind them well and boil them well in water. Then put silver in the middle and (keep it) for the time of a Pater Noster. Then remove it, put it in pure cold water, and brush (it) off.72

(30) 192v5-13 δταιν σκαζη [-ει MS] το ἀσημιν [-ήμην MS], “If silver is defective” (= Rec. 31 in CAAG II 329,20-24

(31) 192v13-193r1 εις την κολλησιν [κώλυσιν MS] τοι σμαρδου,73 “To solder an enamel”

(= Rec. 32 in CAAG II 329,25-28: same title)

(32) 193r1-7 εις το ποιησαι σωρμα [ση- MS] κουφιον, “To make a thin (metallic) wire” (= Rec. 33 in CAAG II 330,1-5: Περι τοι π. σωρμαν κ.)

(33) 193r8-17 να κανης [-τς MS] έγκαυσιν, “To perform an enameling technique” (= Rec. 34 in CAAG II 330,6-11 (Περι τοι ποιησαι έγκαυσιν)

(34) 193r18-193v8 εις το ποιησαι χροαν [χρω- MS] εις χρυσωμενον ἀσημιν [-ήμην MS] “To give a good colour to gilded silver”

(= Rec. 35 in CAAG II 330,12-17: Περι τοι ποιησαι χρ. ευμορφην εις χ. ἀσημην)

70 CAAG II 329,18: ἀσημων.
71 CAAG II 329,19: βδομ ψυχρων.
72 See Merianos 2015, 255.
73 See DuCange II 1404, s.v. σμαγδος, encaustum, pigmentum metallicum.
(35) 193v8-17 εἰς τὸ ποιῆσαι κόλλησιν [κώλσιν MS] τῶν κακαβίων εἰς λουτρόν καὶ εἰς <σω>ληνάρια [ληνάρια MS], “To solder small pots (to make) a washbasin and tubes” (= Rec. 36 in CAAG II 330,18-23: Περὶ τοῦ ποιῆσαι κόλλησιν τῶν κακαβίων καὶ εἰς σουλινάρια λουτρόν)

(36) 193v18-194r4 εἰς τὸ λαμπρόνα μαργαρίτην, “To make a pearl shiny” (= Rec. 37 in CAAG II 330,24-27: same title)

(37) 194r4-6 έτερον εἰς αὐτὸ, “Another recipe for the same purpose” (= Rec. 38 in CAAG II 330,28 – 331,2: ἄλλον)

(38) 194r7-195v3 ἐξήγησις τῆς τυμωτάτης καὶ ψιλωτάτης [ψυ- MS] καὶ ἀχειροθέτου (=? αχειροτέτοι MS) τέχνης τῶν συρμάτων τῆς χρυσοχοικῆς τέχνης, “Explanation of the very precious and easy and divine (i.e. not belonging to human beings) art of (making metallic) wires for the art of goldsmiths” (= Rec. 39 in CAAG II 331,3-28: Περὶ τῶν συρμάτων τῆς χρυσοχοικῆς τέχνης)

(39) 195v3-196r24 σμάρδωμαν ἄλλον, “Another enameled object” (not included in CAAG)

(40) 196r24-196v5 ἔτερα δουλία, “Another work” (= Rec. 40 in CAAG II 332,1-11: ἄλλη μέθοδος μυστικῆ)

(41) 196v5-197v3 έτετερον ὑδωρ X [i.e. θείου/θείον], “Another (recipe for) sulphur/divine water” (= Rec. 41 in CAAG II 332,12 – 333,6: same title).75

(42) 197v4-198r4 έτετερον θείον X [i.e. θείου] ὑδωρ· νά ἐκ βάλης τὸ χρύσομα [-ομα MS] ἀπὸ τὸ ἄση(μιν), “Another sulphur/divine water to divide gold from silver” (= Rec. 42 in CAAG II 333,7-17: Ὑδωρ ἵνα ἐκβάλης χρύσομαν ἀπὸ ἄσημην)

74 See DuCange II 1514, s.v.σωληναρίον (or σολυ-), tubus.
75 On sulphur/divine water, see Viano 1997; Martelli 2009.
(43) 198r4-198v5 ἕτερον εἰς αὐτό, “Another recipe for the same purpose”
(= Rec. 43 in CAAG II 333,18-27: ἕτερον ἀσαῦτως)\(^76\)

(44) 198v5-15 λαγάρισμα χρυσαφίου [-φήου MS], “Purification of gold”
(= Rec. 24 in CAAG II 333,28-334,6: τὸ λαγάρισμαν χρυσαφίου)

(45) 198v15-199r5 ὁμ(οίον) εἰς ἀσημιν [-ήμην MS] χρυσό<μενον> [χρυσό MS], “The same for gilded silver” (= Rec. 45 in CAAG II 334,7-11: ἕτερον ὁμοιον εἰς ἀσημιν)

(46) 199r5-8 δόταν σκάζῃ τὸ ἀσήμανῃ [eι MS] τὸ χρυσάφιν, “If silver or gold are defective”
(= Rec. 46 in CAAG II 334,12-14: same title)

(47) 199r9-13 τοί πῶς νὰ σταγματίσης ἀργυρον, “How to harden silver” (= Rec. 47 in CAAG II 334,15-17: τὸ ποῦ σταγμάτισης ύδραργύρου)

(48) 199r13-199v3 ἄλλον, “Another (recipe)” (= Rec. 48 in CAAG II 334,18-21: same title)

(49) 199v3-200r1 εἰς τὸ ποιῆσαι γράμματα χρυσά, “To make golden letters” (= Rec. 49 in CAAG II 334,22 – 335,2: περὶ τοῦ ποιῆσαι γρ. χρ.)

(50) 200r2-13 εἰς τὸ ποιῆσαι ὀραίαν χαλκὸν ὡς αχρυσόν [i.e. χρυσόν], “How to make copper as beautiful as gold” (= Rec. 50 in CAAG II 335,3-10: περὶ τοῦ ποιῆσαι ὀραίϊχαλκός ὡσπερ χρυσόν)

(51) 200r13-16 ἕτερον εἰς σαπούνιον, “Another recipe for soap” (= Rec. 51 in CAAG II 335,11-12: Περὶ τοῦ σαπουνίου)

\(^76\) On recipes 42-43 see Halleux 1985, 56-57.
(52) 200r17-200v2 ἄλλον, “Another recipe” (= Rec. 52 in CAAG II 335,13-14: ἕτερον)

(53) 200v2-4 Τὸ υαλί [γεαλῆ MS], “Glass” (= Rec. 53 in CAAG II 335,15-16: ὁ ύελος)

(54) 200v4-201r7 εἰς τὸ λευκάν(α) χαλκόν, “To whiten copper” (= Rec. 54 in CAAG II 335,17 – 336,3: Περὶ τοῦ λ. χ.)

(55) 201r7-201v8 εἰς τὸ ποιῆσαι χαλκόν77 ὡσπέρ α [i.e. χρυσὸν], “To make copper like gold” (= Rec. 55 in CAAG II 336,4-14: Περὶ τοῦ π. χ. ώσ. χρ.).78

(56) 201v8-202r7 ἕτερα ἐρμηνεία εἰς τὸ ἀξυγγοσάπουνον [ἀξυγγοσάπουνον MS],79 “Other explanation for a fatty soap” (not included in CAAG)

(57) 202r7-202v6 εἰς τὸ ποιῆσαι φούρμας, “To make hollow moulds” (not included in CAAG)

(58) 202v7-12 Sine titulo (not included in CAAG)

(59) 202v13-17 Sine titulo (not included in CAAG).

REFERENCES
Abbreviations

77 The alchemical sign of copper is hardly readable in the MS.
78 Rec. 56 (CAAG II 336,15-337,9: ὁδῷρ πιστῆς σύκονομίας) and rec. 57 (CAAG II 337,10-11: καὶ ὀλλος φησίν) are omitted in the Meteora MS.
79 ἀξυγγοσάπουνον is a hapax that is not recorded in the lexica. The term ἀξούγγιον (Byzantine spelling for ἀξούγγιον, ‘animal fat, tallow, grease’; see DuCange I 94) refers to the main ingredient of the soap (σάπων or σαπούνιον), whose preparation is explained in the recipe.

THALES-DACALBO
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The relationship between alchemy and natural philosophy in Byzantine times

Gianna Katsiampoura

Introduction

This presentation is a part of a research project in progress about natural philosophy, sciences and alchemy in the Byzantine era. The paper addresses a significant void in the current historiography of science by surveying and mapping a previously unexplored area: the relationship between alchemy and natural philosophy in the Byzantine era after 750 AD (according to historiographical boarders of history of science and culture). Although our aim is to explore the concepts of matter, its characteristics, properties and of course its potential transmutation, within the epistemological, educational, technical and also religious context of this period, and generally we don’t adopt the epistemological tradition of the Great Man of History, our study is based mainly on the examination of the life and works of the scholars who presented works on both natural philosophy and alchemy. This methodological approach is a choice imposed upon, because, among the many difficulties in the study of the relation of byzantine natural philosophy and alchemy is that the sources are very few and fragmentary. However, except of the texts by scholars who wrote on alchemy and natural philosophy, other relevant sources, such as theological and philosophical texts, byzantine dictionaries, chronicles, laws etc., are also examined.

On the other hand, philosophy, the arts, and technology were not separated by clear boundaries, as the surviving sources reveal. So, a clear definition of these disciplines, although is necessary, is very problematic. In addition, the more one examines the

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differences among texts, contexts, and even social roles of the Byzantine thinkers, the more one realizes how multiform and versatile this tradition is.\(^2\)

In this paper the texts under the term “natural philosophy” are the ones having as a main subject the study of nature and the physical universe. Byzantines usually used the terms physica, or physiki akroasis (according to Aristotle), or natural science\(^3\), or physikos logos (discourse about nature) according to the definition by the *Suida Lexicon*, from 10\(^{th}\) century, where we are reading: “discourse about nature by philosophers, i.e. about bodies, principles, elements, about universe and space and vacuum” etc.\(^4\)

On the other hand, for the term “alchemy” in Byzantine texts, the term in use was “chymeia” in different forms (χημεία or χημεία or χημία or χημία), or chymeftikos logos (discourse about chymeia)\(^6\) and its definition, again by the *Suida Lexicon*, was the following: “the making of silver and gold, which the relative books burned by Diocletian” (here the Lexicon referred to Greco-Egyptian alchemical texts).\(^7\)

Emperor Konstantinos Porphyrogenitus, in 10\(^{th}\) century, gives the same definition in his work *virtutibus et vitiis*.\(^8\) In Byzantine texts the terms “chrysopoiesis” or “poiesis chrysoù” or “chrysopoia” is also in use for the goldmaking, which is the main subject of the Byzantine alchemical texts from the middle Byzantine era and onwards, as we can see


\(^3\) As Michael Psellos wrote: “[Aristotle] was the first which intenified the natural science” ([Ο Αριστοτέλης] τὴν φυσικὴν πρῶτον ἐπιστήμην ἀκρίβωςαν), Boissonade J.Fr. (ed.), Michael Psellus, *De Operatione Daemonum*, Norimbergae 1838, p. 163.


\(^7\) χημαία: Ἡ τοῦ ἄργουρον καὶ χρυσοῦ κατασκευήν, ἢς τὰ βιβλία διερευνησάμενος ὁ Διοκλητιανός, ἔκαψε. Ὄτε δὴ τὰ νεωτερισθέντα Αἰγυπτίως Διοκλητιανῷ τούτῳ ἀνιμέρῳ καὶ φονικῷ ἐχρήσατο. Ὄτε δὲ καὶ τὰ χρημάτων χρυσοῦ καὶ ἄργουρον τοῖς παλαιοῖς αὐτῶν γεγραμμένα βιβλία διερευνησάμενος, ἔκαψε, πρὸς τὸ μηκέτι πλοῦτον Αἰγυπτίως ἐκ τῶν τοιώτης προσγίνεσθαι τέχνης, μηδέ χρημάτων αὐτῶς ἄργουρον τοῖς παλαιοῖς ἐκ τῶν τοιώτης προσγίνεσθαι τέχνης, μηδὲ χρημάτων αὐτῶς ἄργουρον τοῖς παλαιοῖς. *Suida Lexicon*, op.cit., c. 3899.

from the work by Anonymous from the 7/8 c., Cosmas Ieromonachus from the 11th c., in vernacular Greek, Michael Psellos from the 11th c., Nikephorus Blemmydes from the 13th c.). In addition, references to goldmaking exist in non alchemical texts, such as in Carmina Moralia by Gregory of Nazianzos, while the myth of Hermes, who discovered gold is common not only among the alchemists, as Julius Sextus Africanus, but also among Byzantine chronographers who reproduce his narration.

Alchemy in Byzantine era

The Greco-Egyptian alchemical tradition, according to different sources, was known to the Byzantine scholars from the early period. There are references to alchemy in philosophical, theological, historical texts, etc.

There is a lot of this kind of references. In the category of the philosophical texts, for example, Aeneas of Gaza, a Neoplatonist philosopher who became a Christian and lived in the 5th-6th centuries, in his dialogue entitled Theophrastus about immortality of the soul and the resurrection of the body, accepts that the change of matter is possible and uses as

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11 As example, « ἐκ ψαμάθου δὲ μέγ’ ἔξοχος ἐπλέτο χρυσὸς», J.-P. Migne, Patrologiae cursus completus, tome 37, Paris 1862, col. 575. See also cols 914, 967.
Issues on Greek Alchemy

an example the making of gold from cheaper metals, such as silver and tin. Aeneas says that in the same way the bodies are joined with the souls.\textsuperscript{14}

According to Aeneas, the alchemical process changes the eidos (form) of matter.

About a century later, John of Antioch, a monk in the 7\textsuperscript{th} century, apparently contemporary with emperor Heraclius, composed a chronicle (Ιστορία Χρονική), where he refers to the burning of alchemical texts by emperor Diocletian. As he writes, the reason for the burning was that Diocletian was afraid of the power of money Egyptians could have:

"Ὅτε δὴ καὶ τὰ περὶ χρημάτες ἀργυροῦ καὶ χρυσοῦ τοῖς παλαιῶς αὐτῶν γεγραμμένα βιβλία διερευνηθέντας έκαυσε πρὸς τὸ μηκέτι πλοῦτον Αἰγυπτίως ἐκ τοῖς τοιαύτης περιγίνεσθαι τέχνης, μηδὲ χρημάτων αὐτῶς θαρροῦντας περιουσία, τοῦ λοιποῦ 'Ρωμαίοις ἀνταίρειν".\textsuperscript{15}

Both Porphyrogenitus and the Suida Lexicon, as mentioned above, repeat this sentence, such us other texts (Acta St. Procopius).\textsuperscript{16} The interesting point here is that there isn’t any comment for the ability of the Egyptian alchemists to produce gold or silver.

Another chronicler, George Syncellus, from the 8\textsuperscript{th} century, in his chronicle Ecloga Chronographia refers to Greco-Egyptian alchemists commenting on different types of their approach to the transmission of their alchemical knowledge.\textsuperscript{17}

George Malalas, in his work titled Chronographia, describes the story of a fake alchemist, John Isthmeos, who, during the reign of Anastasios I, swindled many

\textsuperscript{14} «όὔτο δὴ τῶν ἀνθρώπων τὰ σώματα τῇ τῆς ψυχῆς ἰδιότητα συμμετέχοντα», «Καὶ οὐκ ἔπηθανος ἢ πρὸς τὸ κρείττον μεταβολὴ τῆς ύλης. Ἐπει δὲ καὶ παρ’ ἡμᾶς οἱ περὶ τὴν ύλην σοφοὶ, ἀργυρὸν καὶ κασσίτερον παραλαβόντες, καὶ τὸ εἶδος ἀφανισταντες, ἐπὶ τὸ σεμιάρτερον μεταβαλόντες τὴν ύλην, χρυσὸν κάλλιστον ἐπιτίθησαν», "Aeneae Gazaei Philosophi Christiani, Theophrastus", in J.P. Migne (ed.), Patrologia Graeca, vol. 85, 1864, c. 992A, 989C.

\textsuperscript{15} C. Muller, Fragmenta Historicum Graecorum, vol. IV, Paris 1883, p. 602, par. 145.


\textsuperscript{17} «Δημόκριτος Αθηνίων φυσικός ἠκούσας ἀνέγοντα τοῦ καθὼς ἐν Αἰγύπτῳ μυθικὰς μυθικὰς υπὸ Ῥωμαίων τοῦκ Μήδου σταλέντος ἐν Αἰγύπτῳ παρὰ τοῖς την καρδιὰν βασιλέων Περσῶν ἀργυρὸν τὸν ἐν Αἰγύπτῳ ἱερόν. ἐν τοῦτῳ τῆς Μέμφεως ἐν άλλοις ἱεροῖς καὶ φιλοσόφοις, ἐν οἷς ἦν καὶ Μαρία τῆς Εβραίας σοφή καὶ Παμμένης, συνέργασον περὶ χρυσοῦ καὶ ἀργυροῦ καὶ λίθων καὶ πορφύρας λεοξῆς, οὕτως δὲ καὶ Μαρία. ἀλλ’ οὕτως μὲν Δημόκριτος καὶ Μαρία ἐπιθύμησαν παρ’ Ῥωμαίοις χρυσοῦ καὶ Παμμένος δὲ κατέγραψεν καθὼς ἀργυροῦ γράφοντας: Alden A. Mosshamer (ed.), Georgii Syncellii, Ecloga Chronographia, Teubner, Leipsig 1984,
silversmiths in Constantinople. After this, the emperor had arrested him and exiled him to Petra.  

Cedrenus, and other chronographers tell the same story.

Another category of sources is the one referencing alchemy and alchemists. Photius, in his Βιβλιοθήκη, makes a synopsis of the work of Olympiodorus and refers to Zosimus.

Until the 11th century, the references to alchemy and alchemists show that the interest about them is alive among the Byzantines, as a subject for debate, according to Photius.

Also, in the late eleventh century, in a poem entitled Dioptra, which is in the form of a dialogue between body and soul, the monk Philip Monotropos uses the alchemical process too: just as an alchemist changes lead into gold, in the same manner Christ will change human nature.

In our opinion, these texts are important because they show that the principles of alchemy, as Suidas defined it, have a continuous existence in Byzantine thought in a theoretical, not only practical, level.

In addition, there are reports in historical sources for the interest about alchemical practice. For example, the report of ‘Umāra ibn-Ḥamza (d. 814/815), the ambassador of caliph al-Manṣūr (754-775) to the Byzantine court, evokes the alchemical interests of emperor Constantine V Kopronymos (741-775). The report describes that two


experiments in the ambassador’s presence transmuted lead into silver and copper into

**The discourse on matter in Byzantium**

The tradition of Aristotelian physics in the Byzantine period is more or less known. The byzantine approach to nature was a Christian version based on Aristotelian works, with some elements of Platonic and Neoplatonic philosophy.\footnote{23 E. Nicolaidis, Science and Eastern Orthodoxy, The John Hopkins University Press, Baltimore 2011, passim. K. Oehler, “Aristotle in Byzantium”, Greek, Roman and Byzantine Studies, 5, 1964, p. 133-146.}

Here, the discussion will focus on the concept of matter, which was a common topic not only for the philosophers, but also for the theologists. Besides, most Byzantine scholars were both theologically and scientifically informed and they understood that theological beliefs necessarily entailed scientific beliefs and the opposite.\footnote{24 D. Lindberg, “Medieval science and religion”, in Gary B. Ferngren, Science and religion. A historical introduction, The John Hopkins University Press, Baltimore 2002, p. 57-72.}

As mentioned above, the conversation (discourse) about matter was common among the Byzantine scholars. From Basil the Great, from the 4\textsuperscript{th} century, until Nikephoros Gregorias, in the 14\textsuperscript{th} century, the concept of matter attracts the interest of scholars and discussions are held not only about its creation, its eternity or not, but also about its characteristics and its properties, the possibility of transmutation etc.

In the Byzantine texts the concepts of sympathia, meixis and krasis and transmutation of matter exist very often. The process of meixis and krasis exists not only in alchemical or texts of natural philosophy, according to Suida, as mentioned aboved, but also in theological texts. Sometimes, the discussion is about the combination of the created and the non-created world, others about the union of soul and body or about the union of Jesus’ divine and human nature, as we will see later in what Psellos writes.

Many Christian beliefs, which exist in Byzantine texts, are discussed in natural philosophy’s and alchemical terms, such the transfiguration in Thabor mount, the resurrection of the body, the transubstantiation in the Eucharist. Aeneas of Gaza, for
example, uses the alchemical finishing of basic metals to demonstrate the transfiguration of the resurrected body.\(^{25}\)

Theophylaktos of Bulgaria, archbishop of Ohrid from the 11-12\(^{th}\) century and student of Michael Rsellos, also uses an example from nature, the combination of fire and iron, to explain the union of human will with the divine.\(^{26}\)

Nikephoros Gregoras, one of the scholars of the Paleologian Period (14\(^{th}\) century), discussing about created and non-created things, wrote that all the created could be increased or reduced. In another section of this chronicle, he wrote that the only non-created thing is the divine nature. All the others are created, so they could change.\(^{27}\) In his «Ερμηνεία εἰς τὸν Συνεσίου περί ἐνυπνίων λόγον» (Comments on Synesios’ Discourse on dreams), Gregoras wrote that the world under the moon consists of the four elements and its nature changes (πάσχειν καὶ ἀλλοιοῦται), giving examples for this change.\(^{28}\)

As we already said, another term which is very often in use by the Byzantine scholars in the discourse on nature is the one of sympatheia, a stoic principle whose origins were incorporated into Greek thought by Poseidonius (c. 135-51 BC), formed part of the early alchemical theory.\(^{29}\) The concept of sympatheia is basic in the medical and astrological discourse and exists in ancient and Byzantine medical texts (by Galen, Aetius, Paul, John Actuarius, Symeon Seth), astrological texts (by Ptolemy etc.) and texts by pagan philosophers (Iamblichus, Simplicius, Proclus, John Stobaios etc.).

In the Christian Byzantine tradition, the concept of sympatheia remained in use for a long time: from Basil of Caesarea,\(^{30}\) in the 4\(^{th}\) century, to Theodorus Metochites, in the 14\(^{th}\)

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century. 31 Gregory of Nyssa, brother of Basil of Caesarea and also among the Fathers of the Church, refers to sympathiea in different texts, discussing God, the human body and the creation of the world. 32 Theophylaktos Simocattes, chronicler and natural philosopher in the 7th century, used the term to interpret the relation between iron and lodestone in his work “Dialogos peri diaforon fysikon aporematon” (Questiones physicae). 33 Here we can not fail to mention Ioannes Philoponus, 34 from the 6th century, and his text about the combination of natural bodies, and the work by Theodore Laskaris, 35 emperor of Nikaea and student of Nikephoros Blemmydes, in the 13th century. It is therefore more than obvious from the previously mentioned sources that the alchemical terms constitute an important interpretative tool for Byzantine natural philosophy.

34 «πάθεν οὖν τὶς δυνάμεις αὕτη, εἰ καθαρὰς ἀμορα ζωῆς τινὸς ἦσαν τὰ ἄγνηχα; τὶ δὲ δουλεύεται αὐτῷ ἡ διαπλοκὴ τῆς ψυχῆς πρὸς τὸ σωματοειδή τοῦ κόσμου; λέγω οὖν ὅτι τριῶν οὐνὶν τοῦτον μίξεαθ, τῆς κατὰ παράθεσιν καθ’ οὓς συνιμμένους εἰσὶν ἄλληλοι εἰς ἔναν οὐκ ἔνα, καὶ τῆς κατὰ κρᾶσιν, ἐς ἐπὶ τοῦ ὅλου καὶ τῶν ἀνδριάτος, καὶ τῆς κατὰ διαπλοκὴν ὡς ἐπὶ τῶν σχοινιῶν, ἡ μὲν κατὰ παράθεσιν ἀσμαθίας ἐστὶν (οὐδεμία γὰρ γίνεται τῶν παρακείμενων πρὸς ἄλληλα συμπάθεια), ἡ δὲ κατὰ κρᾶσιν συγγραμμὸν τῶν κατακεφαλικῶν ἐργάζεται, ἡ δὲ κατὰ διαπλοκὴν μέση ποὺς ἐστίν οὔτε τῆς παράθεσεως τὸ ἀσυμμέθυστο ἑρωίναι οὔτε τῆς κρᾶσεως τῶν ἀσφιεγκεμένον· συνάσπεται γὰρ ἄλληλος τὰ συμπλεκόμενα κατὰ πλείονα μορία”, M. Hayduck, Ioannis Philoponi in Aristotelis de anima libros commentaria, Commentaria in Aristotelem Graeca 15, Reimer, Berlin 1897, p. 20-21.
Texts about goldmaking, natural philosophy and their writers

Returning to the main question of this presentation, the relation between alchemy and natural philosophy, it’s important to examine two interesting cases of Byzantine scholars and their work, Michael Psellos and Nikephoros Blemmydes. Both of them were monks, writers and teachers, and wrote about natural philosophy, medicine and gold making. As mentioned above, the alchemical works from Byzantine period were about goldmaking, while the references to gold as material can be often encountered in other texts.

Michael Psellos

Michael Psellos was one of the scholars who attached particular importance to the study of the natural world, also as a subject for teaching. He was a scholar in the imperial court, monk for a while, head of the Imperial School of Philosophy under Constantine IX Monomachos (1042-1055) with the rank of the consul of the philosophers (hypatos), and was called “polyhistor” on the grounds of his multiplicity of interests. He lived in the 11th c., when the interest in the natural world essentially made its appearance and was associated with a more general secularization of Byzantine thought. Psellos’ contemporary historiographers, like Zonaras or Skylitzes’ Continuatus, criticize his work from a traditional Christian perspective. It should be noted that, earlier in the end of the 10th century or in the beginning of the 11th, the Byzantine scholars collected the surviving alchemical texts and compiled a coherent corpus.

It should be noted herein what Psellos himself writes in his Chronographia about his scientific and philosophical culture: After the study of Plato and Aristotle, he studied Plotinus, Porphyrius, Iamblichus and Proclus, and learned from them the scientific accuracy. In another quotation, he writes that the aim of philosophy is to investigate the nature of beings and to interpret the arcane theories (ἀρρήτους θεωρίας).

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38 Codex Marcianus Graecus 299 (= M), surviving in the San Marco Library in Venice.
39 «Ἐντεθέν τοῦν ὀρμηθές αὐθής ὁσπερ περιόδουν ἐκπληρών οἱ Πλωτίνους καὶ Πορφυρίους καὶ Ιαμβλέχους κατήκην, μεθ’ οὖς ὁδὸν προβαίνων εἰς τὸν θαυμασμοστήτατον Πρόκλουν ὁς ἐπὶ λιμένα μέγιστον κατασχύν, πάσαν εἰκέθεν ἐπιστήμην τῇ καὶ νοῆσεν ἀκρίβειαν ἐπίστασα· μέλλον δὲ μετὰ ταῦτα ἐπὶ τὴν πρώτην ἀναβάνειν φιλοσοφίαν καὶ τὴν καθαρὰν ἐπιστήμην μειώσθαι, τὴν περὶ τῶν ἀσωμάτων θεωρίαν προϋλαμβῶν ἐν τοῖς λεγομένους μαθήμασιν, ὅ δὲ μέσην τινὰ τὰξιν τετάρταν, τῆς τε περὶ τὰ σώματα φύσεως καὶ τῆς ἀσχέτου πρὸς τάστα νοῆσεως, καὶ αὐτῶν δὴ τῶν οὕσιων, αἰς ἡ καθαρὰ συμβαίνει νόησις, ἕν’
Michael Psellos, as mentioned above, wrote a lot of works, some of them important for the study of natural philosophy in Byzantium. Among others, we should mention the *Omnifaria Doctrina* (Διδασκαλία Παντοδαπή)*, Theologica*, *De Operatione daemonum*, etc. but there are a lot of interesting quotes in other texts.

In his letter to patriarch John Xifilinos, Psellos argues for his interest on natural philosophy. According to his argument, the interest about nature was, on one hand, a main characteristic of a Father of the Church, such as Maximus or Basil of Caesarea, and, on the other, he says that matter exists everywhere… So, the existence of matter per se is the motivation for the research. In the *Opuscula logica, physica, allegorica, alia* he discuss in detail the substance of matter, the matter and its qualities and the composition of bodies and its different forms (Περί της διαφοράς των σύνθετων σωμάτων), using gold and silver as an example. In a letter to an unknown recipient (“Τῷ αὐτῷ”) Psellos, explaining the natural causes, says that among them is the sympatheia («διὰ τὴν ἐν τῷ παντὶ συμπάθειαν»). In addition, we have to mention another Psellus’ text, «Περί παραδόξων ἀναγνώσματων», where the scholar on one hand says that he studied even vicious and hideous ideas to refute them, on the other refers to the alchemist Julius Sextus Africanus and his belief that technique is a process like birth-γέννησις.

After this outline of Psellos’ epistemological framework, lets return to his main texts about alchemy and natural sciences.

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The text Περί χρυσοποιίας (On gold making)\textsuperscript{48} is a letter by Psellos to the Patriarch Michael Kerullarios or to John Xiphilinos, in which the writer, still relatively young, discusses the production of gold, outlining a number of possible methods.

An important point in Διδασκαλία παντοδαπή from an alchimical view is, according to Psellos, the relation between making and understanding. Psellos, talking about divine and human mind, writes that the making is located in understanding in the same way the understanding is located in making.\textsuperscript{49} This principle in the epistemic level is very serious for the scientific discussion in Byzantium as well as in the whole of Middle Ages, when the scientific observation of nature, precise description of what is observed and, the most important, experiment in accordance with a strict methodology, were unknown. As we can see, the making, the basis of alchemical process, is legitimized by Psellos in a philosophical context.

The first sentence of Χρυσοποιία is exactly about the relationship between philosophers and the practical art of alchemy (εμπύριος και βάναυσος).\textsuperscript{50} Psellos claims that alchemy, which is accused as manual and crude according to the ancient Greek tradition of demarcation of sciences and arts, must become a philosophical discipline. His proposal is that the philosopher has to study the alchemical practices and techniques, which are valuable for scientific knowledge. So, according to Psellos, the alchemical practices and techniques become scientific activity, not occult or magic. A similar sentence exists in another text, a letter by Psellos, where he refers to cheese production and he stresses the importance of working manually.\textsuperscript{51}

Here, a corresponding principle by Stephanos of Alexandria should be noted. Stephanos, in the 7\textsuperscript{th} century, wrote that a born of God (θεογενής) and godly-minded (θεόφρων) man have to learn by doing, and by theologies and mystical orations.\textsuperscript{52}

\textsuperscript{49} «Και η ποίησις εν τω νοείν και η νόησις εν τω ποιείν», 28.10-11
\textsuperscript{50} 1.4-10
The second serious point in *Omnifaria Doctrina* is Psellos’ perception of Creation and functioning of the natural world. As he writes, God is the creator and the first cause, but after him in the natural world we could find a lot of causes, which explain the creation and function of bodies.\(^5\) In addition, in another text, echoing mainly the Stoics,\(^6\) he writes that things are in sympathy with each other, so they act in togetherness (in *sympnoia* – σύμπνοια) and all are under the first Cause.\(^7\) So, this dogmatic principle allows the changes of natural bodies, by human action and intervention. The scholar, supporting the relative autonomy of the laws of nature, legitimizes the human effort to change the natural bodies on the basis of natural laws. As he writes in a letter, the providence of nature is wise.\(^8\)

On the same grounds, in *Χρυσοποιία*, Psellos on the basis of the principle that the cause of transformations in things must be sought in nature, he goes on to present and analyze the methods for producing gold. At no point in the text, there are to be found references to the divine will. Presentation and interpretation of the issues is transparently secular. The basic interpretative tool, i.e. the relationship between cause and effect, claims universal validity insofar as hermeneutic approaches to the natural world are concerned.

Another point, which relates Psellos’ philosophy with alchemy, is his ideas about matter and things. In *Omnifaria Doctrina*, on Earth, all material things are under continuous change, as he writes in various paragraphs.\(^9\) Material bodies can change quantitatively and qualitatively.\(^10\) On the other hand, matter is the basis of the four elements (earth, water, fire, air), which we can keep in mind if we remove from them the qualitative characteristics. Nevertheless, this pure form of matter doesn’t exist in the natural world.

On the above basis of the principle that the cause of transformations in things must be sought in nature, as well as that bodies could be changed quantitatively and qualitatively, Psellos in *Χρυσοποιία* goes on to present and analyze the methods for producing gold,

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\(^{53}\) "Άρχη των όντων πρώτη μεν και ὑπεράρχιος ο Θεός, μετά δε θεόν πολλαί αρχαί των φυσικών πραγμάτων εἰσί", §83.2-3.


\(^{57}\) «Πράγματα αλλοίωτα καὶ μεταβλητά», 17.4.

\(^{58}\) See §86
emphasizing that for himself the question of transmutation of stones is of equal interest. As he writes, the alchemical art processes matter.\(^\text{59}\) However, he limits the discussion on the one hand to methods for production of gold, on the other to directions for doubling of its existing quantity, improvement of its quality, and heightening of its lustre.

The last crucial point in *Omnifaria Doctrina* is the issue about mixing and constitution of bodies.\(^\text{60}\) The argument for this process is related with alchemical process, so we can find here another relationship between the philosophical view of matter and alchemy.

In *Ὑποθέησις*, we can find a lot of examples for the aforementioned mixing. But these recipes seem to be only academic, so it’s more possible that Psellos did not enter into alchemy.\(^\text{61}\) Nevertheless, this fact doesn’t change the significance of his philosophical principles.

Finally, it is very important here to mention a quotation from Psellos work “What is the difference between the novels deal with Chariclea and Leucippe” («Τίς ή διάκρισις τῶν συγγραμμάτων, ὃν τὸ μὲν Χαρίκλεια, τὸ δὲ Λευκίππη ὑποθέσεις καθεστήκατον;») about the novels by Heliodore (3\(^\text{rd}\) c. AD) and Achilleus Tatus (5\(^\text{th}\) c. BC): “The beginning of the work itself resembles a coiled snake: the snake conceals its head inside the coils and thrusts the rest of its body forward; so the book makes a beginning of its middle, and the onset of the story, which it has, so to speak, inherited, slips through (to end up) in the middle”\(^\text{62}\).

This quotation with slight variations can be found as introduction in the manuscript 97, in Library of the Monastery of Aghios Stephanos, Meteora, from 1503/4\(^\text{63}\), and also in the manuscript 197, in Library of the Monastery of Panagia Olympiotissa, Elassona, from

\(^{59}\) «Τας ύλας μετακινείν και τας φύσεις μεταποιείν», 1.6-7.

\(^{60}\) «Περί μίξεως και κράσεως», § 90.


\(^{63}\) «θαμάζει τοὺς εὐρύτας τὰ γράμματα, καὶ τοὺς κτισμένους τὰς τέχνας ἀσπάζομαι, (καὶ) φιλῶ τοὺς ἄγαπόντας αὐτὸν· ἐπαινετή (δὲ) ἐλκυοδής γραφή τῆς μεταλλικῆς τέχνης· ἔπει ἡ ἀρχὴ τοῦ συγγράμματος τῆς ἐλικτῆς ἐκείνης δόρεαν· οὕτω γὰρ τὴν κεφαλὴν· ἵσος τῆς πύρας κ(α)τ(α)κλὺζων (δὲ) τὸ λοιπὸν σῶμα προβεβλήθη· (καὶ) τὸ βιβλίον τῆς τοιοῦτο [sic] θέσεως, εἰσβάλη ἐν μέσῳ· διωλισθῆσας, ὅσπερ κλήρῳ κληρωσάμενον· τὴν ἀρχὴν πεποίηται τὴν μεσότητα», man. 97, Library of the Monastery of Aghios Stephanos, Meteora, f. 1r.
1507 and 1741. One could argue here that the symbol of the snake used here by Psellos takes him into the tradition of the alchemists and it is another indication for his relation with them.

**Nikephoros Blemmydes**

There are fewer sources for Nikephoros Blemmydes, monk and teacher of Theodore II Laskaris, emperor of Nicaea, which are related with his beliefs about natural science. Although Blemmydes wrote a lot of works in different subjects, he wrote only an extensive textbook under the title *Περὶ φυσικῆς ἀκρόάσεως* (*Epitome physica*), for the students in his school in his monastery in Emathia, near Ephesus. The *Epitome* survived in numerous manuscripts up to the 19th century, an indication of the popularity it enjoyed at schools thereafter. On the other hand, unfortunately we have only the problematic edition in *Patrologia Graeca* but not a scholarly standard edition yet. Blemmydes wrote a work on alchemy too, where he mentions a recipe for goldmaking from eggs.

Nikephoros Vlemmydes, in the 32 chapters of *Epitome physica*, presented in detail the main topics of natural philosophy. He uses the Aristotelian works, mainly the *Φυσικὴ Ἀκρόασις* and *Μετεωρολογικά*, as well as the commentaries by Alexander from Afrodias, John Philoponus, Simplicius and others.

The first chapter is about natural principles and causes, and Vlemmydes writes here that the first efficient cause is God and the first final cause is divine kindness. In other words, God created the world and so someone could know God by knowing nature. Then, Vlemmydes presents the main principles of Aristotelian physics, adding Christian

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64 [12.] (f. 1r) ἀρχὴ τῆς θείας κ(α)ί ἱερᾶς τέχνης. Inc. (manu B): « Θαυμάζω τοὐς εὑρόντας τὰ γράμματα· κ(α)ί τ(οῦς) κτίσματος τὰς τέχνας ἀπάνωμαι· κ(α)ί φιλῶ τοὺς ἀγαπῶν· τ(οῦ· ἐπενετῇ (δὲ) ἢ ἐλκοδύθης γρα(ϕή) τῆς μεταλυκτῆς τέχνης· ἐπὶ ἢ ἀρχὴ τοῦ συγγράμματος· τοῖς ἕλκτοις ἔοικεν ὀδεσιν ὀὐτοῖς γὰρ τὴν κεφαλὴν ἵσος τ(ῆς) πυρ(ῆς) καταλύσαν(τες) τὸ λοιπὸν σῶμα προβέβληται· κ(α)ί τὸ βιβλίον τοῦς τοιούτωs εἰσβάλη εν μεσω διολιστήσας ὄςπ(ηρ) κλῆρον κληροσάμενον τ(ήν) ἀρχὴν πεποίηται (τα) τὴν μεσώτητα ἐπετεί».  


66 «Οθεν θειικὸν αἴτιον (καὶ) κυρίον καὶ πρώτως ὁ θείος ἐστί νοῦς καὶ τειλικόν ἢ αὐτοῦ ἀγαθότης, δι’ ἢν πάσαν κτίσιν ἐδημιούργησεν, ἵνα γνορίζηται καὶ κηρύττηται», 1025γ.  

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cosmological principles (God is the first cause Creation,\textsuperscript{67} God is the architect who created the world\textsuperscript{68}).

Blemmydes in \textit{Epitome} devotes a large part in the debate on matter and its properties, according to Aristotelian principles, changing only the first cause, which for him is the Christian God. However, some excerpts listed in other sections are very interesting. One of these refers to metals and their natural properties. Here, Blemmydes presents the properties of metals and their different types, such as metals and ores. These different types are made by different natural process. He states, for example, the exhalation and the burning, usual and frequent processes for the alchemists.\textsuperscript{69} In other passages, he refers as natural caused processes the condensation and the sublimation.\textsuperscript{70}

In the alchemical text which passed down under his name, the \textit{Crysopee}, Blemmydes gives a technical recipe for gold making, using mainly natural materials as eggs, earth, and water. He seems to know well the power of fire and in his text gives precise instructions for the amount of material and the necessary tools and utensils.\textsuperscript{71} It should be noted that these short text doesn’t refer to any philosophical or alchemical principles.

\textbf{Conclusions}

A first conclusion from this presentation is that both scholars, Blemmydes and Psellos, were to a great extent familiar with the subject and shows that they believed in the theoretical possibility of transmutation, as a consequence of the laws governing the four elements.

In this context, they considered that the alchemical process is a natural processes, based on the properties of matter, and in agreement with the Divine will. Blemmydes, for example, mentions in the first and final lines of his text that his recipe was performed with the synergy of God.\textsuperscript{72} So, the maker-craftsman could change nature only with

\footnotesize{\textsuperscript{67} «ἐμελέτηκεν ἄρη καὶ αἰτία μόνη ἐστὶν ἢ παντουργός σοφία καὶ δύναμις τοῦ Θεοῦ», 1065 στ.
\textsuperscript{68} «κατὰ τὴν νεότιν τοῦ μόνου σοφοῦ ἀρχιτέκτονος καὶ πανταιτίου Θεοῦ», 1097δ.
\textsuperscript{69} Migne J.P. (ed.), «Νικηφόρου τοῦ Βλεμμίδου Εἰσαγωγικῆς Ἐπιτομῆς Βιβλίον Β. Περὶ φυσικῆς Ἀκροάσεως», \textit{Patrologia Graeca}, vol. 142, 1863, c. 1211 C-D.-1213 A.
\textsuperscript{70} As example in c. 1165, op.cit.
\textsuperscript{72} «τῇ συνεργείᾳ τοῦ πάντα ἢς ἤκουσε οὖν εἰς τὸ ἐνναὶ παραγάγοντος Χριστοῦ τοῦ ἀληθινοῦ θεοῦ ἡμῶν», Berthelot M. (ed.), “Nicephore Blemmydes – Chrysopee”, op.cit., p. 452.}
divine synergy and help. The Creator created the world but he gave to humans the freedom for changes. Therefore, alchemy is based on natural and divine principles and doesn’t have any relation with occult practices or paganism. This rational schema shows a possible difference between the origins of alchemy and the Byzantine scholarly tradition, and in this way it is directly connected with the dominant Byzantine eschatological context of understanding of the world. Of course, the matters arising here are more complex. For example, the relation between laymen knowledge and formal knowledge. Alchemy is above all a practical knowledge based on the knowledge and skills of the craftsmen and therefore accessible by laymen and laywomen. An important issue therefore has to do with the extend that the knowledge of the craftsmen influenced formal/typical natural philosophy. And this brings us directly to the work by Edgar Zilsel.

Within the social and religious movements of the sixteenth century, new kinds of intellectual activities emerged that combined philosophical ideas with technical interests. The mathematical logic of scholastic philosophers was combined with the practical skills of artisan craftsmen into a new kind of instrumental rationality. The previously separated roles, or identities of scholars and craftsmen were mixed together in new combinations, giving rise to what Edgar Zilsel termed the modern ‘scientific spirit’. At the same time, a range of movement intellectuals propounded ideas about making knowledge useful by adopting new methods for investigating both human and non-human reality. As such, the cognitive praxis of the Reformation provided a point of departure for the discourses, methods and practices that would later come to be characterized as modern science.

A last point for more research: It is also probable that the plans of the Emperor Konstantinos Monomachos (the Gladiator) for the foundation of an Imperial Technical School are connected with Psellos’ interests on Alchemy (Νεαρά-Novelle 1047), In the middle of the eleventh century technical training was provided in Constantinople through special schools. These schools were, possibly, functioning under the imperial authority. We assume, further, that the innovation in technical training was due to

Constantine IX, and that this innovation aimed to reinforce the «new class» of merchants and craftsmen, which arose during his reign.\textsuperscript{75}

\textsuperscript{75} Σταυρούλα Χονδρίδου, «Σημείωμα για την τεχνική εκπαίδευση στο Βυζάντιο τον 11ο αιώνα», \textit{Σύμμεικτα}, τ. 13, 1999, σ. 157-166.
Two unidentified Greek alchemical manuscripts

Andrée Colinet notes in the 11th volume’s introduction of *Les alchimistes grecs* that “the Greek alchemical manuscripts [starting from the end of the Byzantine Empire] are very few and well-known”¹. And yet two manuscripts, at least, are missing from that general inventory. These missing manuscripts do not belong to the “relics”² which Paul Kraus was talking about, i.e. some alchemical recipes found among Medieval Greek texts of astronomy, astrology or magic. These two manuscripts represent a relatively important and coherent whole, and are – as for their form – totally new. They are rather late since they date from the 17th century. It might be the reason why nobody has been interested in them until now. They are too late for the scholars specialized in Byzantine period and too far from the interests of the historians of chemistry of that time who give more importance to the Western chemistry. The two manuscripts I am talking about are not unknown for all that, even if they have never been studied nor even perhaps been read: actually they appeared in the catalogue of the France National Library collections. They are the manuscripts “Supplément Grec 1027” (SG 1027) and “Supplément Grec 1030” (SG 1030) of the Department of the Western manuscripts. Their author is Athanasius Rhetor³.

The reason why these manuscripts have been preserved until now is that they were integrated – with other Athanasius’ papers⁴ – into Chancellor Pierre Séguiers’ library at Athanasius’ death in 1663 or as soon as 1655 when Séguiers confiscated several manuscripts from Athanasius. We know that the Ms. SG 1027 appeared in the 12 August 1672 inventory of Séguiers’ library⁵ several months after his death. But even if none of Athanasius’ papers had been included to the detailed inventory of the Greek manuscripts published by Bernard de Montfaucon in 1715, entitled Bibliotheca Coisliniana, a stamp on Athanasius’ manuscripts attests that these documents (recipes, letters, notes, rough drafts, and a dozen unpublished Athanasius’ writings⁶ as well) were in the 18th century in the library of Séguiers’ grandson and heir, Henri-Charles de Cambout de Coislin, bishop of Metz. It was only in the 19th century that Athanasius’ papers were taken into account when Séguiers’ collection was added to the France National Library through the abbey of Saint-Germain-des-Prés collections⁷, with the following classification marks: Coislin 138-143, Coislin 162, Coislin 391, Fonds Grec 2106, SG 582, SG 1014, SG 1026, SG 1027 and SG 1030⁸, the last two concerning chemistry. Therefore, thanks to the preservation of Séguiers’ entire library, Athanasius’ papers have been saved.

**Athanasius’ biography**

Unlike compilers and copyists of the Greek alchemists’ corpus, the broad outlines of Athanasius’ life are known. But in order to clear up a possible misunderstanding, let us specify immediately that Athanasius was not a copyist; if he was a copyist, he was the copyist of his own writings, as we shall see. Athanasius was first and foremost a Greek scholar who used to write down chemical notes and recipes for himself and perhaps for a

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⁴ The other papers of Athanasius included to Séguiers’ library concern particularly philosophical and theological matters.

⁵ The Ms. SG 1027 was the ancient Ms. Séguiers 385; see the “procès-verbal de prise de la bibliothèque grecque du Chancelier Séguiers, dressé le 12 août 1672” (Devresse R. (1945), Bibliothèque Nationale, Dépt. des manuscrits, Catalogue des manuscrits grecs II Le Fonds Coislin, Paris, p. X).


⁸ We can add the Ms. 1018 (Suppl. R grec & latin 268 bis, in 4°) of the Bibliothèque Sainte-Geneviève (which is a rough draft of 1641 Athanasius’ book).
few Greek-speaking people of the Levant, too. He was a man who had devoted, as he said, all his life to study; and he had for chemistry, at least at some point of his life, an unquestionable interest.

The links between Séguier and Athanasius go back to the late 1630s. Since 1635 Séguier had been Chancellor of France and Athanasius was for more than 10 years in Paris where he was taking part in the intellectual debates and polemics of his time. He must have belonged by this time to the entourage of Séguier to whom he dedicated several works. Thus in 1639 and 1641, he published three philosophical and theological books. The first one (about the knowledge of God and the eternal truths) was only dedicated to the Chancellor Séguier, the second one (on the vices and virtues of the human beings according to Iamblichus who was a rather rare Neoplatonic reference at that time) to Cardinal Richelieu and the third one (against those who were claiming that the rational soul was mortal and that this was Aristotle’s position) to Séguier, as well as to the bishop of Saint-Malo, Achille de Harlay de Sancy, who was ambassador of France to Constantinople during the period 1610-1619. In 1655, 1657 and 1662, Athanasius published five more volumes on the union of the Christian churches and against the 1637 Parisian edition of Campanella’s De sensu rerum et magia (in February 1638 Athanasius had already received for this purpose the authorization of the Sorbonne’s theological authorities to print this book); volumes were dedicated to Cardinal Spada, Latin patriarch

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10 Here are Athanasius' books:

- 1639: Delitiae animae sive hortus ex iis quae Iamblichio magno elaborate sunt consitus, (Latin and Greek), Paris, dedicated to Richelieu.
- 1655 (1657 for the second edition) and 1662: D.[octoris] Athanasii Rhetoris Presbyteri Byzantini Anticampanella in Compendium redactus adversus librum de sensu rerum & Magia, (Latin only), Paris, dedicated to Cardinal Spada (and to Séguier) and Louis XIV.

of Constantinople, to Séguier and to Louis XIV. The East was thus regularly represented through Athanasius’ dedications.

Athanasius was born in Cyprus, in Costanza precisely, about the year of the Turkish invasion of the island in 1571. He lost his parents when he was rather young, but he managed to move to Constantinople where he was taken into care by the Patriarchate. Then he became *hieromonachus* (i.e. a priestmonk) and *Protosyggelos* (i.e. vicar-general) of the Church of Constantinople. Although he was Orthodox, Athanasius was also educated in a Jesuit College, at the Patriarchs’ expense. It is certainly under such influences – but also in a particular climate of the Orthodox Patriarchate’s pursuit of a Western support against the Turks – that Athanasius became an ardent defender of a catholic Orthodoxy; and his position gave rise to controversy in 1614 with Hilarion, Metropolitan of Heraclea. About that time, “for the love of learning”, Athanasius decided to go to Rome in the hope of joining the Pontifical Greek College ‘Saint Athanasius’ (he had converted to Catholicism meanwhile). Indeed, he was rejected because of his age (he was around 50 years old); however, he stayed in Rome. Then he came to Paris probably in 1615 and in the 1620s he settled there where he got in touch with, inter alia, Séguier.

At about the end of the year 1642, Séguier had the project to enrich his library with Greek manuscripts. For that purpose, he sent 71-year-old Athanasius to the East in order to buy and send to him rare and precious manuscripts. On 1 August 1643, Athanasius introduced himself to the ambassador of France in Constantinople, Jean de La Haye, before starting his mission in monasteries in Constantinople, Cyprus, Thrace, Macedonia and Thessaly.

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11 On Athanasius’s life, see SG 1027 ff. 347r-350r; Legrand, vol. 3: 417-418; Omont, H. (1902), *Missions archéologiques françaises en Orient aux XVIIe et XVIIIe siècles*, Paris, 1: 1-26; Astruc, Consty, p. 113; and O’Meara, 483-484.
12 It should be noted that the Jesuit mission in Constantinople – set up in 1583 – enjoyed the patronage of the kings of France and the full support of the French ambassadors to the Porte. Furthermore, a manuscript in Athanasius’ hand in the France National Library (Coislin 391) contains a Greek version of Jesuit manuals of Rhetoric, Logic and Physics. See O’Meara, p. 483.
13 See O’Meara, p. 483.
14 Besides, Athanasius might have also gone to Rome, then to Paris, as part of a mission about a possible unification of the Christian churches (as suggested by Blanchet, L. (1920), *Les antécédents historiques du ‘Je pense, donc je suis’*, Paris, p. 130).
Almost at the same time – in 1643 – Cardinal Mazarin thought of enhancing his own library with Greek and Eastern manuscripts, too. To this end, he wrote to the ambassador of France in Constantinople to request his assistance. About the middle of the following year, Jean de La Haye sent a capuchin, Father Romain, towards Mount Lebanon to explore the Arab libraries, and Athanasius towards Thessaloniki. Athanasius was thus in charge of an identical mission on behalf of two different and powerful figures.

His mission was long and rather perilous (Venetian blockade, pirates, corsairs, aggressiveness of the monks, health problems). Athanasius spent 10 years in the East and sent more than 300 Greek manuscripts to France. As far as Séguier was concerned, he paid 4,500 pounds for his acquisitions. Nevertheless, it has to be said that Athanasius did not devote all his time, during the 10 years he stayed in the East, to the achievement of his mission. He was living as a priest with the authorization of Patriarch Parthenion. Moreover, it is strongly probable that Athanasius also devoted his time to the learning chemistry, to the meeting of craftsmen and chemists, and to the writing of the recipes of SG 1027 and SG 1030 manuscripts as we will see.

Upon his return to France, Athanasius was to be responsible in Séguier’s library for the Greek manuscripts he had chosen and sent. But a disagreement very quickly appeared between him and his patron. By 1655, the Chancellor Séguier acquired – through the seizure of a baillif who spent a whole day in Athanasius’ home to this end – 116 Greek manuscripts which Athanasius had brought for his own account from the East. He never managed to get them back, nor to get money in compensation. On 13 March 1663,

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17 Indeed, the following quotation could intimate that Athanasius was acting as a kind of librarian in Séguier’s library for the Greek manuscripts: “Je trouvay, par le moyen de M. d’Herouval et d’un autre de mes amis, toute entrée dans la bibliothèque très magnifique du Chancelier, qui, étant luy-même très savant, avoit de la joie que ses livres et ses manuscripts, qui étoient en fort grand nombre, pussent servir au public. Mais comme je sceus qu’entre les manuscrits de cette bibliothèque, nouvellement apportez du Levant par un moyne grec, et scellez, il y en avoit un de S. Climaque, qu’on disoit estre très beau et très ancien, j’usay d’adresse avec le sieur Blaise, bibliothécaire, afin d’engager ce moyne à nous le montrer, quelque grande répugnance qu’il y eust. Nous lui parlâmes d’un autre de la Bibliothèque du Roy, que nous jugions pouvoir être ancien de 800 ans et dont nous lui relevâmes beaucoup la beauté extraordinaire et l’exactitude […]”. Après que nous l’eûmes fait enfin résoudre à nous faire voir ce livre, nous y trouvâmes la chose du monde la plus surprenante. [Le manuscrit du moyne grec] apporté nouvellement du Levant se trouve si parfaitement conforme à celuy de la Bibliothèque du Roy […]” (from Mémoires de Pierre Thomas, sieur du Fossé, quoted by Omont (1902), p. 21).
19 Athanasius appealed in vain to Séguier, then to Baluze, at the time – 1661 – working for the bishop of Toulouse Pierre deMarca, and in 1662 to the king himself in the hope of finding a solution to the
Athanasius – 92 years old – died in rue Saint-Jean-de-Beauvais, in a house depending on the abbey of Sainte-Genevieve, and was buried in the church of Saint-Etienne-au-Mont. A fortnight later, Ségurie was officially granted Athanasius’ 116 manuscripts (par droit d’aubaine); Athanasius’ other possessions were given to a musketeer of the king and to his footmen. However, the books that Athanasius owned were preserved at the abbey of Sainte-Genevieve’s library.

**Presentation of Athanasius’ alchemical papers**

Athanasius was the subject of a few studies (theological, philosophical or philological studies from the late 19th century to 1970s). His name is still occasionally quoted about an inventory of collections or studies of a particular Greek manuscript which he sent from his mission in the East. Nevertheless, Athanasius’ alchemical papers have gone completely unnoticed.

disagreement with Ségurie. See Omont (1902), 1: 22-24. At this occasion, Baluze described him at about this time as “learned, but ragged and poor (in his notes of his Beati Servati Lupi ... Ferrariensis ... opera, Paris, 1664, p. 443). “However, de Marca did not deem the man contemptible on that account, a man in whom were present, apart from good mind and extensive knowledge of sacred matters and of divine and human philosophy, a modesty worthy of a Christian and a blameless character” (Omont (1902), p. 22, and O’Meara, p. 484).

20 Omont (1902), p. 25.


The Ms. SG 1027 contains 522 folios and has a 17th century parchment binding. As for the Ms. SG 1030, it is made up of 161 folios and is bound with a simple cardboard from the 19th century. Only a proportion of these two manuscripts concerns chemistry. Chemistry in these papers represents more than 250 pages for more than 300 recipes, and is close to craftsmen’s chemistry (dyeing, whitening, preparation of metals and coins, purification of natural substances, preparations of saline and acid bodies, preparations of some clays, pharmacological preparations against arthritis, plague, gout, eye diseases, or to preserve the memory, to give strength) as well as alchemy (preparations of philosopher’s stone, potable gold, metal transmutation, fixing or extraction of mercury, gold and silver production by more or less complicated chemical combinations).

There is certainly a reason why the Ms. SG 1030 had not been correctly bound as soon as it was integrated Séguier’s possessions neither written down in Montfaucon’s inventory. Unlike the Ms. SG 1027, the chemical papers of the Ms. SG 1030 contain many recipes crossed out and/or carelessly written. As far the chemical folios are concerned, the Ms. SG 1030 gathers indeed Athanasius’ rough drafts, original versions and notes of a rather large proportion of recipes neatly written in the Ms. SG 1027. Actually, around 30% of the recipes in the papers are in two, even three, similar versions. Thus, these two manuscripts show us an extremely lively way how Athanasius used to work and study chemistry (and perhaps also how authors of Greek chemical manuscripts generally used to work): notes, rough drafts, choices, translations, additions, corrections, and writings up of recipes, and sometimes annotations and questions on the recipes.

Recipes in Athanasius’s papers can be distinguished on the basis of the language in which they were written. Approximately 60% of the recipes are in Italian and 40% in (classical and demotic) Greek. But if one withdraws the recipes obviously not written by Athanasius’ hand, a balance is achieved: half in Italian, half in Greek. In addition, a few recipes are also in French (3) and Latin (1). It would be tempting to think that the language used in the papers indicates the geographical origin of the recipes. Nevertheless, the criterion of the language might not be so pertinent about Athanasius who was


In the French National Library Catalogue’s description of the Mss. SG 1027 and SG 1030, it is just written, from time to time, “alchemical notes” or “alchemical recipes”.

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educated in both languages, Greek and Italian; two languages he apparently used to practise very fluently. So the Italian language does not necessarily indicate a western source. As we will see, an eastern recipe could be directly written in Italian, and a western one in Greek. On the other hand, a more significant criterion to make a distinction between eastern and western recipes would be rather based on the units of weight employed by Athanasius in his papers. In some recipes were used “ounces” and “pounds” and in others “okka” and “dramia”. The latter were not the result of any translation of western texts with conversion in Ottoman units of the ounces and pounds. The Ottoman units do reveal us an eastern chemical practice, maybe suspected but never seriously envisaged by historians of science to study it. We will deal with this point further, after talking about the presence of Turkish terms in the recipes.

Very many Athanasius’ recipes contain names of ingredients in Turkish. The most present are “nisantiri” [i.e. sal ammoniac], “tourti” [i.e. tartar], “kouvergilé” [i.e. niter], “rastik tasi” to say “rastikopetra” – grecized term which meant according Athanasius “ferretto di spagna”, i.e. “copper calcined with sulphur”, and “soulima” probably to say corrosive sublimate (or even perhaps white lead).

24 In Athanasius’ manuscripts, the Turkish names could be written in Latin letters as well as in Greek letters but they were always phonetically written.

25 See SG 1030 f. 71r/SG 1027 f. 475v and SG 1030 f. 83r/SG 1027 455v.

26 According to the fourth edition of the Lessicografia della Crusca (1730, vol. 2, p. 436) (the 1691 third one said only it is a kind of calcined copper (vol. 2, p. 675)).

27 Colinet (p. 102, n. 108) says that the ‘soulima’ could actually be the corrosive sublimate (i.e. mercury (II) chloride) but its meaning remains quite vague in alchemy.

28 For example, here is a typical recipe with Turkish terminology: “A far oro. Rx ruch tutia δραμια 10 και λύσετε την, και όταν ανάπτη, ρίχνε απάνω ξύγκι. λυθείσης δε χύσε την εις το κανάλι. είτα κούπανε 20 δρ. ραστικόπετραν ψιλώτατα, και 10 δρ. τρίχαν ανθρωπινάς ψιλώτατα κομμένας, και ανακάπωσεν ταις με 30 δρ. νισαντήρι με την ραστικόπετραν, και ανάλυσέτα εις μίαν χούλιαν σιδηράν, είτα ξηράνε τα, και ύλη με την ραστικόπετραν, και κόψε την τετράγωνος. Είτα χύσε τα εις ένα πινάκι ξιρόν, και έπειτα κουπάτα κίτρινα και ανάλυσέ τα αύθις και χύσετα εις το κανάλι και έσται χρυσός άριστος, πλην ο σολυμάς τον τρώγει” (SG 1027, ff. 485r-486v).

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As regards the Turkish vocabulary in some recipes of Holkhamicus 109, Lagercrantz suggested that there had to be a Turkish alchemy in the 16th century. As for Andrée Colinet, such a Turkish terminology simply related back to a trade name which helped the Greek alchemists to get their supplies from Ottoman traders. However, without denying the need to use Turkish names to get ingredients for the practice of chemistry in the Ottoman Empire, the study of Athanasius’ manuscripts would rather agree with Lagercrantz, even if one has more correctly to talk about a Levantine alchemy and not a Turkish alchemy, as long as in the Ottoman empire – made up of several communities – half of the 30 million or so inhabitants were Christian by 1600. The use of Turkish terms by Athanasius in his recipes was actually not systematic and met very variable criteria. Moreover, all the ingredients in Turkish could not necessarily be found at the market such as the roots called “otoulki” and “zerdehiaf” – for the cleaning of metals or for the preparation of gold –, or even still plants acting as philosopher’s stone like “kaiapasha” which was in Latin the ‘parisia’ and “zevetounié” which was the lunar herb ‘borissa’, according to Athanasius.

The Turkish terms written down by Athanasius were certainly already present in the original recipes taken up in his manuscripts; these original recipes could be transmitted to

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30 Colinet, pp. xli-xlvii.
31 For the needs of trade with the Ottoman Empire, the practice to convert into Turkish the name of goods continued at least until the 19th century, as we can see for instance with the vocabulary from the “Convention conclue à Constantinople le 25 novembre 1838, et formant appendice aux capitulations garanties à la France par la Porte-Ottomane…”.
32 Certainly to clean the copper: “ρίζα ονομαζόμενη τουρκιστί οτουλκί δράμια 30. σκόροδον καθαρισμένον [δρ.] 100. ὄξος δυνατόν δρ. 400. κόχλασον αυτά ἐως ότου καταλυθή το ἡμίσυ, καὶ τότε λύσε το χάλκωμα και ρίψον αυτό ἐνδον. Και πάλιν λύσον και ρίψον ἐνδον, και οὕτως ἐως πεντάκις δράσον” (SG 1030 f. 52v).
33 Indeed, for gold preparation: “λέγουσι να βάλης τριμμένον ύαλλόν εις το χονή, εἶτα τετριμμένην ρίζαν καλομεζόμενην τουρκιστί ξερέξειρα, επ’ αὐτή δὲ μόλισθον, εἶτα αὐθίς επ’ αὐτήν την ρίζαν ὡς καὶ υπ’ αὐτήν. εἰπὶ δὲ αὐτῇν πάλιν, ύαλλόν. καὶ ίσθι ὅτι το χονή θέλει να εἶναι τριτυμενόν, ὅπερ ήθες επάνω εἰς ἄλλο χονή γερά, ἐπειτα βάλες αὐτό το που κάτι τον χρυσοχούς, καὶ όταν λύθη, ἐξαγε το ρύεν εἰς το γερό, καὶ εὐρήσετε χρυσόν. Λοκίμασον” (SG 1030 f. 74r).
34 Such vegetable philosopher’s stones were usually related to a particular planet. The best known is the lunar one that we can find in the 13th century writings of Paul of Taranto (Theorica et practica) and of Arnaldus de Villa Nova (Liber novi testament) as well as in the Latin and Byzantine medieval time hermetic herbaria of the astrological botanic. One of the lunar ones, the borissa comes from the Alexandrian period. See Colinet, pp. lxx-lxxxiii.
35 SG 1030 f. 127 bis b: “καλέσας τοιρακτι λα παρια”. And SG 1027 f. 442v.
36 SG 1030 f. 105r: “borissa zeβετουνιε αραβιστί”. And SG 1027 ff. 450v-452v / SG 1030 f. 78r.
him through books, handwritten texts or even verbally, as we will see. Indeed, when
Athenasius wrote down a specific word from a transmitted recipe, he used to adopt this
word such as he read or heard it. For example, in SG 1027 f. 450v – translated from an
Italian version – he wrote: “Λάβε πράσινον χαλκόν και ἀλάς αρμονιακόν” [= ‘take green
copper and sal ammoniac’] but he did not write “Λάβε πράσινον χαλκόν και nisantiri” [= ‘take green copper and nisantiri’] if he wanted to specify a trade name. In SG 1027 f.
452v, a sentence was translated from an Italian in the following manner: “λάβε μερκούριο” [= ‘take quicksilver’] instead of “λάβε διάργυρο” if Athanasius wanted to give
an accurate translation into Greek, or “λάβε γικά” [= ‘take gika’] if he wanted to show
the Turkish term. In several recipes, he wrote in Greek letters “κινάπριον” [= ‘cinnabar’] borrowed from the Latin instead of “κιννάβαρης” or “κινναβαρίτης” in a
correct form such as in SG 1027 f. 485v. Moreover, the Italian word « solfaro » was
always preferred by Athanasius to say ‘sulfur’ – even if the recipe was written in Greek –, except once, in SG 1027 f. 485v, where he used the Greek word “διάφι”. And, in the
Greek recipe SG 1027 f. 485r, he wrote precisely the word “ρακή” [= ‘raki’] and not any
other brandy.

Through all these examples, we can put forward that the reason why some ingredients of
recipes written in Greek or Italian appear with their Turkish names, was that such
ingredients were already in Turkish in the original recipes transmitted to and copied or
translated by Athanasius. Thus, the lists of chemical words in Greek with their translation
in Turkish (in Greek letters) which we find in Athanasius’ manuscripts can be

37 In SG 1027 f. 438p, Athanasius wrote that ‘gika’ means ‘διάφι’.
38 For example, at SG 1027 f. 438r (whose the rough draft is at SG 1030 f. 35v without translation):
“ραστικόπετρα --- ραστί τάχ τουρκιστι
βιτρίολ ευρίσκεται εις την κύπρον και ρώμην --- ζάκκυβρίς
τούτα αλεξανδρεία --- τούτα μαραζή.
ἀλας βουλλομένον. ευρίσκεται εν ικονίω. --- μυλχί εντρανί
μπορά.
σολυμά
σαλαντίριον. Ευρίσκεται εν καισαρεία της καππαδοκίας, και έστι διπλούν δι’ άργυρον και χρυσόν. ---
κουβεργίλι. 
αρσένικον έστι διπλούν δι’ άργυρον και χρυσόν. ---σισάνοθι
νισαντήρι ή sal harmoniacum. και ευρίσκεται εις την αίγυπτον. --- νισαντήρι
διάργυρο --- γικά.
sulpharum --- κιπρίκ. κινάπριον --- ζικίφρα
σισάνοθι. έστι διπλή λευκή και ερυθρά --- χιάπ
tάρταρον ---τουρτί
interpreted as vocabularies helping to understand the Levantine recipes transmitted to him. And similarly, Athanasius drew up some lists of alchemical symbols with their meanings\(^{39}\) in order to understand exactly what alchemical recipes he got said. Here are, for instance, two similar recipes in Athanasius’ manuscripts about the composition of silver. The first one is doubly crossed out and comes from the Ms. SG 1030. It is the original but rough draft version of the second which is carefully written and comes from the Ms. SG 1027. From one to the other recipe, a word in Turkish ‘\textit{tourtī}’ disappeared to be translated into Greek ‘\textit{tartaron}’:

- SG1030 ff. 30r-v (first version):

  “10 dr. of mercury. 10 dr. of white \textit{pontikofarmakon}. 10 dr. of \textit{tourtī}. 5 dr. of alum. Crush them well all together on a piece of marble. Then knead them with egg white, then put them in a piece of cloth and tie up its opening and hang it in a copper box and cover it with its lid and coat it entirely with the kind of clay that is used for making bowls or another kind that is fire resistant[.] Then bury it in common glowing charcoal and leave it for about six hours, then when it has cooled[,] open it and remove the mercury which will look like a shiny skin from the cloth, and gather it and melt it in a crucible, then in another crucible, melting one dr. of it together with 3 of copper, then take this, and 1dr. of silver and remelt it and you will see. And you will whiten it as goldsmiths whiten silver.

  It has been tried. Has been written down.”\(^{40}\)

- SG1027 f. 496v (second version) [see figure 1]:

\begin{verbatim}
terra sigillata”.
\end{verbatim}

\(^{39}\) SG 1030 f. 54r and f. 105r.

\(^{40}\)”διάργυρο δρ. 10, ποντικοφάρμακον ἄσπρο δρ. 10. τουρτί. δρ. 10 , στίψι δρ. 5 . τρίψε τα εις μάρμαρον καλά μαζή είτα μεθ’ ενός ωού λευκού του ωού ζυμόσεις τα τετριμμένα, είτα θήσεις αυτά εις παννίον και δήσεις αυτού το στόμα και θήσεις εις ένα κουτή χαλκοματένο και να το σφαλήσεις με το καπάκι του και να το χρίσεις όλον με τον πλήν οπού κάμνουν τα σκουτέλια ή ήλλο οπού να βαστά εις το πυρ είτα κρύπετο εις τα κάρβουνα τα κοινά τα ημέραν έως ορών εξ, ἐπείτα ψηχθέντοις ἄνοιξαν και ευρήσεις εξω του παννίου τον διάργυρον ὡσάν φλούδα λαμπράν, και την μαζίνες και την λύδες εις το χονή, ἐπείτα εις το χυτήρι, αφ’ οὗ δρ. ἐν εἰς 3 του χαλκοματος λύδοντος μαζή, ἐπείτα λάβε αυτό, καὶ ἐν δρ. αργύρου και ξαναλύσετο καὶ ὅψει. καὶ θέλεις το ασπρίζεις καθώς οἱ χρυσοχόι ασπρίζουν το ασίμι. εδοκιμάσθη, εγράφη” (SG1030 ff. 30r-v).
“Georgakis Kasapoglis from Ex Marmara\textsuperscript{41} gave me the composition. It has been tried.

Take 10 dramia of mercury[,] 10 dr. of white p\textit{ontikofarmakon}, 10 dr. of tartar, 5 dr. of alum. Crush them well all together on a piece of marble. Then knead them with egg white, then put them in a piece of cloth and tie up its opening and put it in a copper box, and cover it with its lid, and coat it entirely with the kind of clay that is used for making bowls, or another kind that is fire resistant. Then bury it in common glowing charcoal and leave it for about six hours. Then[,] when it has cooled[,] open it and remove the mercury which will look like a shiny skin from the cloth, and gather it and melt it in a crucible, then in another crucible. (if you do not have a box, put it in a crucible, and cover it all over with copper filings, then cover it with a piece of tile and coat it with clay[,] as said above. And the following), then from what was melted in the crucible take one dr., and three dr. of copper, and melt them all together. Then take the melted material, and one dr. of silver and remelt it, and you will see if it needs more silver. And you will whiten it as goldsmiths whiten silver.”\textsuperscript{42}

\textsuperscript{41} ‘\textit{Ex Marmara}’ was a neighbourhood of Constantinople which is today ‘Alti Mermer’.

\textsuperscript{42} “σύνθεσις ήν μοι έδωκεν ο γεωργάκης κασάπογλης εις τα εξ μάρμαρα. Εδοκιμάσθη.

Λάβε διάργυρον δράμια 10 ποντικοφάρμακον ἀσπρόν, δρ: 10. τάρταρον, δρ: 10. στίψε τα εις μάρμαρον καλά μαζή. Είτα μεθ’ενός λευκού του ουώ ξύμωσον τα τετριμμένα, είτα θες αυτά εις παννίον, και δήσον αυτού το στόμα και θες εις εν κουτή χαλκοματένο, και σφάλισε το με το καπάκι του, και χρίσε το όλον με τον πηλόν οποίο κάμνουν τα σκουτέλια, ή άλλο οποίο να βαστά εις το πυρ. Είτα κρύψε το εις τα κάρβουνα τα κοινά τα ημέμα ως ώραις εξ. Έπειτα ψυχθέντος άνοιξον και ευφήμες εξώ του πυρίου τον διάργυρον οςάν φλούδα λαμπράν, και την μαζόνις και την λύσεις εις το χονή, ἐπείτα εις το χυτήρι. (αν δεν έχεις κοινή, βάλε το μέσα εις ἕνα χονή, και κρύψετο με τα ρινίσματα πάντοθεν του χαλκόματος, είτα σκέπασέ το με κοιμαί κεραμιδί και χρίσετο με τον πηλόν ως άνωθεν και τα εξής) είτα από του χυθέντος εις το χυτήρι λάβε δρ: ἕν, και τρία δρ: του χαλκόματος, και λύσε τα μαζή. Ἐπείτα λάβε αυτό το λυθέν, και ἐν δρ. αργύρου και ξαναλυσέτο, και ὅνει ει χρήση πλείονος αργύρου. Και θέλεις το ασπρίζειν καθώς οι χρυσοχόοι ασπρίζουν τὸν ἀργύρου” (SG 1027 f. 496v).
An unnoticed network of eastern chemists

This recipe SG 1027 f. 496v is very interesting because it had been tried, but mostly because the name of the chemist who gave it to Athanasius was revealed, as well as the place where he used to live in Constantinople: Georgakis Kasapoglis from the neighbourhood called Ex-Marmara. This information was not mentioned in the original
version SG 1030 ff. 30r-v in which other details were also absent. Considering that almost one third of the recipes in Athanasius’ manuscripts are in two – or more rarely three – versions, this example of two versions of the same recipe inform us about the way Athanasius worked in chemistry. He used to write the recipes in two stages: first, he gets a recipe which he quickly retranscribed such as he has got it, secondly, he neatly rewrites it by including some details after having tried by himself the recipe or after having got some information in another way. And so, the second version – supposed to remain and perhaps to circulate among other chemists – erased the Turkish terminology but kept the peculiar compound called ‘pontikofarmakon’ which seems to belong to the Greek chemistry in its own 43; both versions being here in demotic Greek. In addition, the second version became more complete and contains two details. One, put in brackets, is about a technical detail, the other completes a sentence which had remained unfinished (“[...] remelt it and you will see”) as its meaning was obvious when Athanasius wrote it down. Moreover, Athanasius might have even got the recipe verbally from Kasapoglis himself. In fact, the verbal transmission of chemical practices to a scholar could be a quite common practice. In Athanasius’ manuscripts, we found two specific pieces of evidence: - In SG 1027 ff. 439r-439v: the recipe begins with the following comment: “ο ειρηκώς μοι τούτο, είληφεν αυτού πείραν” [= ‘the person who told me that did the experiment’]; - In SG 1030 ff. 81r-82r: the recipe was not written by Athanasius but contains two annotations of his: it is a strange enough recipe of gold preparation from partridges, bile and stomach of ox, worms, snake, sheep excrement, yolk, glass, lead mixed with wheat, which ends with the following mention: «Κατά τον ληρούντα τα ημίν απίθανα εγεγράφαμεν» [= ‘we wrote all those things, for us incredible, according to the person who spoke them’].

So, what is really noteworthy to be emphasized in the example of the two versions of Kasapoglis’ recipe is that Athanasius in Constantinople – where he used to live up to

43 The word “pontikofarmakon” appears also in a 1478 manuscript presented in Berthelot, M. (1888), Collection des anciens alchimistes grecs, III, “Cinquième partie – Les traités techniques – V.1 Sur la très précieuse et célèbre orfèvrerie”, Paris, recipe 49, pp. 335 (translation, p. 320); see pp. 307-308 for the presentation of that manuscript. In Bethelot’s book, “pontikofarmakon” was translated into “litharge”.

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1610s and where he spent most of his time during his missions on behalf of his two patrons – was in contact with alchemists/craftsmen, not to mention the possibility for him to be part of a kind of network of people interested in chemistry.

Georgakis Kasapoglis’ name appears elsewhere – on a scrap of paper – in Athanasius’ manuscripts. Actually, other names of people are found on scraps of paper about chemistry in the Ms. SG 1030:

- f. 34r a: “γεωργάκης κασάπογλις εις τα ἑξη μάρμαρα” [= ‘Georgakis Kasapoglis in Ex-Marmara’]
- f. 126r b: “νικόλα φαρσαλίτης εις τα βρόλα (sic) του Ἵωγράφου” [= ‘Nikolas Farsaliotis in Vourla of Zografos’]
- f. 126r b: “Χεχίς φεστλής ἐμηρις εις το Πεσικτασι” [= ‘Hechis Festlis emir in Besiktashi’]
- f. 127 bis b: “παπά μιχαήλ μητροφάνη” [= ‘Father Mihail Mitrofanis’]
- f. 132r b: “μεχετ δέδε εις του κασουμπαχιά” [= ‘Mehmet Dede in Kasimpasha’]
- f. 34r b: “Malaheh il taloppia ?”
- f. 34r b: “Andrea grimaldi pretre trambuchi ?”
- f. 34r b: “baltasar andrigoy?”

Let us specify that ‘Ex-Marmara’, ‘Vourla of Zografos’, ‘Besiktashi’ and ‘Kasimpasha’ were all Constantinople neighbourhoods.

It is reasonable to think that these names are names of people interested in chemistry or names of craftsmen with whom Athanasius was in contact in Constantinople. So it should be noticed that among his chemical acquaintances there were Greeks, Westerners as well as Turks.

Athanasius’ chemical papers contain other names of unknown people. This time, these names accompany some recipes and belong to authors of those recipes:

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44 Besides it is known that in the 17th century Ottoman Empire dervishes were interested in the pharmacy and were the most inclined to get in touch with Christians; now Mehmet Dede could be a dervish according to his name and he used to live in the neighbourhood of the imperial arsenal.
- f. 63v: “αρχον καρητζη” [= ‘sir Karitzis’]
- f. 64r: “del P. Carazzoli”
- f. 64v: “Παπά κυρ Δανιήλ” [= ‘Father Daniel’]
- f. 44r: “Monsieur Gras docteur en médecine demeurant chez mr devertrieu en dauphine à seriere”
- f. 44v: “Monsieur de St Sorlin recommande à la cortesie de mr larange hoste du faucon à marseille”
- f. 45r: “Ph. Bordier - chez monsieur de Creil maistre de Requestes rue de Lions proche St. Paul à Paris”

So there are here a Greek, an Italian and Frenchmen.

It is difficult to know who these people were but we can point out that two manuscripts of Athos Mount dealing with pharmacological subjects, the Ms. Dionysiou Monastery 610 (17th century) and the Ms. Iviron Monastery 183 (18th century), were written by a certain Daniel; in the first case, Daniel was a hieromonk and, in the second case, a priest. Obviously, nothing permits us to link them to Father Daniel in Athanasius’ papers.

**An alchemist in action**

Athanasius was not an “alchemist by his pen” 45; he really used to practise chemistry. He was part of a network – made up of people working in chemistry and more or less concentrated in Constantinople – in which chemical recipes could pass from hand to hand. It is the reason why his chemistry, as it appears in his manuscripts, was very lively, not to say a chemistry of living people. The recipes he wrote were selected, rewritten, completed or revised. And sometimes he might even have met chemists to ask them some questions about recipes.

Athanasius seems to have a preference for certain topics of alchemical recipes, as mercury congelation or metal transmutation by a plant. The latter was the subject of

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45 Indeed, “alchemist by his pen” (‘alchimiste de plume’) is an expression used by Andrée Colinet to characterize the copyist of the Holkhamicus 109 (Colinet, t. X, p. xciii), i.e. an alchemist practising only the writing of alchemical recipes without really carrying out them.
twenty or so recipes; some of them were illustrated\textsuperscript{46}. Thus Athanasius’ papers contain a set of six anonymous drawings of such plants; for instance, “το λεγόμενον ομφαλός της Αφροδίτης” in SG 1030 f. 123r [see Figure 2]. One of those recipes on the use of a vegetable philosopher’s stone is even rather similar to a recipe of Paul of Taranto\textsuperscript{47}. But it should be noted that such a philosopher’s stone was already quite rare in the medieval alchemy, and since it had not been at all a topic of the western early modern chemistry. According to Athanasius, this kind of plant grew in Rhodes, Cyprus, Smyrna, Πολύκανδρος (i.e. Folegandros) or near Ancona in Italy, and in his manuscripts he gave its name in Greek, Italian, and French as well as in Turkish, Persian and Arabic. Thus we may see with the vegetable philosophers’ stone a peculiar topic belonging to 17\textsuperscript{th} century Greek or eastern alchemy.

\textsuperscript{46} SG 1030 f. 31r, f. 34r, f. 44r, ff. 54r-54v, f. 66r, f. 78r, ff. 96v-97r, ff. 101v-102r, ff. 108v-109r, f. 113v, ff. 122r-125r, f. 127v, f. 128v, ff. 129v-131r, and SG 1027 f. 442v, ff. 450v-452v, f. 453r, ff. 457v-458v, ff. 466r-467r, f. 491v.

\textsuperscript{47} Indeed, the recipe SG 1027 ff. 450v-452v is rather similar, at least in its first part, to one of those of Paul of Taranto (in his Theorica et practica) pointed out by Colinet (pp. lxxi-lxxiv).
But Athanasius was not interested in all the recipes he could get; he used to pick some of them according to his personal interests and leave the rest. We can clearly see it for instance in the anonymous 55 page set of leaves in Italian included in the Ms. SG 1030. He marked several of its recipes he copied with the following sentence written next to the title of the concerned recipes: “Questo non ho scritto” [= ‘I did not write this one’].

Recipes without such a mark were in fact copied in Italian or translated into Greek by Athanasius elsewhere in his manuscripts. In addition, as we can see in the two Greek translations of same and quite long recipe concerning the philosopher’s stone from this Italian notebook, Athanasius only selected the passages he wanted. It is obvious, in

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48 For example, in SG 1030 f. 95v (“Olio di tartaro col quale si fa l’argento dundeci legue”).
49 For example, the three recipes in SG 1030 96r (“On Congellation di mercurio”, “A conegliare et fissare il mercurio”, “Altro modo sensa odor di mettalo”) were copied by Athanasius respectively in SG 1027 f. 457r, ff. 457r-v and 1027 f. 457v.
50 The Italian original version is in SG 1030 ff. 100r-101v (“Della pietra d’un Certo filosopho Eccellentissimo”), translated into Greek first in SG 1027 ff. 448r-450r (“Lapis philosophicus – approbato”) and secondly in SG 1030 ff. 35r-35v (“Peri της πέτρας κάποιον φιλόσοφον”).
51 For instance, here are the ends of the two Greek versions. The first version in SG 1030 f. 35v: “και ? αύξήσον το πυρ μέχρι τρίτου βαθμού, διατί όταν αναβαίνειν ἄρχεται, εἰς τὸ αντονερόν μέρος του αγγείου τότε τοῦτο το διόκχαρον ἐστὶν ἄβαρτον καὶ όταν όλον αναβησίας εἰς την φωλίαν ἢ εἰς ταύματον ἄλλο ἄλλο. ἔλαβεν οὖν τὸ νεόρα οἱ σουαθηνον χρή σου καὶ θες εἰς βαγνοιν τιττικικασίσις ὁμοίως μή πλέον δυνάμειον δεστιλλάρησιν, ἐπείτη ἔσαξεν δια βαγνο εκεῖνο τον αγγείον, καίεις εἰς τὸ βάθος αὐτοῦ εὐχησθήνες πράγμα τι εὐθρόσυνον; ἂν λάβῃ καὶ θες εἰς ἄλλο αγγείον καθαρὸν καὶ θες αὐτὸ εἰς τέφραν, καὶ κάλυψον αὐτὸ εἰς τέφραν, καὶ κάλυψον αὐτὸν μέχρις εἰς τούτον μεῖνε το ἐνέσταθεν το ἐνέσταθεν μέρος αὐτοῦ εκτοῦ ὑποτεθέντος ελαίου, καὶ συμμελοσὶν παντὸς μέρος τοῦ πάντοτε γενέσθαι μια ωσία, εἰτα θες τὴν τοῦ αὐτόν αὐτό

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both Greek versions, that he experienced difficulty in translating into Greek some technical and alchemical terms\(^{52}\). But it is probably not for this reason, in the first one, he dropped all the alchemical rhetoric and theoretical developments of the original Italian version, and simplified the alchemical terms he used (except for the “\(\thetaα\upsilon\mu\alpha\sigmaτον \; \alpha\lambda\alphaς\) \[= ‘miraculous salt’\] which remained in such a form). Athanasius apparently was an alchemist who used to pay more attention to the practice than to the theory. But it is quite problematic that, in spite of the simplifications of the original recipe, the conclusion could remain the same: this Greek version’s recipe leads to the philosopher’s stone, too.

So, in the second Greek translation – based on the first one –, Athanasius reintroduced some theoretical developments of the Italian text into his recipe as well as some specific alchemical terms in order to restore the recipe’s alchemical sense: for instance, “\(το \; νερό\) \[= ‘the water’\] and the common “\(σούλφαρο\) \[= ‘sulphur’\] of the first Greek translation were substituted for “\(το \; πολύτιμον \; ύδωρ\) \[= ‘the precious water’\] and the “\(ευλογημένον \; σόλφαρον\) \[= the ‘blessed sulphur’\]\(^{53}\).

Still more significant about Athanasius’ chemical practice is his critical reading of recipes he wrote down. For instance, in SG 1027 f. 456r, he clarified information of a recipe he was copying by a detail in brackets: “… \(δίδοντας \; πυρ\) \(\alphaπ\; το\; \pi\rho\; \alphaπ\; το\; \pi\pi\rho\) \(\text{μεχρ} \; \text{τρίτης} \; (\text{δοκεί} \; \text{μοι} \; \dot{\omega}ρα)…\)” \[= ‘by heating from the morning to three ([three] the afternoon, in my"

\(^{52}\) Such a difficulty appears very often in Athanasius’ writings, even in his philosophical ones. About Athanasius’ unpublished work on the discipline of Logic (in Fonds Grec 2106 (ff. 83-101)), O’Meara notes (p. 488, n. 32), for his own, that in “there are some lacunae in the text which seem to relate a problem Athanasius alludes to in ch. 8, namely the difficulty he is having in finding Greek equivalents for certain Latin terms”.

\(^{53}\) Moreover, we can note that the second Greek version contains a sentence (“\(\eta \; \phiυςις \; εκρη\; τη\; \phiυςις \; τη\; \phiυςις, \; και \; \eta \; \phiυςις \; εκ\; τη\; \phiυςις\) \[SG 1027 f. 449r\]) based on the famous sentence of pseudo-Democritus’ \(\text{Physica et mystica}\) (“\(\H\eta \; \phiυςις \; τη \; \phiυςις \; τη\; \phiυςις \; νικ\;\), και \; \eta \; \phiυςις \; τη\; \phiυςις \; κρατε\)” and present in the Italian version.
Issues on Greek Alchemy

Or in SG 1027 f. 489v, just after a recipe in Italian on the arcanum of tartar, he wrote in Latin: “Quosto liquore servere per la transmutatione dei metalli. Sed ego ignoro modum” [= ‘This liquor is used to transmute metals. But I do not know how’]. Athanasius did not at all comprehend passively the chemical practices he recorded. This is obvious in SG 1030 f. 67v [see Figure 3]. There are here only a few lines on a rough draft leaf but they are very practical questions in order to carry out several recipes and very interesting so as to understand what kind of alchemist Athanasius was:

“- σμίξε τον διάργυρο με το μάλαμα, πως; [= ‘Mix silver and gold, how?’]
- β[ρ]άσε τον με το νερόν όστε να κοκινήσει, εἰς τι; [= ‘Boil it with water until it turns red, in what (container)?’]
- τι το χωρίζον το ορπιμέντο από το άλας; [= ‘What does pull the orpiment off from the salt?’]
- τι το σπόλτεον το άλας; [= ‘What to do with the salt?’]
- τι εάν καταλυθή όλο το ορπιμέντο; [= ‘What happens if all the orpiment disappears?’]
- το αλκαλί λέγουν ειστό β’ έγημα πως γίνεται τόσον δυνατόν οπού διαρρήγνυσι το άγγος. [= ‘It is said that the alkali in the 2nd cooking becomes so strong that it breaks the container’]
- τίνα τάρταρον; [= ‘Which tartar?’]
- [πως] από την τρύπα του σκουτέλου ρίχνεται το στάνιο; [= ‘How can the pewter be poured through the spoon’s hole?’]”
These questions are actually crossed out. Athanasius was in the habit of crossing out in the Ms. SG 1030 what he had copied or dealt with in the Ms. SG 1027. So that means that these questions have to get their answers in the Ms. SG 1027. Moreover, they have to refer to recipes in an original version in Ms. SG 1030. It goes indeed like that. So the two first questions refer to the recipe SG 1030 f. 67r and their answers are in two notes in the margin of the recipe SG 1027 ff. 485v-486r which is the same Greek recipe but neatly copied with a title in Italian “à far oro”:

- ‘Mix silver and gold, how?’ => “ως ποιούσιν οι χρυσοχόι” [= ‘as goldsmiths do’]
- ‘Boil it with water until it turns red, in what (container)?’ => “μέσα εις δύο βεντούζασ” [= ‘in two phials’]54

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54 Here is the recipe SG 1030 f. 67r enriched with the answers of the two first questions in SG 1030 f. 67v: “à far oro. Rx ραστικόπετρα δρ. 50 σαλνίτριο δρ. εκατόν βιτρίολο δρ. 50 τρίψε τα καλά, και σμίξετον μετά πίντε δραμίων χρυσοῦ [in the margin: ως ποιούσιν οι χρυσοχόι], έπειτα βράσε τον [in the margin: μέσα εις δύο βεντούζασ] μετά τοῦ νεροῦ οπού ελαμπικαρίσθη και γίνεται ένα κόκινο χώμα, και όσον βαρεί τούτο το χώμα, λάβε και άλλο τόσον κινάριον και τρίψετο μετά τοῦ χώματος. έπειτα Rx 200 δρ. νισαντήρα, και σολνίτριο δρ. 100 και σούλφαρο δρ. 50 και λαμπικάσετα. Είτα Rx διαργύρου δρ. 50 και σμίξε τον. και το
The same for the other questions:
- The three following questions refer to SG 1030 88r recipe and their answers are in SG 1027 484r-484v version.
- The sixth question concerns an original recipe not found in the Ms. SG 1030 but its answer appears in SG 1027 f. 485r recipe.
- The two last questions concern SG 1027 f. 485r recipe.

All the answers to these questions are in recipes copied one after another in two leaves of the Ms. SG 1027 (from f. 484r to f. 486v). Thus, Athanasius dealt with them at the same time. Having said that, in our turn we can ask: who did Athanasius intend to ask his questions to? Himself or the craftsman/chemist who would have given him the recipes concerned? Or another person from whom he expected some help to carry them out? Without any doubt Athanasius had carried out chemistry himself but also had mixed with chemists. So he could get directly, verbally, chemical recipes or even attend experiments carried out by a craftsman (actually some of recipes’ versions in Athanasius’ papers are abridged enough to make us presume that they were transmitted verbally). Thus the details added in the second version of Georgakis Kasapoglis’ recipe we are talking about could correspond to answers of such Athanasius’ questions, too.

The Ottoman units of weight

In order to tackle the last point of my paper, I would like to return to the strange anonymous partridge-based recipe for gold preparation mentioned above. Actually there are two versions of this recipe in Athanasius’ manuscripts; both in Greek but written by two different persons who are not Athanasius. The first one was verbally given to the copyist by a craftsman and reproduced thus the voice of the latter: it was written in vernum evghē pōtizē tēn kinnábarın kai to χόμια. Ποτισθέντος δὲ, ἐπαρε κομάτι ασίμι πτανόν και πύρωσέτο να κοκινήση, και βάλε ολόγον αὐτῆς τῆς κόνεως, και αν κιτρινήσει όλον, εἶναι καλόν, εἰδὲ μη, αλλὰ καπνίζει, πότισθέντα ακόμη ἀπὸ τοῦ εἰρημένου νεροῦ, ἐως ὅπως να μὴν καπνίζῃ. Ἑπειτα λάβε ἐξ αὐτῆς δρ.1. καὶ ῥύμον αὐτὴν εἰς ἐν ἄργυρον λελυμένου. Ἑπειτα αὐτὰ τὰ 2 ἄργυρον βάλε τὰ εἰς 10 ἄργυρον, καὶ ἔσται χρυσός εὐδοκιμάσθη” (SG 1027 ff. 485v-486r).

SG 1030 ff. 81r-82r.

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demotic (every day Greek language\textsuperscript{56}), used a more prosaic terminology, and gave more details (like the stench of the partridges after having their throats cut, and the lumpy consistency [“τραχανά”] of the lead/wheat mixture). As for the second version\textsuperscript{57}, it rather makes us hear the voice of an educated person who did not seem willing to carry out what the recipe said and who seemed to content himself with writing it: it was written in a pure Greek language (i.e. in ancient Greek) with a finer terminology. At the very beginning of this second version, the recipe was explicitly defined as a chemical recipe and it said with a certain contempt that the original version on which it was based was written in a very faltering Greek (barbaric Greek)\textsuperscript{58}. This second version erased all the foreign words of the first version (like “τζυκάλιν” [= ‘pot’] and “άμπουλλα” [= ‘phial’]), and corrected a misinterpretation. Actually, the craftsman’s version did not master enough the alchemical doctrine and the copyist who wrote down what he said wrongly pointed out that the “rain of May” was simply the “clean rain” in opposition to the “dirty rain” streaming from the houses’ roofs (while the rain of May was – alchemically speaking – the rain under the influence of the Lion constellation, i.e. a rain rich in virtues of the universal spirit); so a third but original version might have inspired the craftsman’s version. Nevertheless, what is important to notice here, in this partridge-based recipe, is the pedantry of the second copyist. He translated the first version into a pure Greek as far as the unit of weight is concerned: the Ottoman unit of weight ‘dram’ (“δράμι”) became ‘drachma’ (“δραχμή”), the unit of weight of the ancient Greek time. The unit of weight changed but the quantities mentioned in the recipe – in both versions – related carefully to the divisions of the Ottoman ‘okka’ (made up of 400 dramia): 100, 200 and 400. This remark allows us to introduce the question of the recipes using the dramia in Athanasius’ manuscripts.

In Athanasius’ papers, all the recipes in Greek do not contain ingredients in Turkish but the use of the Ottoman units of weight is almost systematic. In Kasapoglis’ recipe the dramia are used as well as in those of the anonymous copyists and in most of the other recipes; the exceptions show us that Athanasius never mistook the Italian ounce for the

\textsuperscript{56} But strangely the copyist put a dot on each iota of his text.
\textsuperscript{57} SG 1030 ff. 128r bis-133r bis.
\textsuperscript{58} “Περὶ τῆς ζητούμενης χυμείας εὑρομεν καὶ ταύτην τὴν ερμηνείαν γεγραμμένας σολοικοβαρβάρους λέξεις ταύταις λευκόσας ἡμῖν […]” (SG 1030 f. 128r bis).
Ottoman okka. The spelling in Greek of these two units sets them well apart. For instance, in the recipe SG 1027 ff. 456r-v, entitled “εις το ποιήσαι χρυσόν μετά της marchesita” – which came from the Italian recipe SG 1030 ff. 94v-95r using the ounces (i.e. ‘uncia’) entitled “à far oro con marchesita” – Athanasius was careful to always write “ουνγγία”59 while, elsewhere the okka was written “οκγία” or “ογγία” (for example, in SG 1027 ff. 442r-v). Furthermore, when the quantities in the same recipe changed from one version to the other, the right proportions were always respected; as with the two versions SG 1030 ff. 77r-v and SG 1027 ff. 440v-442r in which 40 dramia (i.e. 1/5 okka) of seleima, the same quantity of nisantiri and 10 dramia of arsenic became 50 dramia (i.e. 1/4 okka) for each of the two first ingredients and 13 dramia of the third one60.

But it is important to add that the use of the Ottoman units of weight okka and drami was not specifically linked to the use of the Greek language. That only depended on the place where the recipes were carried out. In fact, Levantine recipes could also be written in Italian, as the recipe SG 1030 f. 73v which contains measures in «occa» and which was rewritten half in Greek and half in Italian in SG 1027 ff. 490v-491r with right conversion of the okka unit into “400 dramia”. As mentioned by Athanasius, this recipe came from certain notebooks he got (“rescriptum est in quaternionibus perfectus”). At the end of the recipe SG 1030 f. 84r, he wrote too: “questo

59 ‘uncia 2’ / ‘ουνγγίας 2’; ‘uncia 1’ / ‘ουνγγίαι 1’; ‘uncia 10’ / ‘ουνγγίας 10’; ‘uncia 8’ / ‘ουνγγίας 8’ (SG 1030 ff. 94v-95r / SG 1027 ff. 456r-v).
60 SG 1030 ff. 77r-77v: “Σελειμάν και νισαντήρι ομόζυγα άμφω ως 40 δράμια από καθ'ένα. τρίψετα καλά και τα δύο και βάλετα εις μιαν άμουλαν και βάλετα εις τη χόβολη, id est στάκτη θερμήν και ασταθή τόσον ώστε να κοπή ο καπνός οπού ευγένη από την άμουλαν[,] [...] και θέλη φάγη το ασίμι, τότες έπαρε αρσενικόν και τρίψε το καλά, και κουβεργκιλέ (ότιο γαρ οι τούρκοι τουρκιστί καλούσιν) ήγουν, σαλεμονίτριον, και τρίψε και αυτό καλά, και ας είναι ομόζυγα, ήτοι από καθε δραμιά δεκα, και βάλε αυτά τα δύο εις μιαν βεντούζαν και χρίσε την ωσάν και την άμουλαν και αφήσε το στόμα ανικτόν και βάλε την εις τα κάρβουνα ώστε να ειγη όλος ο καπόν και στέκου από μακρα διά την υγιάν των οδόντων, και όταν ο καπόν καταλυθή αφισέ το να κριάνη και τότες τρίψε το καλά, και τρίβε το ποτιζοντάς το ώστε να το φάγη όλον ήτοι ταις 4 ογκίαις. Quere quod deest, ut argentum efficiatur.”

SG 1027 ff. 440v-442r: “λάβε νισαντήριου όσον βούλει, και άλλο τόσον από σελειμάν ως είη ομόζυγα. λόγον γάρ ει μεν το εν εις δρ. 50, και το έτερον δει είναι δρ.50. τούτο γάρ έστι το ομόζυγα. και τρίψοι αμφότερα εις λίαιν, ἐπείτα θες αυτήν από ψαλίδων, ήν ήθεις εις τέραν θερμήν εις ήν τοσούτον μενεί, ώστε μηκέτι καπνός εκ της φύλλις εξίη, [...] μέχρις αν βρωθώσι τα φύλλα του αργύρου, ου γεγονότος, λάβε αρσενικόν δρ.13 και σαλονίτριον όσον τόσον εις λίαιν, ου όμοιον, ἐπείτα θες αυτήν από μιαν βεντούζαν και χρίσε αυτήν καθα και την φιάλαν και στήθι μακρόθεν υγείας ένεκα των οδόντων. όταν δε ο καπόνς παύσητα παντελώς, άφεις αυτώ ψυχράνθηνα, και τότε τρίψοι αυτώ εις μάρμαρον πορφυρούν, καθα οι ζωγράφοι ποιούσιν και πότιζε αυτόν το ώστε να το φάγη όλον ήτοι ταις 4 ογκίαις. Quere quod deest, ut argentum efficiatur.”
This last recipe has another version in SG 1027 454v without the mention of its source but with a title which gives the following detail: “a far oro, chè èstato provato d’un di nostra conossensa”. So these notebooks seem to be laboratory notebooks of an Italian-speaking acquaintance who used to practise chemistry in the Ottoman Empire\(^6\). We found once more such a reference in the recipe SG 1030 f. 83r using also the *dramia*: “tutte queste recette sono recopiate nelle quaternioni chimici che sono in 4°”. The same recipe was neatly copied in SG 1027 f. 455v and completed with Turkish names for each of its ingredients. In addition, the recipe SG 1030 f. 73r is a rough draft in Italian using the *dramia* and the Turkish ingredient “selymà” (probably for “solyma”) written with the same stress as in Greek and in Turkish\(^6\). Thus all these recipes in Italian actually reflect a Levantine chemistry, as well as the Greek ones.

**Conclusion**

The present paper is the first study on Athanasius’ chemical manuscripts ignored until now. These manuscripts show a chemistry which was not in line with the 17\(^{th}\) century Western chemistry. And yet Athanasius had lived in Rome and Paris for a long time and he knew Michael Sendivogius’ name which is written on a scrap of paper in his manuscripts\(^6\) as well as the titles of some Johann Rudolph Glauber’s works\(^6\). On the other hand, Athanasius’ chemical manuscripts do not just revive the byzantine alchemy’s tradition. These papers rather show us a really lively and particular 17\(^{th}\) century chemistry: Constantinople chemistry with its own character. It used to be practised in two languages (Italian and Greek) but within the framework of the Ottoman Empire customs and with its specific corpus of recipes. So not only does the study of Athanasius’

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\(^6\) In addition, these two versions contain some sketches of chemical apparatus.

\(^6\) In the recipe SG 1027 f. 477r in Italian, the Turkish ingredient “solima” is also present.

\(^6\) Actually, Athanasius strangely wrote Sendivogius’ name with its anagram: “Michael Sendivogius / divi leschi genus amo” (SG 1030 f. 42v).

\(^6\) Athanasius wrote down the following references in SG 1027 f. 435r (on scraps of paper): “glauberus in prima parte de prosperitate germanie, non malè loquitur de miraculo panum quod christus fecit. pag : 4. dedicatoriae. et pag: 22 de ebrietate.” / “glauberus in consolatione navigantium de embritudine pag : 77, et ante hanc et post, ubi in S\(^{am}\). Joannem baptistam blasphemat.”. Such quotations do not help us to precisely date Athanasius’ manuscripts, but they prove that the Ms. SG 1027 – at least – had not been already taken by Séguier in 1655, since Johann Rudolph Glauber’s *Prosperitatis Germaniae*... was first published in 1656 and his *Consolatio navigantium*... in 1657.
manuscripts present a new character of the Greek alchemy’s history and state how writings of the early modern Greek alchemy could be shaped, but it also reveals the existence of a Levantine chemistry made up of craftsmen and chemists who could meet together and share their recipes. In this chemistry Christian and Muslim chemists might have even been in contact with one another.

Nevertheless, for a Greek, studying chemistry in the Ottoman Empire was probably not without difficulty, where, indeed, printing books or getting books from the West was not so easy for the Christians. Consequently, the diffusion of the Greek 17th century chemistry in the Levant had to be a matter of handwritten texts circulating inside certain networks. It is certainly the reason why Athanasius copied some recipes of Guglielmo Gratarolo’s *Verae Alchemiae Artisque Metallicae...* from an anonymous Italian handwritten source⁶⁵ (even if, as we know, he owned the 1561 Basel edition of this book at least at the moment of his death⁶⁶) and translated one recipe of Jean Liebaut’s often republished book, entitled *Quatre livres des secrets de médecine et de la philosophie chimique*,¹ into Italian, then into Greek, from an anonymous French handwritten version. The question of Athanasius’ sources is important and I will deal with it, as well as with a more detailed examination of his recipes, in a next study.

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⁶⁵ Four recipes: SG 1027 ff. 468r-471v. Let us add that a recipe attributed to Archelaus is also found in that anonymous Italian source (SG 1030 ff. 97v-98r); this recipe is copied by Athanasius in SG 1027 458v. On Archelaus, see Colinet, pp. lix-lxviii.

⁶⁶ The Sainte-Genevieve Library has Athanasius’ copy of Gratarolo’s book with an explicit ex-libris.

⁶⁷ SG 1030 ff. 32r-32v. The French title of 1573 Jean Liébault’s original version is “Huile de naphte, c’est à dire, de soufere, laquelle est incombusstilble, inscente & clarifiante des esprits”.

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Sacred initiation related to alchemy is a topic not widely diffused in alchemical texts, except in commonplace statements.¹ Yet it can be traced from the origins of alchemy up to the 20th century. In the Physica kai mystica of pseudo-Democritus, we are told that Democritus’ master died before having completed the initiation of his pupil. He hid a secret formula in a column of a temple, which suddenly opened in front of Democritus. The temple will be later given a name: Memphis, and the master as well: Ostanes.² Specialists of Greek and Arabic alchemy might give us many other examples of such initiatic schemes, but in the Latin West, a real alchemical interpretation of ancient Mysteries cannot be found, to the best of my knowledge, until the early modern times, when poetry was no longer considered as mere lies (as it was in Aristotle’s works, and more generally in medieval culture), but began to be commonly praised as “poetic theology,” a way for the Ancients to hide divine truths behind fables.³

The notion of “poetic theology” was resonating with that of prsca theologia, prsca philosophia, or prsca sapientia, an idea which originated from late Antiquity philosophers such as Diogenes Laërtius, Iamblichus or Proclus, and Church Fathers like Augustine, Lactantius or Tertullian, according to which the most ancient theologians and philosophers – Hermes Trismegistus, Zoroaster, Orpheus, Pythagoras, Democritus or Plato –, though pagan they were, were in Egypt and received part of the teaching of Moses, the most ancient theologian of them all. Their doctrines were therefore imbued with part of the genuine Christian revelation, which made them invaluable, since they

¹ E.g. Jacques Gohory, preface to [Colonna] (1554), v° of the title-page (Jacobus Gohorius Parisiensis Lectori S.): “Quæ arcana sub his architecturae ac cerimoniae involucris tegantur, vulgo non sciri, reip. interesse aiant: sed ab iis tantum sanctioris Philosophiae sacris initiati, sese in rerum abstrusarum contemplatione abdiderunt.” Paracelsus (1568?), dedicatory epistle, fol.(3 r°-v°: “Si tandem eorum vel minimus, qui sacris & abditis naturae mysteriis operam dant, experientiaque sensuali Philosophiam veram exercent, opere quopiam nos aggerderetur certandi gratia: mox e Philosophis reddebamur asini literati saltem.”
² See Martelli (2014).
³ On this topic, see Kahn (2013), 97-99 (with bibliography).
were closer to the origins of the revelation of God than any other doctrine. This idea was revived by the Florentine Renaissance in the second half of the 15th century. Classical mythology was understood by many Renaissance thinkers as the proper theology of the Greeks and Romans. It was therefore quite natural for Renaissance alchemists to investigate classical myths in order to discover a hidden truth in them. This was clearly expressed, for example, in 1585 by the English alchemist Richard Bostocke: “Divers Poets before the tyme of Plato, and also after his tyme did wrapp and hide this Arte in Ridles, darke speeches and fables. As by the fable of the golden Fleece […]”

Thus, Renaissance alchemists began to interpret alchemically Greek, Roman and Egyptian mythology, hoping to discover the alchemical truths hidden there by the Ancients. Fables, they argued, had preserved these truths more safely and faithfully than the alchemical writers did in their obscure treatises. Besides, Renaissance alchemists were now in a position to claim much older roots in history than before, when alchemy was still considered an Arabic import in Europe.

Within a few decades, the alchemical interpretation of classical mythology became an essential nutriment to alchemy. In 1544, Giovanni Bracesco assigned an alchemical meaning to a huge number of ancient fables in his influential treatise La esposizione di Geber filosofo. At the end of the 16th century, Vincenzo Percolla interpreted no less than 209 myths in his manuscript Auriloquio. But the first alchemist to give a proper interpretation of ancient Mysteries was, not surprisingly, Michael Maier in his Arcana Arcanissima, published in London in 1614.

Relying on Diodorus Siculus’ and Plutarch’s statements that Dionysos is obviously none other than Osiris, and on the common opinion that most of the Greek prisci philosofi had received in Egypt their knowledge in science and philosophy, Maier rhetorically asked why the Egyptian priests did conceal alchemical secrets under the veil of sacred celebrations, instead of disclosing them to all and everyone. – For two reasons, he answered: had anyone known that the Great Work was currently performed among
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Egyptian priests and that this was the actual meaning of these celebrations, then the celebrations would have been attended in droves by all nations; furthermore, Egypt would have been threatened by countless military expeditions sent at once by all kings from abroad. Therefore the priests made sure that everyone of them was forbidden, under death penalty, to disclose the secrets of alchemy. There were other reasons as well, including, Maier wrote, the very reasons why craftsmen always hide their processes to other people, and the fear that common people make a foreseeable misuse of this secret. Maier’s more general argument was that all classical myths, considered as historical narratives, are entirely implausible, if not deeply shocking: they only make sense if we accept that they are intended to conceal mysteries. This argument was a blow to both the euhemerist and moral readings of classical myths. Consistently, Maier explained the many prodigies occurring in ancient Mysteries, such as empty bottles put in the temple and found full of wine on the next morning, as mere trickeries performed by the priests in order to deceive the people: an explanation quite identical, by the way, to those given by libertine thinkers, in the same years, for pagan (and implicitly Christian) miracles. But Maier’s conclusion, of course, was different: these trickeries were not a proof that there are no gods, but that the meaning of the ancient celebrations was secret – i.e. alchemical. It is also interesting to see that in Maier’s works, contrarily to many supporters of the prisca theologia, Orpheus is not given the prominent place, as the one who imported the Egyptian sacred celebrations in Greece: in Maier’s opinion, the most plausible account of Orpheus’ death is that he was struck by lightning for having disclosed initiatic secrets to ordinary people, which was a good revenge for God, not only for this sinful disclosure, but also for the dreadful idolatry which it caused everywhere in the world. This opinion reflects the Lutheran position of Maier, which was less dogmatic than that of Libavius, for example, and can be best described as a Christian

10 Maier (2005), 42-43; Maier (1614), 19-20.
12 Maier (2005), 238, 254, etc.; Maier (1614), 168, 179, etc. The best examples of libertine thinkers in Maier’s times are Naudé (1625), and of course Giulio Cesare Vanini (1585-1619). See Montfaucon de Villars, ed. Kahn (2010), 65-74, 76-77, 191, 193, 206, 233.
13 Maier (2005), 256; Maier (1614), 180-181.
14 Maier (2005), 248; Maier (1614), 175-176.
humanism typical of the Protestant, post-Renaissance (or, let us say, post-Ficinian) thinking, where David, not Orpheus, was given the most prominent place among poets.\(^{15}\) Coming to the origins of the Eleusinian Mysteries, Maier recalled the legend of Demeter, who tried to make young Triptolemus immortal by secretly anointing him with ambrosia and laying him in the flames in order to gradually burn away his mortal self. Who cannot see at once, Maier wrote, that such tales are plain alchemical secrets? Who ever heard of children usually hidden under red coals? Triptolemus is our philosophical foetus, which is long hidden in fire and fed with fire as it were pure milk, until he is able to endure the violence of every fire.\(^{16}\) All the details of the Eleusinian celebrations were similarly alchemically explained by Maier, who referred to this general interpretation in his subsequent works and even added interpretations of other Mysteries, such as those of Samothrace.\(^{17}\)

The alchemical meaning given to the Eleusinian Mysteries can also be found in the *Chryseis* (*Chryseidos libri IIII*) of Johannes Nicolaus Furichius, published in 1631. This less-known work written by a Strasbourg physician is one of the main early modern Latin alchemical poems. Chryseis is the name that Furichius gave to Proserpine, implicitly referring to the word *chrysos* (gold) and explaining it with this gloss in the margin: “Chryseis is imagined as Ceres’ daughter, because gold is taken out of the earth.”\(^{18}\) When Chryseis married Dis (or Hades), Furichius explains, she received the hidden caves of gold as a dowry and dwelt among the smoky sulphurs of the metal (an allusion to Hades’s words of comfort to Proserpina in Claudian’s *De raptu Proserpinae*).\(^{19}\) Whenever she returned on earth, she left clues to extract the seeds from crude gold. These clues have yet to be explained, for no one can understand them without help. The goal of the poem is to explain them. Not surprisingly, the secrets of alchemy are identified to the Eleusinian Mysteries through the character of Chryseis’ mother, expressly named “sanctae mater Eleusinae”, and through the metaphor of Dionysos’ cistus as the receptacle of all these secrets.\(^{20}\)

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16 Maier (2005), 249; Maier (1614), 176.
17 E.g. Maier (1617), 101, 105-108.
18 Reiser (2011), 106 and 262.
19 Ibid., 106 and 263. The *De raptu Proserpinae* is dated 395-397 A.D.
20 Ibid., 172 and 342.
Michael Maier’s suggestions were taken for granted by a number of alchemists, among which we should first quote Isaac Newton, perhaps the most eager reader and interpreter of Maier’s writings, who transcribed and translated in a manuscript a brief marginal summary by Maier, taken from Maier’s *Symbola Aureae Mensae*: “Sacra Bacchi (vel Dionysiaca) instituted by Orpheus were of a Chymicall meaning.”

This idea can be found again in several alchemical writings from the eighteenth century, such as the *Clavicula Hermeticae Scientiae ab Hyperboreo*, an anonymous work published in Marburg in 1746. There, in a historical excerpt, the Eleusinian Mysteries were named as a landmark of the transmission of alchemy. In 1773, the French alchemist Etienne Libois repeated this mention in his *Encyclopédie des Dieux et des Héros sortis des qualités des quatre élémens et de leur quintessence, suivant la Science Hermétique*. Meanwhile, Maier’s *Arcana Arcanissima* had been plagiarised, and even extended, by A.-J. Pernety in *The Egyptian and Greek Fables Unveiled and Reduced to One and the Same Principle*, a work published in 1758 and re-edited until 1795, which offered a pleasant, useful and learned rendering of Maier’s views in the vernacular. The weight of the Freemasonic rituals in the transmission of the alchemical interpretation of Ancient Mysteries throughout the second half of the eighteenth century should also be mentioned.

The alchemical reading of classical mythology often supposed the interpreters to be endowed with a considerable knowledge of Antiquity. In 1617, Michael Maier theorised this practice, locating it at the very core of the intellectual activity of the alchemists. Maier wanted the alchemists to master the arts of discourse and language – especially poetics, since the very subject of poetry had first been to conceal alchemical allegories and enigmas, but even grammar, rhetoric and logic, which formed the basis of all other fields of knowledge. Besides, the alchemist had to know geometry, arithmetic,
astronomy, and physics; and, of course, medicine. Without these arts and sciences, the alchemist was unable to interpret the allegories and translate them into laboratory processes, an ignorance which would bring about mere darkness, instead of the truth hidden behind the veils of the fables. In addition, the alchemist must learn more specific arts like docimastics, which allows one to know the differences between all the minerals and metals, to analyze the purity of precious metals, to know what pertains to their colours, their vitrification. The arts of the goldsmith and smith were also of great help. Finally, the alchemist must become much experienced in the observation of nature (especially the nature of minerals), and perfectly learned and skilled in the very theory and practice of alchemy. Accordingly, the ideal alchemist, in Maier’s opinion, was none other than an encyclopaedic scholar, competent in academic, scientific and technical fields at once, due to his major task: alchemically interpreting the classical myths in order to translate their secret learning into concrete laboratory operations.27 Thus, alchemical research opened up to a genuine quest for universal knowledge.

The alchemical interpretation of ancient Mysteries still left traces even after the complete decline of alchemy, in the 19th and even 20th century, in the most unexpected places. Thus in 1829, the German classicist Christian August Lobeck began his Aglaophamus with a brief survey of the diverse interpretations of ancient Mysteries since the seventeenth century up to his time. Lobeck’s purpose was to oppose the view of his contemporary colleague Georg Friedrich Creuzer that Greek mythology came from an Eastern source.28 Creuzer was probably the last philologist to be a follower of the prisca philosophia. Lobeck aimed to show, on the contrary, that the ancient Mysteries were an integral part of the Greek religion and had no proper esoteric content. The first author mentioned in his survey of interpretations of ancient Mysteries was Michael Maier, “the most learned of the Spagyrics,” who “stated that the principles of alchemy had been secretly transmitted in the Eleusinian, Samothracian and Olympian Mysteries”.29 Needless to say, Lobeck did not delve further into this subject.

The alchemical interest in ancient Mysteries can be traced further to the pioneer of the spiritualist 19th-century English revival of alchemy, Mary Anne Atwood. In her

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27 This encyclopaedic purpose was exemplified in 1617 in Maier’s famous Atalanta fugiens.
28 Creuzer (1810-1819).
29 Lobeck (1829), vol. 1, 6. On Lobeck and the puzzling title of his book, see Brisson (2005), 120-121.
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Suggestive Inquiry into the Hermetic Mystery (1850), Atwood devoted most of the second part to the “Mysteries”.30 Beginning with the assumption that “the Egyptian, that is the Hermetic Art, or Art of Divine works” (i.e. alchemy) “was by the Greeks called Theurgy”, Atwood could easily shift towards the ancient Mysteries: this Art, she went on, “was extensively practised at Eleusis”.31 Furthermore, Atwood connected alchemy, ancient Mysteries and Mesmerism: in Principe and Newman’s words, “Atwood claims that the trancelike state necessary for self-purification and the concentration or manifestation of the ‘matter’ was achieved in ancient times by the devotees of the Eleusinian mysteries and contemporaneously by the practitioners of Mesmerism – ‘the first key opening to the vestibule of this experiment’.”32 In Atwood’s book, the whole Great Work as she conceived it is likewise connected to the Eleusinian Mysteries.

A further interest in the alchemical interpretation of ancient Mysteries may be noticed in the early work of W. B. Yeats as well – not surprisingly, given Yeats’ temporary addiction to “occult” secret societies. Thus his tale Rosa Alchemica (1897) significantly opens, since its third edition (1914), on a quotation from Euripides celebrating those initiated into the rites of Dionysus.33

Some thirty years later, another unexpected place to find a new alchemical interpretation of ancient Mysteries was the collection of essays The Theatre and Its Double by the famous French writer Antonin Artaud, published in 1938. This collection included a short text from 1932, The Alchemical Theatre, in which Artaud offered a comparison between his conception of theatre as a radical, ontological performance involving the whole being of the people composing the audience, and alchemy as he understood it through a number of readings into the contemporary esoteric literature.34 Admittedly, in 1925, the French 20th-century alchemist Fulcanelli had perpetuated the alchemical tradition of Maier and Pernety in his first book, Le Mystère des Cathédrales, which offered an interpretation of the Eleusinian Mysteries partially based on new (and quite fanciful) elements.35

30 I owe this reference to Larry Principe.
31 Atwood (1918), 181.
33 Euripides, Bacchae 72-77. See Yeats (1914), 190; Arkins (1990), 103.
35 Fulcanelli (1964), 93, n. 1 and 192; see also 108-109.
However, it is highly implausible that Artaud, as early as 1932, knew Fulcanelli’s book. No one among, nor around, the surrealists did know it – until the beginning of the years 1950, when André Breton met Fulcanelli’s disciple René Alleau.  

Artaud’s comparison between theatre and alchemy rested upon the fact that the origins of theatre lay in ancient Mysteries. Theatre as Artaud conceived it had to recover the original strength which once characterised both (though differently) the Eleusinian Mysteries and the dramatic allegories used by the alchemists to describe the Great Work. Only this original strength was able to lead theatre toward the ideal Artaud dreamed of. In Artaud’s words:

“the Orphic Mysteries which subjugated Plato must have possessed on the moral and psychological level something of this definitive and transcendent aspect of the alchemical theatre, [and] with elements of an extraordinary psychological density, […] must have evoked the passionate and decisive transfusion of matter by mind”.  

This is not exactly an alchemical interpretation of the Orphic Mysteries, but rather an analogy between these Mysteries and the alchemical allegories (termed “alchemical theatre” by Artaud). Yet this analogy was probably inferred from Artaud’s reading of an attractive, coloured-illustrated anthology of alchemical texts published in 1929 by Emile-Jules Grillot de Givry (1874-1929): Le Musée des sorciers, mages et alchimistes. Artaud certainly did not draw directly from the ancient books of Maier or Pernety: reading through old books from a remote past was not Artaud’s customary practice. Grillot de Givry,

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on the other hand, was also the author of an *Anthologie de l’occultisme* (1922), and translated into French John Dee’s famous *Monas Hieroglyphica* (1925): all these publications immediately won the attention of several members of the surrealist group, including Michel Leiris, a close friend to Artaud. Grillot de Givry is, therefore, a very likely source of Artaud. In *Le Musée des sorciers*, Artaud could find a suggestive comparison between the athanor and the Orphic egg:

“the athanor, where the transmutation is performed, is an egg-shaped matrix, just as the whole world, which is itself a gigantic egg: the Orphic egg underlying every initiation, in Egypt and in Greece alike.”

As for the puzzling mention of Plato subjugated by the Orphic Mysteries, it needs to be explained. This view does not fit well with Plato’s works. It was only held in late Antiquity, by such neo-platonists as Proclus. To the best of our knowledge, Plato had only ironic remarks about the initiates in Orphic Mysteries.

As it happens, Artaud’s opinion only reflects the *status quaeestionis* commonly held among early 20th-century scholars, especially in France. Before the works of Wilamowitz, Festugièrè and Linforth, it was currently accepted that Plato had borrowed his myths of the Afterworld from an Orphic cosmogony. In France, Mario Meunier’s comments on Plato’s *Phaedo*, published in 1922 and 1926, are a good example. We cannot state that Artaud spontaneously read Meunier’s edition, but Meunier’s comments were abundantly quoted by the French writer Rolland de Renéville, Artaud’s friend since 1925, in his best-seller on Arthur Rimbaud, *Rimbaud le voyant* (1929). Artaud was most probably led to Meunier’s edition by this very book. In addition, Artaud certainly read

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38 Grillot de Givry (1922); Dee (1925); Grillot de Givry (1980). See Leiris (1927), esp. 63; Leiris (1929).
39 Grillot de Givry (1980), 386: “[…] l’athanor où s’opère la transmutation est une matrice en forme d’œuf, comme le monde lui-même, qui est un œuf gigantesque, l’œuf orphique qu’on trouve à la base de toutes les initiations, en Égypte, comme en Grèce […]”
40 These opinions are conveniently quoted in the work of the late English neoplatonist Thomas Taylor (1790). On Plato considered as a follower of Orphism by late Antiquity Neoplatonists, see among others Brisson (1995); Brisson (2002).
41 For a recent reassessment on this subject, see Bernabé (2011).
43 Plato (1926). See also Euripides (1923), e.g. 71; Bergson (1932), 234.
44 See Habrekorn’s preface to Rolland de Renéville (1985), 7 and 22-23, as well as Rolland de Renéville’s footnotes. The first edition is Rolland de Renéville (1929); see 37-81.
Édouard Schuré’s best-seller *Les Grands Initiés* (1889), a work continuously reprinted until 1931, a chapter of which described Plato as an initiate into Eleusinian Mysteries.\(^45\)

Returning to Artaud’s essay, what Artaud tried to express here was his conception of theatre as a kind of material basis arranged in order to induce a massive psychological impact on the audience, resulting in the transmutation of the spectators’ minds. Thus, he spiritualized the alchemical meaning which, in the times of Michael Maier, had only consisted of plain laboratory processes. As an example, the castration of Osiris meant, according to Maier, that the penis of the god was «these black, useless faeces through which Osiris first took his growth, but which must be separated, after the dissolution, from the cleaned, pure rest of the body».\(^46\)

However, Artaud’s interpretation of alchemy was not a forerunner of the spiritualist interpretations given by Carl Gustav Jung and Mircea Eliade just a few years later. Artaud was not by far a spiritualist. Rather a monist, as were his former surrealist friends, he insisted on the necessary fusion of matter and mind:

“‘We are told that the Mysteries of Eleusis confined themselves to the *mise en scène* of a certain number of moral truths. I believe instead that they must have consisted of projections and precipitations of conflicts, indescribable battles of principles joined from that dizzying and slippery perspective in which every truth is getting lost in realizing the inextricable and unique fusion of the abstract and the concrete, and I think that by certain musics of instruments, by certain notes and combinations of colors and shapes, of which we have lost every notion, they must have managed […] to resolve by conjunctions unimaginably strange to our waking minds, to resolve or even annihilate every conflict produced by the antagonism of matter and mind, idea and form, concrete and abstract, and to dissolve all appearances into one unique expression which must have been the equivalent of spiritualized gold.’”\(^47\)

\(^{45}\) Schuré (1889). New editions appeared, among others, in 1918, 1921, 1927, 1931.

\(^{46}\) Quoted by Matton (1987), 213.

Strangely enough, Artaud’s essay had an impact on further interpretations of ancient Mysteries, later on in the 20th century. In 1953, the French alchemist René Alleau, who was close to the surrealists, drew massively from Michael Maier for his own interpretation of the Samothracian Mysteries, but Artaud was invoked by him as a major authority as well. In the same period, the works of Jung, Eliade and René Guénon contributed much to strengthen the opinion that alchemy was a sort of gnostic, initiatic doctrine. As long as this opinion prevailed, it was extremely difficult, as we know, to make real and tangible progress in the history of alchemy.

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Texts and Practices:  
The Promises and Problems of Laboratory Replication and the Chemical Explanation of Early Alchemical Processes

Lawrence M. Principe

For a long time historians of chemistry tended to give primary attention to the succession of chemical theories and understandings of chemical change (such as the nature of elements or atoms) or to the study of historical chemists’ biographies or trajectories. But chemistry is first and foremost a practical endeavor. Throughout its long history, chemistry (or chymistry, or alchemy) has been predominantly about making stuff, producing new materials, often of commercial value. More recently, the history of science has begun paying greater attention to the practical and material aspects of the sciences. Within the history of chemistry, this broader focus now includes the more serious examination of such things as the technological applications and deployments of chemistry, as well as what chemical practitioners were actually doing in their workshops or laboratories, how they were doing it, and why they were doing it in particular ways.

Several methods can be used to explore the practical, materially-productive aspect of chemistry. There are the usual historical methods of examining written sources like books and manuscripts, especially laboratory notebooks when they survive. But a complementary method that I have long practiced and advocated, and that is now rather suddenly receiving broader interest, involves attempting to replicate historical processes and experiments.¹ In this way, one has the opportunity of experiencing (to some extent) what historical actors experienced. In chemistry this includes not only seeing what they saw but often enough smelling what they smelled, and indeed, the highly sensual nature of chemistry, as a science predominantly of qualities, renders historical replication

especially promising as an additional source of valuable information about historical events and ideas. Careful, circumspect replication can provide the historian with fresh insights that may help us reach a better understanding of what the authors were doing, of how and why they interpreted their results in certain ways, and of the texts they left behind. In this way, I see textual methods and experimental replication as not only complementary, but also dynamic, in the sense that the texts must initially direct the course of experimental research, the results of which should then help us better understand and interpret the texts, and the better understanding of the texts may thereafter allow us to modify the replication, and so forth.

The ability to replicate experiments is a foundational principle of modern science. But, as any practicing experimenter knows, this notion is usually a much easier to realize in theory than in practice. Every replication encounters the problems that arise when one person translates a practice into words and then another person tries to retranslate those words back into practice. Details that are obvious to, or unnoticeable by, the first experimenter are often left unmentioned, yet these features may be unknown to, perhaps even unimagined by, the second. Personal experience and habits (of hand or of mind) can cause the second experimenter to misinterpret unconsciously the words of the first. Such difficulties only increase when we move to older and older texts, where the cultural, philosophical, theoretical, and linguistic contexts of writer and reader move ever further apart. I examine here a few of these difficulties as they emerge in some ancient texts that describe chemical operations, and point out how modern replications can help us better understand the texts and perhaps even help guide philological endeavors, especially in the translation of technical texts. I will also point out some problems that occur when modern chemical knowledge is too easily or casually applied to ancient texts--what I call “armchair” chemical interpretation--without the benefit of historically-sensitive replication.

I examine here a seemingly simple process, one practiced in various forms for over two thousand years, namely the production of a substance known as lead white (Gr. ψημύθιον, Lat. cerussa). Lead white was used first as a cosmetic, and later for medical, artistic, and other purposes. It is cited as an ingredient in many Classical and later chemical texts,
such the *Four Books* of ps-Democritus and the Leiden Papyrus.\(^2\) Its production is described in more or less detail by four important ancient authors: Theophrastus (*Peri lithōn*, 56), Vitruvius (*De architectura*, 7:12), Dioscorides (*De materia medica*, 5:88), and Pliny the Elder (*Naturalis historia*, 34:54). These four authors, and most of their successors, describe the basic method of making lead white largely uniformly. It *seems* a very simple process. Lead, either in thin sheets, scrapings, or brick-like blocks, is exposed to the action of vinegar. Notably, the lead is always kept above the surface of the vinegar and exposed only to its vapors. Thus the lead is either supported on a mat of reeds or wooden sticks, suspended by a cord or rod, or placed like a cover upon the jar containing the vinegar.

In order to replicate these conditions in a way that could be observed and recorded, I suspended a sheet of lead by a cord within a glass flask above a solution of 10% acetic acid.\(^3\) The flask was then covered and left on the laboratory benchtop for three weeks. A time-lapse video, with frames taken every thirty minutes, was taken over the course of 20 days. (Video 1: Note that the jittering movement of the lead is due to the winding and unwinding of the twine suspending the lead owing to changes in humidity levels and to changes in the lead’s center of gravity as it corrodes.) After this time, it can be seen that a substantial layer of white crust has formed, significantly swelling the original dimensions of the lead. This white crust is easily scraped or flaked off. (Figures 1 and 2). The *overall* chemical reaction can be expressed thus:\(^4\):

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\(^3\) Note that an *absolutely accurate* replication would have utilized wine vinegar, an earthenware vessel, and many other specifics of the ancient process. However, performing replications for historical purposes is not a type of antiquarianism but an attempt to gain further scientific and historical understanding, and for this purpose I advocate beginning with a “stripped down” version of the original process that limits the number of variables and potential chemical complications. Often this proves inadequate for achieving the original results, and further “complications” need to be added in order to achieve the desired results (see Principe, “Chemical Translation”).

\(^4\) Because of the commercial importance of this process in the nineteenth and early twentieth centuries, the chemistry of the transformation was repeatedly investigated; it is clearly far more complicated than the simple reaction shown here--some of these complications are introduced later in the paper.
Scheme 1: The overall (simplified) transformation of lead into lead white

Figure 1: Before and after photographs of the lead white experiment; at the start of the experiment (left) and after twenty days (right). Author’s laboratory
Figure 2: The flakes of crude lead white scraped from the residual piece of lead. Author’s laboratory

Types of Problems in Understanding Practical Texts
I shall return to this chemistry shortly. But first it will be useful to classify the types of problems encountered in texts, particularly in the technical literature. These problems can be conveniently broken into two main groups--those stemming from the texts, and those stemming from the readers. In regard to the texts, the authors were often not themselves practitioners; this is certainly the case in the example of lead white. It is highly unlikely that Theophrastus or Dioscorides ever made lead white themselves, and very possibly never even saw it being made. Their accounts are at best second-hand, and therefore their knowledge of the process was itself more or less imperfect. In other words, there is an unavoidable gap between the (probably illiterate) artisans who actually made the product and the literate scholars who wrote about it. It is difficult to assess how much crucial or
simply pertinent information failed to be transmitted across that gap. This problem may not be as significant when the authors are themselves practitioners; however, there remains of course the well-known problem of unexpressed, or “tacit” knowledge. In such cases, a replication aims at spanning that gap by bringing the modern reader closer to the practitioner, perhaps enabling the recovery of some information lost in the original transmission from practitioner to author.

A second problem in the texts is technical vocabulary--were the authors aware of it and did they use it? If they were not aware of it, they might have failed to make distinctions in language that the practitioners considered crucial. In short, even if the authors understood a process fairly well, did they use the right words to describe it? Modern English offers a good example of this problem: non-chemists often conflate the two words “melt” and “dissolve” because both melt and dissolve describe the transformation of a solid into a liquid. But speaking correctly, melting occurs strictly as a result of heat, and dissolving strictly by means of a solvent. Thus when we are presented with a historical text it can be difficult to determine at what level of technical and linguistic proficiency we should interpret its vocabulary.

The second main category contains problems due to the reader. The reader could either be a modern historian, or an historical author copying or paraphrasing an earlier text. The first problems come from the reader being a non-practitioner. This is almost always the case, rarely does a reader have first-hand practical knowledge of what he is reading about in a historical technical text. Experimental replication addresses this problem most directly by providing, or at least approximating, first-hand practical knowledge. Without the information provided by replication, several errors can arise from imperfect knowledge of the processes, and these are similar to those faced by non-practitioner authors. More critically, and in my experience most commonly, a good historian endeavoring to understand a technical text goes to modern technical literature to get a better understanding of what he is reading about. Unfortunately, historians are not necessarily--and can hardly be expected to be--familiar with the intricacies (and potential pitfalls) of the scientific literature, and so this potentially very promising solution can instead produce fresh problems. In some cases this occurs by innocently using outdated or substandard sources, or by missing crucial details and creating oversimplifications.
Chemical experimentalists know how complicated even a theoretically “simple” process can really be in practice. Unfortunately, chemists (or at least chemical textbooks) have the unfortunate tendency to keep that experience a secret. Oversimplifications can also occur by assuming that modern chemical substances are equivalent to ancient ones, without taking into account the presence and role of impurities, or the very different technical conditions of apparatus, heating methods, and physical environment. Finally, there is another feature to the problem of technical vocabulary mentioned above; namely, even if the author uses technical vocabulary correctly, will a subsequent reader be able recognize it as such and understand it? This is obviously most serious with languages that are no longer spoken, in which we might have very few usages of a particular word, or perhaps only one as in the well-known philological problem of the *hapax legomenon*. A similar problem can occur however even with common words. For example, the word “metal,” a common enough word with a clear meaning, is often used by seventeenth-century glassworkers to refer to the molten glass with which they are working, which usage proves highly confusing to those not familiar with it.

**The Lead White Case-Study**

A case-study of lead white offers examples of these problems and also demonstrates how replications can help solve them. Beginning with the problem of non-practitioner authors, I turn first to Pliny. His text reads

> Psimithium likewise, that is, lead white, is produced in the workshops of lead-works, the most praised of which is at Rhodes. It is made when very thin shavings of lead are placed atop a vessel of very sharp vinegar, and thus produced by dropping down. Whatever falls off from the lead into the vinegar itself is dried, ground, and sifted….

> [Psimithium quoque, hoc est cerussam, plumbariae dant officinae, laudatissimam in Rhodo. Fit autem ramentis plumbi tenuissimis super vas
Here Pliny writes that the lead white is retrieved from the vinegar, presumably strained out and then “dried, ground, and sifted.” But in the replication of this process no white lead is found in the vinegar, as can be clearly seen in figure 1.

In fact, we should not expect to find lead white in the vinegar because because lead white dissolves in vinegar. Indeed, throughout my replication of the process, fragments of the lead white “dropped down” frequently into the vinegar, but dissolved there in a matter of minutes. Tests on the residual liquid at the end of twenty days showed it to be full of lead in the form of acetates. Pliny is thus certainly mistaken, but how did he go wrong? A hint may be offered by his use of the crucial word destillantibus, “by dropping off.” It is surely Pliny’s Latin rendering of the Greek verb katarrheō which Dioscorides uses in his own account of making lead white—thus strongly suggesting that Dioscorides is Pliny’s main source for this process. But Dioscorides himself notes that the workers first put a mat of reeds into the jar over the vinegar, and then place the lead on top of that. What “drops off” of the lead would then fall onto the mat of reeds and be collected. So Pliny, presumably unfamiliar with the process and the properties of lead white, “over-edited” Dioscorides’ description and thereby gave an incorrect account. Readers should have been sceptical anyway. The whole value of lead white lies in its pure, dense white color. The vinegar that a Roman or Greek artisan would have used to prepare lead white was not the clear, colorless distilled vinegar of today, but almost certainly sour wine, probably sour red wine. Therefore, even though the residual liquid in the modern replication does give a very handsome lead white if it is allowed to evaporate very slowly, this method could not have worked in antiquity since the coloring matters in the crude vinegar would have ruined the product’s whiteness and thus rendered it worthless.

5 Pliny, Naturalis historia, 34:54. All translations are mine unless otherwise indicated.
Applying modern chemical knowledge too easily to ancient texts can sometimes be as misleading as not applying it at all. In 1932, Kenneth Bailey, in his study of chemical subjects in Pliny, argued that what the ancients produced was not lead white (a basic lead carbonate) at all, but rather lead acetate, also known as sugar of lead. He based this claim on the fact that when vinegar acts on lead, lead acetate is produced first, and then carbon dioxide converts this acetate into the basic carbonate known as lead white. But since the vessels containing the lead and vinegar were sealed, he argued, no atmospheric or other source of carbon dioxide could enter, and thus the reaction would stop at the acetate.  

This is true as far as it goes, but proves the proverb that a little learning is a dangerous thing. Bailey was in fact not the first person to remark upon the apparent “lack” of carbon dioxide in the ancient recipes. The earliest indication I have located is from William Pulsifer in 1888, who concluded that the ancients did not distinguish between lead acetate and lead white. This conclusion is less than convincing given the widely divergent appearance and properties of the two substances. A similar observation regarding the lack of provision for carbon dioxide was also made in 1909 by C. D. Holley and in 1927 by J. W. Mellor. Yet neither of these two latter authors took the subsequent step of asserting that the ancients really produced lead acetate rather than the basic carbonate (lead white). What Bailey (and presumably Pulsifer as well) did not account for was an equally crucial first step, without which no reaction at all--not even to lead acetate--can take place. There must be atmospheric oxygen present in order to oxidize the lead before the vinegar can begin to act upon it. The need for oxygen, besides being obvious from chemical theory, has been known (and experimentally demonstrated) since at least 1842. So, if the ancient jars were actually sealed air-tight, the conversion of the lead would have quickly come to a halt as soon as the oxygen trapped within the jar was used up. But since the ancient accounts are clear that the lead was indeed corroded, that means

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that oxygen must have had access to the lead, and if atmospheric oxygen had access then so did atmospheric carbon dioxide. Thus Bailey’s reasoning about the identity of the product is based on a false foundation.

\[
\begin{align*}
\text{Pb} & \quad \text{Pb(OH)}_2 \text{2PbCO}_3 \\
\text{lead} & \quad \text{basic lead carbonate} \\
\text{oxygen / water} & \quad \text{carbon dioxide / water} \\
\text{v vinegar} & \quad \text{vinegar} \\
\text{Pb(OH)}_2 & \quad \text{Pb(CH}_3\text{COO)}_2 \\
\text{lead hydroxide} & \quad \text{(acetic acid)} \\
\end{align*}
\]

**Scheme 2:** A more complete (but still simplified) scheme of the production of lead white from lead showing the critical roles of acetic acid, oxygen, carbon dioxide, and water

When such confident and apparently scientific or authoritative claims get into the historical literature they are difficult to purge. This result can be seen clearly in what the translator for the Loeb Classical Library did: he incorporated Bailey’s erroneous chemical claim directly into his translation. He thus rendered Pliny’s text as “psimithium also, that is cerussa or lead acetate, is produced at lead-works.” He even supplies a footnote keyed to the term “lead acetate” that explains, based on Bailey, that the material produced is “sugar of lead, not the modern basic lead carbonate or ‘white lead.’” The error should have been immediately apparent since “sugar of lead” is a colorless, crystalline, easily water-soluble material, completely unlike the bright white, powdery, water-insoluble white lead. Thus, sugar of lead (lead acetate) is completely unsuitable for

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use as either a cosmetic or a pigment.\textsuperscript{13} While it is useful to clarify the identity of premodern chemical products, such direct “translations” of ancient terms into modern chemical ones should never be done; they are almost always misleading if not simply wrong.

The question of where the necessary carbon dioxide was coming from garnered a number of responses over the years.\textsuperscript{14} Some writers, taking their cues from the “Dutch Process” that was in use for making lead white from the seventeenth until the mid-twentieth century and in which fermenting tan-bark was used as a source of carbon dioxide and gentle warmth, opined that some similar organic matter--perhaps grape residues in the crude vinegar itself--evolved carbon dioxide during its putrefaction. Besides being questionable whether an adequate supply of carbon dioxide could be generated in this manner, it does not resolve the difficulty (which was not pointed out by any commentator on the ancient processes of which I am aware) regarding the necessary role of oxygen. Bailey certainly overestimated the ability of premoderns to seal clay vessels air-tight. Yet, even if the jars of lead and vinegar were simply covered reasonably well (which is all the texts describe) rather than actually \textit{sealed} how could a \textit{sufficient} supply of oxygen and carbon dioxide get into jars to produce a reasonable yield of lead white?

Replication of the process made this clear, and partly by the kind of accident that is not uncommon in practical work. Some months after the video above was recorded, I attempted to make a similar video, but was frustrated to find that the process no longer worked the way it had previously. Multiple attempts were made, but with equally poor results: the production of the lead white was extremely slow, and soon came to a halt before anything more than a thin and partial crust, largely of lead acetate rather than of

\textsuperscript{13} This point had been made by Holley, \textit{Lead and Zinc}, p. 3.
\textsuperscript{14} Lloyd G. Stevenson, “On the Meaning of the Words \textit{cerussa} and \textit{psimithium} (psimythion),” \textit{Journal of the History of Medicine}, (1955):109-11; Pulsifer, \textit{Notes}, pp. 211-214; and Caley and Richards, \textit{On Stones}, pp. 187-88; it is especially noteworthy that the last of these authors carried out their own simple replication of Theophrastus’ process, they claim to have obtained only lead acetate but that after dissolving the crusts in water, atmospheric carbon dioxide caused the precipitation of a considerable amount of lead white. It is true that lead acetate forms first during the exposure to vinegar, but given moisture and carbon dioxide, this then converts to lead white; Caley and Richards experiment therefore was possibly not carried out for a long enough time.
white lead, was produced (video #2). The only obvious difference was the seemingly incidental fact that in the meantime I had relocated my laboratory to a new building. The crucial difference turned out to be temperature control. The first laboratory had very poor temperature control, and the first video was shot during extremely cold weather such that the daytime and nighttime temperatures of the laboratory varied by as much as 10° Centigrade. The second laboratory had much more constant temperatures. The temperature fluctuations in the first locale meant that during cooler nighttime temperatures, the vinegar vapors within the vessel condensed and the enclosed air contracted in volume, thus pulling fresh external air into the vessel. During the warmer daytime periods, more vinegar evaporated and the air expanded, thereby pushing some of the “old” air out of the vessel. (In the first video one can at times observe the vinegar vapors alternatingly condensing and evaporating from the walls of the flask through the diurnal cycle.) Thus the temperature fluctuations produced a daily cycle of “breathing”; each night fresh air--containing oxygen and carbon dioxide--was pulled into the flask, thus allowing for both the formation of lead acetate and its subsequent conversion to carbonate. The ancients manufactured the material outdoors without anything like modern temperature controls, and where the difference between daytime and nighttime temperatures was significant. Accordingly, when I tried the replication in a sheltered place outdoors, the production of lead white was rapid and efficient. Since the daily “breathing” of the vessel is driven by differential air pressure, that means that even a very small opening into the vessel would suffice to permit the daily replenishing of the oxygen and carbon dioxide within the flask. Thus in this case, replication provided completely unexpected insights.

Replication As an Aid to Philology

Finally, let me turn to Theophrastus to illustrate how replication can potentially help clarify problems of technical vocabulary. The crucial passage (De Lap., 56) regarding the elaboration of the lead white is rendered as follows by Caley and Richards.

...the part that is scraped off is ground in a mortar and decanted frequently, and what is finally left at the bottom is white lead.
The consensus of the three Vatican manuscripts of Theophrastus provides a strange spelling of the verb \( \text{ἀφηθοῦσιν} \), which Caley and Richards, following Schneider, correct to \( \text{ἀφηθοῦσιν} \), and translate as “decant,” implying that the scrapings were ground with water and the supernatant water poured off the top, leaving a washed white lead behind at the bottom of the mortar.\(^{15}\) This rendering makes good chemical sense, and presumably incorporates results from the translators’ own replication of the process. The use of water, although not explicitly mentioned in the text, would purify the desired product because the crude lead white, by my analysis, contains both insoluble basic lead carbonate (the lead white) and soluble lead acetate, often in roughly equal amounts by weight. Ancient samples of lead white discovered in burials have been shown by analysis to be the pure basic carbonate, suggesting that some method was employed to remove the acetate, and the simplest way of doing this is by washing the scrapings with water.\(^{16}\)

Eichholz corrects the problematic verb further into the more common form \( \text{ἀπηθοῦσιν} \) and translates it as “strain away,” which seems plausible enough philologically, but gives a translation that is hard to understand in practical terms: “the scrapings are pounded in a mortar and continually strained away \( \text{ἀπηθοῦσιν} \); and the white lead is the material finally left deposited.” What exactly is strained away? Where exactly is the lead white deposited? His commentary explains that water is poured on the scrapings and strained away, therefore presumably implying something close to what Caley and Richards suggest: washing away the acetate with repeated affusions of water, finally leaving pure lead white behind in the mortar or perhaps on a filter or strainer of some sort.

But when I tried replicating this part of the process, I discovered two unexpected problems. The first is that the scrapings contain many tiny particles of unreacted lead—five to ten percent of the weight. This result is because the lead, whether in the form of a thin plate or the kind of a brick \( \text{plinthos} \) that Theophrastus mentions, exfoliates dramatically during the reaction, sluffing off thin fragments of lead that are subsequently


\(^{16}\) Caley and Richards, \textit{On Stones}, pp. 189-190 and references therein.
either fully or only partially converted to acetate or carbonate. Since the *psimuthion* was originally used primarily as a face powder or fine white pigment, the lead particles would make it gritty and grey rather than smooth and white. How did ancient workers remove the unreacted lead particles? The methods suggested by the translations above would leave these lead particles with the lead white. Second, grinding with water gave a bigger problem as can be seen in video #3.

The lead white produced by this method is so finely divided that *nearly all of it* comes off suspended in the wash water, as a fluid white like milk; the product is *not* left behind in the mortar. The lead white actually takes many hours to settle out, up to two entire days, thus it would have been impossible to “decant” the water directly or to “strain it away” without taking the lead white along. Indeed, measurements of the size of the particles of lead white produced by the exposure of lead to air and vinegar vapors indicate average diameters ranging from 0.04 to 0.3 microns (by comparison, a human blood cell is about 5 microns in diameter). Nevertheless, this discovery did solve the first problem: all the unreacted lead particles were left behind in the mortar. Since they are much denser, they settle out much faster than the lead white and so are not carried out of the mortar with the poured off water. These grey-black particles can be seen still in the mortar at the end of the video.

These practical results, if they in fact replicate accurately the experiences of the ancient workers, encourage us to turn back to classical philological methods for a resolution. Theophrastus uses this same (possibly problematic) verb in one other place. In his *History of Plants*, when describing the means of extracting juices from plants, he writes that some plants are so dry that no juice can be obtained from them by pressing or squeezing. He reports that in such cases, the workmen pour water over the crushed plants, and then “…δῶρ ἐπιχέαντες ἀπήθοδοι καὶ λαμβάνονσι τὴν ὑπόστασιν” (9.8.3). What they collect is called here the *hupostasis*. The Greek medical literature uses *hupostasis* specifically to refer to the sediment that urine deposits upon standing for a day. In other contexts, it refers to the sediment or lees deposited by wine as it ages. Thus it would seem that Theophrastus’ use of *hupostasis* does not refer to material that remains on a filter or

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strainer, but rather to the solid that settles out from a liquid over time. So here the verb cannot mean something like our concept of filtration, a process that would remove all the solid material suspended in the liquid such that nothing would be left to settle out. There are two possible interpretations. First, the straining would be only to hold back the large pieces of vegetable matter, and the desired *hupostasis* settles out of the strained liquid upon standing. This kind of straining might have been done using the kind of sieves that the ancients possessed--pierced metal sieves to strain wine, and woven sieves of reeds or fibers for processing grain. Such straining might instead have been more efficiently done by filtering through cloth. In either case, the openings in the sieves or in the weave of cloth would have been too large to retain very fine particles, and the strained liquid would then still have deposited this finest material as a *hupostasis* upon standing. The other possibility is that the verb means merely “draw off” or simply “pour off” and does not involve anything akin to filtration or straining through some sort of barrier. In this latter case, the larger solid particles would be left behind, while the poured off supernatant liquid would then in time deposit the fine particles it carried in suspension as the *hupostasis*.

Combining these interpretations with the results from the replication of the lead white process now suggests satisfactory explanations of what the ancient workers were actually doing. The may have poured the milky water out of the mortar through a cloth, which would have held back large material--perhaps particles of lead or foreign matter that may have become mixed with the crude material during processing. The lead white would pass through the weave of the cloth, and upon standing, deposit the lead white which could then be recovered. This interpretation preserves the idea of “straining” in the verb, but with the proviso that the lead white is not recovered as a residue on a strainer but from the liquid that passes through the strainer as a slowly settled-out *hupostasis* or sediment.

The other possibility, which I tend to think more likely, is that what Theophrastus is really describing in the lead white passage is a process known today as *levigation*. This is a particular kind of washing where different materials are separated based on their

-- Suzanne Amigues, in *Théophraste, Recherches sur les plantes*, p. 21 and 121 renders *hupostasis* as *sédiment* but then implies that this *sédiment* is the solid left on a filter, which is correctly called a *résidu*.---
different rates of settling out of a liquid. Ancient writers do describe such a process, and very often particularly in the context of pigments—and indeed Theophrastus describes lead white in the middle of his section on mineral pigments. Pliny describes levigation clearly and unambiguously for the separation of a yellow pigment (litharge, a lead oxide) from lead dross: “after being finely broken up, it is washed in mortars until the water draws out the yellow color, and [that water] is poured out into a clean vessel, and this is done repeatedly until what it most useful settles out.” This process works by getting and keeping the finer and less dense particles of litharge suspended in the wash-water while the larger and more dense particles of lead and dross settle out. The colored wash-water with litharge in suspension is then poured off carefully into a new vessel where it is allowed to stand until the desired particles of pigment settle out, the water poured off and the pigment dried and collected.

Theophrastus does describe the process of levigation unambiguously in a passage adjacent to his description of the manufacture of lead white. For the preparation of cinnabar as a pigment, Theophrastus notes that the raw mineral is thoroughly ground and then “washed” [plunousin]. “Indeed, that which has gone underneath to the bottom is the cinnabar, that which is above and is the most part of it, is wash-water [γίνεται δὲ τὸ μὲν γὰρ ύστραμενον κάτω κιννάβαρι, τὸ δ’ ἐπάνω καὶ πλεῖον πλύσμα]” (De Lap. 58). The top-quality cinnabar is thus “that which goes to the bottom” [huphistamenon] or sediment, described here using the same word that Theophrastus uses in the section on lead white. This is clearly a process of levigation, where particles of the very dense cinnabar (mercuric sulfide) settle out from the water much faster than those of the much less dense minerals with which it is found in the mine. The wash-water [plusma] would still contain suspended a portion of the smallest particles of cinnabar along with the other lighter minerals, and thus retain some value “for painting walls” (presumably by allowing it to sit for a longer time until everything settles out, thus providing a paler, lower-quality

19 Pliny, NH 34:171: “lavatur haec in mortariis minutim fracta, donee aqua luteum colorem trahat, et transfunditur in vas purum, idque saepius usque dum subsidat quod utilissimum est.” In describing levigation, Pliny notes the repetitiveness of the process [saepius] which may also be indicated in the lead white case by Theophrastus’ use of ἀεί.

20 Note that here, the denser material is what is desired—the cinnabar settles out first—whereas in Pliny’s description of the yellow pigment, it is the lighter material that is desired—the lead settles out first (or never gets into suspension) and the pigment sediments later, after the washes are poured off. Both cases are examples of levigation.
pigment). Theophrastus notes that the yield depends upon a certain skill [technē] in carrying out the operation, presumably the experience of knowing exactly how long to allow for sedimentation; too short a time and the yield is low, too long a time and the product is poor-quality. A similar process of levigation might also be implied in the section immediately preceding lead white, where Theophrastus notes how the blue frit pigment kyanos is prepared in four different shades depending on the size of its particles (De Lap. 55). Although the use of water is not mentioned here, it is possible that the separation of kyanos particles by size was carried out by means of levigation. It is however also possible that the ancient artisans simply ground the pigment for a longer or shorter period, even though that method would not have provided as homogeneous a product as levigation.

Reading Theophrastus’ description of lead white either as straining followed by sedimentation or as levigation now better explains what he means when he says that the lead white is eschaton huphistamenon, literally “that which has gone underneath last.” During the process of sedimenting or levigating lead white the desired product is in fact what is obtained last and “underneath.” The finest material settles to the bottom of the vessel at the end of the process. This result is in opposition to a method of filtering or straining out a substance where the desired solid is obtained first and above (while the filtered or strained water trickles below), a process that could not have been successful in antiquity given the extreme fineness of lead white particles and the coarseness of available strainers. So I would suggest translating eschaton huphistamenon as “that which settles to the bottom last,” a phrase which rightly distinguishes the lead white from the residual lead particles that settle out first, or any foreign matter than might be left on a cloth.\(^{21}\) Levigation and sedimentation also provide an additional benefit. As shown by the

\(^{21}\) The phrase eschaton huphistamenon is similarly rendered as “what at last subsides to the Bottom of the Vessel” by Sir John Hill in his eighteenth-century translation of Theophrastus. He also follows the Aldus 1497 editio princeps by giving ἐφθοῦσιν for the problematic verb ἀφθοῦσιν, which he then translates as “boil.” Despite this philologically questionable modification, the resultant translation is at least chemically felicitous, as extended boiling allows much of the lead acetate to convert to basic carbonate under the influence of atmospheric carbon dioxide, thus enhancing the yield and reducing waste. Sir John Hill, Theophrastou tou Eresiou peri Ton Lithon biblion: Theophrastus's History of Stones (London, 1774), pp. 224-25.
replication, during the length of time required for the finely-divided lead white to settle out of the wash water, atmospheric carbon dioxide acts upon the dissolved lead acetate, converting it to basic lead carbonate (lead white) which then precipitates and increases the overall yield.

Thus, combining the results of replication and philological analysis, and in light of the positioning of the lead white passage amid other pigments for which levigation is clearly employed, I would propose translating the critical passage from Theophrastus as

…that which is scraped off is ground in a mortar and continuously levigated, what settles out last is the lead white.

I should mention that the verb ἀπηθοῦσα might reasonably be rendered as “sift away,” which is certainly plausible and avoids the objection that Theophrastus does not explicitly mention the use of water for working up the crude lead white; however, other serious problems would arise. On the one hand, this translation would not work for the passage from History of Plants, where water is explicitly mentioned. On the other, no separation of the three chemical components of the scrapings (residual lead, lead acetate, and lead white) would occur. Also, by means of sifting, the fine-grained solid product one wants is collected below the sieve, but first not last. That said, the text of Dioscorides does appear to describe a process of dry sifting as the final operation, but that method does not fit Theophrastus’ text. Indeed, there is no sense in being needlessly reductionist by endeavoring to propose a single method used in antiquity, as there was surely some variation in operations between different manufacturing centers and over time. However, the process of levigation better fits both the sense of Theophrastus’ text and the practical process: it separates the unreacted lead particles from the lead white, dissolves away the soluble lead acetate, and the final product, purified basic lead carbonate, i.e. lead white, is collected at last as a fine sediment from underneath the poured off wash water.

So actually trying to reproduce a process provided several additional pieces of information, and this is, finally, the real value of replication— it provides us with an additional source of information and insight. That further information, of course, has to be subjected to the same critical judgement and assessment as the information gleaned
from more traditional historical sources. However, in an enterprise as difficult as trying to understand the past, we should be happy to obtain additional information from any reasonable source for inclusion in our work.
The educational applications of the historical material and on the reproduction of alchemical procedures

Kostas Skordoulis, Kostas Exarchakos

In this presentation, we will at first give a short account of the role of History of Science in Science Teaching underlining the merits of the historical approach in the science classroom. Following we will report on the design and development of a series of teaching activities based on the History of Alchemy (4\textsuperscript{th}-17\textsuperscript{th} centuries) as it is reconstructed through the collections of primary and secondary literature in the data bases of the project DACALBO.

Two sets of teaching activities have been designed and developed: 1) Activities aiming in the training of secondary teachers of Chemical and Life Sciences in using original (alchemical) texts for the reconstruction of apparatuses in the school laboratory and 2) Activities aiming in raising awareness on issues of cultural heritage for the wider public. Namely, activities supported by innovative interactive charts and timelines, activities exploring the relation between the Greek, Arabic and European alchemical traditions, and activities highlighting the technical applications of Alchemy (eg. pigments), the relation of alchemy to medicine and the presence of alchemy in poetry, literature and myths.

Collateral topical activities have been also developed such as the description of the materials used for writing, the laboratories of copying (Scriptoria), the coloring of clothes and the use of plants during the Medieval and Modern period.

On how History and Philosophy of Science contribute to Science teaching and learning processes

The following points have emerged as crucial/fundamental with regard to the contribution of History and Philosophy of Science in improving teaching and learning Science, (Matthews M. 2007, p. 73):
- The History and Philosophy of Science present a more human approach of the scientific task, setting connections with additional aspects such as the moral or the cultural aspect.

- The Philosophy of Science, in particular, enhances an individual’s competence to analyse and rationalize, thus contributing to a more refined critical thinking.

- The History and Philosophy of Science also invest on mathematical formulas and equations, denotations and concepts, so that they are not understood under a purely instrumentalist perspective, as a mere causal nexus of a rigidly rational structure.

- The History and Philosophy of Science further improve teachers’ training, since they help develop a more profound and rich understanding of different scientific aspects. Furthermore, the teachers’ viewpoints on the very nature of the science they teach directly affect/influence the way they teach it.

- The History and Philosophy of Science may also provide indications regarding possible difficulties in understanding different concepts. In science education, it is acceptable to form a cautious comparison/parallel between the way scientific knowledge is built and the way the student builds knowledge. The way science confronted each occasional difficulty could jointly form the potential strategy to be used in order to lift the alternative perceptions of the students.

**Historiographical standpoints on Alchemy as a source of alternative ideas**

It is generally accepted that, in terms of science education, the learning procedure is but an effort to bring together/mix new cognitive structures with the ones already present in the students’ mind. In order to provide a teaching plan, it is essential to gather information on students’ perception over the subject/item to be taught. Students’ perceptions usually ignore the scientifically accepted/acceptable approach and it is necessary to identify them given the fact that it is the very substrate/foundation on which the teaching intervention will be founded/will build upon. It is therefore reasonable to consider that students’ perceptions on Alchemy are formed within a context of different historiographical approaches available, whether modern or obsolete. Thus, it is absolutely
necessary to list and identify the principle question arising from said approaches, which could significantly contribute in structuring any teaching effort.

The use of the History and Philosophy of Science in order to teach Natural Sciences is predominantly based on historical examples stemming from the fields of Physics and Astronomy, while lacking examples from the fields of Biology and Chemistry, a scarcity usually explained given the far longer historical presence of the former (McComas 2008). Such perception relies on the, historiographically accepted, *complete distinction between Chemistry and Alchemy*, according to which, *Alchemy has no scientific background* whatsoever, while Chemistry on the other hand fulfills the standards which promote it to a scientific corpus of knowledge, as it is structured since the late 18th century, the relevant landmark being Antoine Lavoisier’s influential textbook “*Traité Elementaire de Chimie*” (Elementary Treatise of Chemistry).

From a linguistic point of view, similar perceptions have been encouraged by the belief that the concurrent use of the terms “alchemia” and “chemia” in 17th century Latin literature was but an indication of complete distinction between the two, an approach nowadays rejected by modern historians. On the contrary, it has been proved that the use of the term “alchemia” in Latin literature was used to describe methods and phenomena which are considered direct precursors of methods and phenomena that are unanimously considered to be integrated in the science of Chemistry ever since the 18th century. In addition, the term “chemia”, has been used, again within Latin literature, to describe processes which aimed, among other things, to metal transmuting into gold. (Newman & Principe 1998). A similar interpretation is used for other terms present in different texts of the Byzantine literature such as “cheimeftos” / “chymeftos”, which refer to enamel decorations. It has been claimed that this particular terminology was used to describe both purely technical and alchemical practices (Merianos & Sakorrafou 2013).

Accepting Alchemy as a non-scientific knowledge corpus, as opposed to Chemistry, is equally supported by influential interpretations constituted in psychological terms, the most emblematic among them being Carl Gustav Jung’s *Psychology and Alchemy*. In such context, Alchemy is accepted as a *mainly psychic process*, de-materialised and independent from physical phenomena. Under this perspective, studying Alchemy is experienced as an ahistorical, completely self-referring process in terms of the
alchemist’s communication with physical phenomena; so, by completing alchemical processes, said communication aims to *restore/reinstate the communication between the conscious and the unconscious mind*. The self-referring character of this process lies on the fact that within this particular interpretive scheme, the alchemical processes are conceived as the object on which the acting individual projects his/her emotional/psychological load. It is worth noting that Jung clearly accepts the historiographical distinction between Alchemy and Chemistry, in terms of a transition from theoretical patterns with no scientific characteristics to explanatory schemes with purely scientific conceptualisations.

There are also other perceptions with regards to the nature of Alchemy which have unequally promoted aspects which increasingly pinpoint issues relating to its so-called “esoteric” character.¹ This category includes hermeneutic schemes which are presented as a mixture of elements from the fields of witchcraft and mysticism whereas the corresponding perceptions completely lack any practical aspects, which are present in Jung’s point of view, even though it is weaker since it is merely a vector of convergence between the conscious and the unconscious. In some of these hermeneutic schemes, Alchemy is conceived as a field expressing religious quests, as primarily depicted by researchers such a Mircea Eliade.² In others, it is considered as a field expressing arcane hermeneutic schemes; said approach was mapped via the contribution of different researchers and was led by the works of Antoine Faivre. One of their predominant characteristics is the emerging influence of Hermeticism in texts which are part of the alexandrine Alchemy but also the Latin alchemic literature, dating from 12<sup>th</sup> century AD onwards. (1995, pp. 20-21).

In other cases, it is the purely practical aspect of Alchemy which is unequally promoted. With regards to its conception as a predominantly practical task, current historic research keeps pointing out the ability of Alchemy to assimilate different techniques from a range of professional areas (glassworks, metallurgy, pigment production, etc), but in a way that transcends the sterile adaptation of methods and *incorporates new technical paths of*

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² A typical example can be Eliade Mircea, The forge and the crucible: The origins and structure of alchemy, *University of Chicago Press*, Chicago 1974
refining theoretical questions. The alchemic practice was in continuous interaction with particular interpretive schemes regarding the structure of the material world; it adopted specific guidelines in accordance with them and was defining them through the continuous accumulation of empirical data. To that end, several indicative examples can be mentioned: one of them is Geber’s *Summa Perfectionis*, where already known techniques, such as amalgamation or the exposure to organic acids, are used as a means to theoretically establish the structure of metals. (Newman 2011).

In an effort to reconsider perspectives such as the aforementioned ones, new research fields are now addressing the History of Alchemy, trying to delegitimize the *a priori* rejection of its subject matter as non-scientific, thus resulting to a constant accumulation of new information, growing in geometric sequences, during the past two decades (Martinon-Torres 2011). Even though it would not be accurate to treat the approaches of all Science historians who study Alchemy as equal, we should by all means consider there is a convergence as to *restore the scientific character of Alchemy*, in an effort to disengage it from the “non-scientific” rhetoric, which has been triggered for different reasons. These reasons relate to charlatanry with regards to its alleged potential, the effort, on behalf of the dominant social class, of exercising social control through such alleged potential, particularly in terms of gold-making, following the attacks it underwent by the newly established field of Chemistry, which began to define its identity mainly during the 18th century; other factors are to be considered as well. The point of view adopted within this framework is the one that wishes to re-approach Alchemy as a system where theory and practice intertwine; historical research should, thus, refrain from conceiving the alchemic task either as fraudulent or as a mere projection of ideotypical forms inhabiting psychological and occultist schemes or a purely technical process, striped of any theoretical structure (Principe 2011). However, this does not mean that a historiographic standpoint which would follow historical sources regarding the type of knowledge incorporated in Alchemy should put/push aside those aspects that pinpoint its psychological or occultist character, by turning to a fully positivist approach. A rather balanced mixture of all historical data should *take into account every single aspect, rejecting opinion dichotomies such as “esoteric vs scientific” and providing each one
with the corresponding importance as it is defined through the findings of modern historical research (Calian 2010).

Therefore, the entire teaching effort aims to provide the necessary conditions so that students change the idea/image they have on Alchemy, which probably results from historiographical perspectives which are rather distorting as it is proved by current historic research.

**On teaching goals using History of Science to teach Science**

The use of History of Science in order to teach Science is part of the NOS (Nature Of Science) field. Within the NOS has been established a rather acceptable convergence between historians of science, philosophers of science, scientists and science teachers regarding the intended goals of such subject matter (Lederman et.al 2002). These include the following:

- Putting forward the *empirical character* and *creative nature of scientific knowledge*, in cases where there is no possibility of directly observing physical phenomena. A fundamental aspect of the goals resulting from this particular feature of science is to develop students’ ability to evaluate the contribution of empirical observation as well as of their personal, creative involvement in providing explanatory schemes of the material world.
- Distinguishing between *scientific theories and laws*.
- Putting forward the fact that observational data are depending on the theoretical acceptance on which they are articulated (*theory ladenness of observation*).
- Putting forward the interdependence between the production of scientific knowledge and the *social and cultural context* which is defined by it and within which this knowledge is produced.
- Dealing with the issue of one (or not!) *single and unique scientific method*.
- The *provisional character of the scientific method*. In particular, the idea that this medley of facts, laws and theories are under constant transformation.

From one point of view, convergence on these matters has proved to be beneficial, since it has promoted their *integration into the teaching action*. From a different point of view,
the mere fact of establishing such categories has led to a *dogmatic acceptance* of their constituent elements, which consolidates an attitude completely *opposite to the spirit of the goals* it aspires to promote. In addition, it has been pointed out that it favours the consolidation of specific dichotomies (the most characteristic one being the “scientific vs non-scientific”), the incoherent mix of epistemological, sociological, psychological, moral and other issues. To respond to this tendency, the suggestion was to introduce a wider regulatory grid incorporating a wider range of debatable issues, directly falling to NOS through which they will be featured *not as goals to be achieved but as fields of conflict*. Such suggestion is summarized in the proposal of *Features Of Science* (FOS) (Matthews 2011), which maintains the basic elements the NOS revolves around, and are the following:

1. Empirical basis
2. Scientific theories and laws
3. Creativity
4. Theory dependence
5. Cultural embeddedness
6. Scientific method
7. Tentativeness

To these, we can also add, aspects such as:

1. Conduct historical experiments
2. Discuss on the creation and operation of models
3. The nature of the involvement of technology
4. Choosing between adversarial theories
5. The role of religion in science
6. The conflict between realism and constructivism

The important thing, however, is not the fact of expanding the issues related to the new model. What proves to be defining is the fact that those issues are not presented as
predetermined teaching goals which must be achieved by the end of a predetermined teaching path but as fields where debate over them is favoured. This perspective of FOS is complying with aspects to be examined, which are stemming from the History of Alchemy. This is because modern Science historians understand Alchemy as a subject matter which is constantly growing, is particularly flexible and prone to constant re-views and re-interpretations, whose boundaries remain open to interaction with other fields. As a consequence, it cannot be perceived in a dogmatic way by the teacher who will try to incorporate it in Science education.

On the methods of using History of Science in Science Education
Available methods within formal education regarding the use of the History of Science in Science education, include:

- lectures,
- reading and interpreting original historical sources,
- replicating historical experiments,
- creating narratives,
- role playing,
- descriptions of historical personalities and scientific objects, etc.

These methods work as a means to fulfill a wide range of teaching goals which may vary from merely instrumentalist ones, such as developing skills regarding the use of equipment, to goals aiming to redefine the perceptions related to the nature of science.

Beyond formal education, History of Science may also be used for the purposes of the informal sources of learning such as scientific exhibitions, science centers and above all science museums.

On the use of historical experiments in Science Education
The replication of historical experiments within the framework of History of Science is a research method with multiple benefits, which is becoming more and more popular. Under the term “historical experiments” we include those experiments whose scientific paradigms are no longer in use. Chang (2011) distinguishes three categories of historical
experiments, each one having their own aims and restraints; these are historical replications, physical replications and extensions.

During a *historical replication* what is replicated is the precise experiment procedure, as it took place in the past. What is necessary for such task is a high degree of “completeness” on what concerns the available historical information. However, it is not always possible to make sure that the scientific instruments we have in our hands are in a condition which would ensure an accurate replication of the experiment. It is also possible that specific information, necessary for the replication, is not available, precisely because it is taken for granted during the time the experiment was conducted, therefore it is omitted from its description. In any case, the procedure is structured based on the type of questions answered by the experiment as it was conducted in the past.

*Physical replications* aim mainly into reproducing particular physical procedures, without reproducing the entire amount of historical information related to the experiment as it was conducted in the past. During a physical replication, we are allowed to use modern-day instruments and techniques as long as they fully reproduce the desired phenomenon. The process is bound by the type of questions which are considered timely by modern science and not by science as it was structured at the time when the experiment took place for the first time. Furthermore, the role of the experiment designer is crucial since it is s/he who chooses the type of information to be presented.

The *extensions* are experiments which follow as a result of the historical and physical replications. They may be dealing either with additional parametrisation of well-known historical experiments or with innovative experimental devices which are used to verify questions which emerged after conducting a historical or physical replication.

The use of historical experiments *in science education* can fulfill a wide range of *teaching goals*, including:

- acquiring skills in using different instruments.
- presenting the scientific task not as an abstract set of ideas but as a project which includes a practical aspect as well, which takes place in science labs.
- favouring a more positive attitude towards science (Allchin 1999).
- through the participation into planning a historical experiment, emerges a set of tacit and explicit theoretical assertions on which an experiment is based.
- they can be used as a tool which can pinpoint and on the same time transcend/overcome the students’ alternative ideas (Seroglou, Koumaras & Tselfes 1998).
- the production of scientific knowledge is presented as a process directly involving the human factor (Allchin 1999).
- through the use of historical experiments as the framework to provide arguments and counter-arguments, it is the historical debates that surface whereas scientific knowledge is not presented as a set of non-negotiable views but as a process of social nature. (Hottecke 2000).
- students become aware of what escapes a rational evaluation of the contribution of scientific practice to the individual who exercises it, an aspect known as tacit knowledge (Hottecke 2000).
- the phenomena examined are not considered individually but interrelated to others so that the scientific task appears all the more complete (Cavicchi 2008).
- precisely because the replication of historical experiments often requires that the intermediate stages be filled during the experiment, since they are not always included in its representation as it was preserved till our days, it is also possible to be considered as an opportunity for the students to fill the gaps of the intermediate stages so in that case, they will manage to get to the bottom of concepts (Chang 2011) but also of the History of science (Hottecke 2000).

On the methodology of conducting historical experiments
In order to achieve teaching goals, it is necessary to create a suitable methodological tool, which is usually structured in three levels: creating the device, in case students are to participate in that part, replicating the experimental procedure, and placing the experiment within a historical, philosophical, social context. The third level is included as such not in terms of temporal priority; it is present throughout the activities taking place during the experiment replication. Regarding the first two levels, this methodological tool must provide the following (Heering 2003):
- collecting an adequate amount of information, with regards to the experiment. More particularly, lab notes, original published papers, monographs, scientific conference proceedings are all to be used.
- drawing adequate information from historical sources regarding the structure of the experimental device (its individual constituent parts), construction material, special conditions while conducting the experiment, if applicable, etc.
- putting together the individual parts of the instrument. To complete this phase, experienced technicians must be involved. For the cases where we choose to involve students as well, during the construction phase, we also have the possibility to fill the gaps of the historical description of the experiment or proceed to the re-conceptualisation of particular elements of the historical sources, using information stemming from the way the device works.
- adjusting the device in order to replicate the results indicated in the historical sources.
- analyzing and interpreting the results following the experiment.

Teaching Activities in the context of the DACALBO project

In the context of the project:

1. two historical experiments were designed and conducted as replications of recipes found in the chymeutic book (Codex 107) of the Monastery of Olympiotissa in Elassona, Larissa (central Greece).
2. two alchemical instruments were designed and built, in order to be used as display material in the context of informal sources of learning.
3. a methodological tool was developed contributing to writing biographies suitable for science teaching.

Historical experiments

The recipes which were designed and executed were “ζουλαπίον του βασιλέως αλέξιου” – joulapion tu vassileos aleksiou (i.e. King Alexios’ joulapion), as it was retrieved by
page/sheet 99 of the Codex No. 197 (chymeutic book) from the Monastery of Olympiotissa in Elassona, as well as “ζουλαπίον κινητικόν” – joulapion kinitikon, as it was retrieved by page/sheet 102 of the same Codex; both recipes are ιατροσόφια – iatrossofia, i.e. home remedies or nostrums. The term ιατροσόφια– iatrossofia describes simple notes or a synopsis used to treat an illness; they can be the product of a doctor’s/healer’s individual work in order to facilitate the medical/healing practice of his/her profession or of more doctors/healers, in the context of healing within hospitals; they are written in Greek language, probably between mid 15th century to late 19th century (Tselikas 1995). Quite often, they are the compilation of popular recipes composed by monks based on ancient medical texts – Dioskourides’ recipes’ contribution is truly dominant – where there are also references in witchcraft, astrology and alchemy (Stefanidis 1913). The link between Alchemy and Therapy does not reduce itself to mere inline alchemical references while writing synopses of home remedies/nostrums: it emerges from the very names of the healing plants used for the therapeutic recipes. Quite often, particular names are used in both fields: in Therapy as healing plants and in Alchemy with qualities that reflect the products of chemical changes, such as oxidation. (Litsas 2008). The lack of extended historical research regarding home remedies/nostrums is mainly due to the lack of relevant sources and the resulting lack of a clearly defined study method (Touwaide 2007). In general, the historical study of home remedies/nostrums requires a combination of information from different fields such as the History of Science, Pharmacology, Botany, Folklore, etc.

Those particular historical experiments where designed to be included in physical replications; that is we were not interested in replicating the process exactly as it took place in the past (vessels, etc.), but to reproduce phenomena that took place while the recipe was executed, such as boiling, extraction, hydrolysis, etc. During the physical replication, the process which took place was the following:

a. Translitteration of the recipes from the original texts.

“Ζουλάπιον του βασιλέως αλέξιου”
Ζουλάπιον τοῦ βασιλέως ἀλεξίου. "Υδατός γλυκέως # δ’, ξυχάριτος # γ’ ρέου εξάγια β’, σαντάλου εξάγια α’, ἀδιάντου κ’ ib’, ἀνθοφόριζου εξάγια α’, σελινορρίζου εξάγια α’, S’’, ἵντιβορρίζου εξάγια β’. Ταῦτα πάντα ἂς βράσου μετὰ τοῦ ὑδατοῦ ἐδώς οὗ τριτοδή τὸ ὕδωρ καὶ εἰς τὸ ἀπόδρασιμα τούτων τίθει ὕδατα λύτρας β’ καὶ ὑδατὸς οὐργίας β’ καὶ ἂς βράσαν μέχρι μελιτώδους συστάσεως καὶ μετὰ τὸ κρύσσαι ἂς τιθῇ ρέων εξάγια β’ καὶ ἐκτοτε ἂς πίνῃ ἂς αὐτὸν καθ’ ἐκάστην πρῳ νήστης ἅνα ποτήρι ἕνα καὶ ἔστι οὕτῳ σύμμετρον εἰς τὴν κράσιν. Ρίππει δὲ ἐπὶ τὴν ψυχρότητα, λυσιτελεῖ δὲ ἐπὶ πυρετοὺς καύσωνας, οὗ μόνον τὸν ἀπὸ ξανθῆς χολής, ἅλλα καὶ τὸν ἀπὸ φλέγματος. Καὶ πρὸς τὰς θερμὰς γαστέρας καὶ εἰς τὴν τραχύτητα τοῦ φάρυγγος. Μετὰ δὲ ψυχροτάτου ὑδατοῦ διδόμενον τοῖς ὑπὸ καύσωνος πυρετοῦ όχλουμένοις τὰ μέγιστα βοηθεῖ. Ἡταί ἀπὸ κάθε ἀσθένειαν τὰ ἐντερὰ καὶ ἐκκόπτει καὶ τὴν ἄμετρον καταμηνίων ρύσιν.
"Ζουλάπιον κινητικόν"


The transliterated form of the text is the main source from which students will try to replicate the recipe. In this way, they will also practice reading and interpreting original sources.

A. Tracing the terms that are important for the recipe.

The terms constitute 3 main categories: plant names, units of measurement, numbers representing quantities.

b. Plant names

The terms corresponding to plants do not go by the Linnaean taxonomy, since it was established after the recipe was written. Quite often, each term corresponds to a whole genus of plants, which may include several species. In order to have a clearer picture, we should trace the historical and cultural context this recipe was a product of. As a consequence, the demand resulting from the third level of the methodological tool on historical experiments replication, i.e. placing the experiment in its historical, philosophical, social, etc context, is also satisfied.
In some cases, the information that are necessary in order to render a term clearer are of purely historic character, such is case of the term “ζαχάριτος”- jacharitos included in the recipe of King Alexios’ joulapion. The only criterion allowing us to decide whether it refers to sugarcane or sugar beet is the time the recipe was written, probably sometime in the early 16th century. Sugar production from fodder beet was only introduced in mid-18th century. The triggering event to that was the “Law on molasses” that Great Britain imposed, in 1733, to sugar imports to North America by non British colonies; said law aimed at making the sugar market a British monopoly. Therefore, the sugar mentioned in the recipe is the one produced by sugarcane and not the one produced by sugar beet.

Other cases, however, demanded a much more complex approach; this was for instance the case of “reon”. To understand this term, we need to bring together different scientific fields.

- The History of Science informs us that Dioskouridis in “Περὶ ὑλῆς ἱατρικῆς”- Peri ylis iatrikis (On medical matter) refers to “ρα”-ra, “ρίον”-reon but also “ρήον”-rion, which he claims that grows in the area of Bosp(h)orus while he recommends the use of its roots only (Tselikas, 1998, p. 192). The reference of the name “ρα”-ra is often followed by comments on the red colour of the plant. “Ρα”-Ra was also the name the Scythians used for the river Volgas, used in the ancient times as the commercial channel used to carry reon in Ancient Greece.

- The term “ῥέον”-reon corresponds to the Latin name of the genus Rheum. Modern botany indicates there two well-known species of the genus Rheum having a pharmaceutical use: Rheum Rhabarbarum and Rheum Officinalis. The species with the distinctive red colour is Rheum Rhabarbarum; the name of the plant is linguistic loan from its Greek name “Ρα βάρβαρον” – ra varvaron (barbaric ra).

- Modern pharmacology points out that plants with pharmaceutical uses that belong to the Rheum genus owe their pharmaceutical properties to the anthranoids (Westendorf 1993). In particular, Rheum Rhabarbarum is used for its antidiarrheal and laxative action (Barnes 2007, p. 507), which is in accordance with the overall properties of the mixture, the joulapion, as it is indicated in the recipe. More specifically, the recipe recommends to drink the brew in order to
cure, among others, stomach problems (πρὸς τὰς θερμὰς γαστέρας - pros tas thermas gasteras – to cure hot/aching stomachs).

For each ingredient, a separate profile is drawn up, based on the information collected for it from different scientific fields. 14 different ingredients were identified in total for both recipes and they are presented as follows: 1) Saccharum Officinarum (ζάχαρη) 2) Rheum Rhabarbarum L. (ραβέντι) 3) Santalum Album (σάνταλο, σανταλόξυλο) 4) Vitis Vinifera L. (στάφυλος) 5) Chelidonium Majus L (χελιδόνιο, χελιδονόχορτο, δοντόχορτο) 6) Fumaria Officinalis (καπνία, καπνία, καπνόχορτο, φουμαριά) 7) Adiantum Capillus – Veneris (πολυτρίχι, μαλλόχορτο, καλλίτριχο, κα.) 8) Anethum Graveolens (άνηθος) 9) Apium Graveolens 10) Cinnamomum Cassia (κινέζικη κανέλα, κινέζικη κασσία, κασία) 11) Cassia Angustifolia (Senna, Tinnervelly Senna, Indian Senna, Cassia Senna) 12) Cassia Senna (Cassia Acutifolia) (Senna, Alexandrian Senna, Khartoum Senna, Egyptian Senna) 13) Polypodium Vulgare (δεντροφθείρι, πολύριζο) 14) Cinnamomum Verum (σιναμίκη, σιναμό)

c. Units of measurement

In order to calculate the exact quantity of each ingredient in the recipe it is necessary to convert the units of measurement mentioned in the text into the corresponding modern units. Through this procedure, it is once more the historical and cultural context of the experiment that emerges, under the perspective of metrology this time. Again, the timeframe in which the recipe is written plays a significant role, as the same units correspond to different quantities throughout the different historical periods. This was the way that “ἑξάγια” - eksayia, “οὐγγίες” - oughies, “λύτρα” - lytra, “δράμια” - dramia, etc, turned into grams.

Another important issue is the use of Letters to represent numbers. Most of the recipe ingredients are followed by letters of the Greek alphabet that indicate numbers. Knowing precisely the quantities of each ingredient makes it possible to reach to conclusions regarding the type of the brew. More particularly, in the recipe of the King Alexios’ joulapion the ratio of sugar to water is 3/4, which indicates that texture of the end product will probably be syrup-like, an element which is in accordance with the designation of the brew as a joulapion.
d. The identification of Other terms present in the recipes

“ζουλάπιον” - joulapion

The term “ζουλάπιον” - joulapion, which is also mentioned as “ζουλάπιν”-joulapin or “ζουλάπι”-joulapi, refers to a «liquid pharmaceutical mix, made out of water and flower extracts, sugar or honey, which is used either as an emollient and soothing product or as a means to dilute other medicines» (Kazazis & Karanastassis 2001).

The recipe about “King Alexios’ joulapion” is about a solution of water and sugar, from where the rest of the ingredients are extracted via ebullition; this is what is indicated by the specific quantities mentioned in the recipe. Water and sugar, the means in which the rest of the ingredients will be extracted, are to be calculated at 1280gr and 1600gr respectively, while all other ingredients are to be calculated to a a few tens of grams.

In the recipe of “Ζουλάπιον κινητικῶν”- joulapion kinitikon, the dominant ingredient is raisins. More particularly, the recipe indicates the use of 160 grams of raisins, much smaller quantities for the rest of the ingredients and no sugar at all. The much bigger quantity of raisins is responsible for the distinctive syrup-like texture of the joulapion, which is merely the result of the extraction of the raisin sugars.

Planning and conducting the experimental procedure

Planning the procedure includes collecting all of the ingredients to be used. Almost all of the plants for pharmaceutical use can be found in retail stores. In only one case, “polypodium vulgare”, commonly known as “polypod” or “brake root” we had to collect the respective plant directly from Nature. The plant was finally collected, in high altitude, rocky and humid locations in the Prefectures of Evritania and Trikala (Central Greece).

King Alexios’ joulapion

The preparation of the King Alexios’ joulapion recipe indicated boiling all of the following ingredients in water, until their volume is reduced to 1/3 of its original quantity. The ingredients participating in the boiling procedure are presented below followed by the exact quantities in grams, after relevant unit conversion.
Unit conversion

1 λίτρα - litra = 320 g approximately
1 οὐγγία - oughia = 26.7 g approximately
1 ἕξαγι - exsayi = 4.5 g approximately

Exact ingredient quantities

4 x 320 = 1280 g water
3 x 320 = 1600 g sugar
2 x 4.5 = 18.0 g rheum
2 x 4.5 = 9.0 g sandalwood
3 x 26.7 = 133.5 g strong vinegar
1 x 4.5 = 4.5 g χελιδονία (ή 9.0 g)
1 x 4.5 = 4.5 g καπνίον
12 x 4.5 = 54.0 g ἀδιάντο
1 x 4.5 = 4.5 g ἄνθιδορριζον
1 x 4.5 = 4.5 g κελίδον
2 x 4.5 = 9.0 g ἄνθιδορριζον

In order to prepare the syrup in the lab and proceed to the qualitative identification of the ingredients which are responsible for its pharmaceutical action, the mass of each individual ingredient used was reduced by 61% (the respective ratio within the recipe remained stable. The quantities were reduced so that the volume used during the recipe preparation reaches 500ml. So, from the original quantities included in the recipe, the following quantities were weighted and used:

Sweet water = 500,00 g (ml)
sugar = 374.40 g (first addition/round)
249.60 g (second addition/round)
rheum = 3.51 g (first addition/round)
3.51 g (second addition/round)
The total amount of the ingredients mentioned in the recipe which are used during the first part of boiling were placed into a 1L conical container. Following that, the ingredients were boiled while on the same time they were constantly stirred. After 3h10’, the volume of the solution was reduced to 1/3 of the original quantity. The product was then thrice filtered in vacuum, and the extra quantity of vinegar and sugar; as soon as the sugar was dissolved, a sample of the product was taken. The solution was left to boil until its texture was semi-liquid ("μέχρι μελιτώδους συστάσεως"—until its texture was like honey). Following that stage, it was left to cool down and the extra quantity of rheum was added then.

Ζουλάπιον κινητικὸν – joulapion kinitikon
The preparation of the recipe “Ζουλάπιον κινητικὸν”—joulapion kinitikon includes boiling all of the ingredients, except common cinnamon in water, until the volume of the solution was reduced to 1/3 of the original quantity. After that, the common cinnamon is also added to the solution. The ingredients participating in the boiling procedure are presented below followed by the exact quantities in grams, after relevant unit conversion (1 δράμι = about 3,2 g).

In order to prepare the filtrate in the lab and proceed to the qualitative identification of the ingredients which are responsible for its pharmaceutical action, the mass of each individual ingredient used was reduced by 80% (the respective ratio within the recipe.
remained stable. So, from the original quantities included in the recipe, the following quantities were weighted and used:

- common cinnamon = 6.43 g
- συναμεκὴ senna = 6.60 g
- polypod/brake root = 5.17 g
- raisins = 32.12 g
- cinnamon = 0.69 g

The total amount of the ingredients mentioned in the recipe which are used during the first part of boiling were placed into a 500ml conical container, which was then filled up with water until the total amount of ingredients and water reached 500ml. Following that, the ingredients were boiled while on the same time they were constantly stirred for 2h30min. After the initial extraction, the total amount of the product was measured at 300ml. Then, the common cinnamon was added and the solution was left to boil for another 10min, while constantly stirred on the same time. Finally, the solution was thrice filtered, the first time not in vacuum but the other two in vacuum.

e. Analysis and interpretation of the findings
Both recipes replicate, on a macroscopic level, the characteristics of the brew type they belong, that is the *joulapion*. Following the evaporation of the largest quantity of water, they both obtain a honey-like texture, owed either to direct addition of sugar in “King Alexios’ *joulapion*”, or to the extraction of the sugars of the raisins in “*joulapion kinitikon*”. The different way each recipe chooses to produce the result of the syrup-like texture is indicative of the wealth –or lack thereof – of the person to whom it is addressed. “King Alexios’ *joulapion*” recipe which is made for King Alexios includes a large amount of sugar, a particularly expensive ingredient. On the contrary, the recipe for “*joulapion kinitikon*” uses raisins to achieve the syrup-like texture, since they are much cheaper, but they are also used in a much smaller quantity. This information indicates that there is an interrelation between the production of knowledge and the social and cultural context from which it emerges and which it jointly defines.
At the end of the recipe regarding “King Alexios’ joulapion”, there are also the situations for which it is recommended to use it, whereas there are also information regarding the theoretical context within which the effectiveness of the ingredients is explained. Thus, we have the possibility to compare with the respective theoretical context of modern Pharmacology, the conclusion being that the data observed are limited by the theoretical assumption on which they are articulated.

The role of Historical Biographies

Biographies are perhaps the most frequently used method that actually leverages the History of Science for school textbooks, usually by providing, short excerpts regarding the life of famous scientists. The fundamental role of the scientist’s personality when writing a biography is what makes it fall in the type of narrative known as “heroic science story”. The “heroic science story” often creates perceptions regarding the role of the scientist, which are sometimes oversimplified and sometimes inaccurate (Allchin 2003). In particular:

- The scientist is presented as the sole vector of true knowledge about the world.
- Scientific knowledge is considered fully independent of any human filter, a fact which guarantees the truth even though it is the product of human work.
- The scientific task is often interpreted as a process of discovery.
- This point of view presents science as timeless and capable to be conceived outside of specific social, ideological etc restraints. (Milne 1998).
- It is claimed that scientists are mainly male, while women seem to be obliged to complete tasks that lack creativity and imagination (Brush 1985; Schiebinger 1987).
- Observation is considered more important compared to providing interpretive schemes and predictions (Milne 1998).

The central role of a personality when writing a biography, which is inevitably a result of its own structure, can also influence the following aspects:
- Pinpoint excessively specific personal traits, sometimes as part of an anecdotal description, which could give the impression that science is a particular type of knowledge addressed to certain people, a priori endowed with those characteristics which are necessary for their involvement with it, an aspect which could provoke the indifference of the students (Brush 1974; Duschl 1990; Martin & Brouwer 1991).

- Focusing unilaterally to the personal dramatized history of the scientist, so the romantic character of the narrative triggers parallels between the scientist and the student, within a subjective context. This could strip science from being considered as a task involving objective elements. (Solomon 2002).

- The uneven presentation of the intellectual aspect of the scientific task as opposed to its practical aspect.

However, the principal contribution of biography as a method to teach natural sciences lies to its ability to turn the abstract and impersonal image of science into a more “human” one. (Dagher & Ford 2005). The humanization of science is achieved when associating the students’ experiences to the practices adopted by certain scientists in such way that the scientific task is presented not as an abstract procedure of gathering information but as a procedure executed by individuals and a procedure which might overturn even the most deeply established scientific perceptions (Wang & Marsh 2002). Therefore, there must be a balance between the request for a humanised depiction of science and the request for avoiding an approach focusing on the individual with regards to the scientific work. To make this possible, the following could apply:

- Present a wider grid of social, ideological etc restraints which make up science. The scientist as an idea could be established as a channel of all those restraints, so that the degree of liberty of the scientific work is evaluated compared to the context within which it is shaped.

- In order not to identify the scientific task with the intellectual processes taking place into the scientist’s head/brain but to depict in a balanced way the involvement of the intellect with the practical aspects of science με την πρακτική πλευρά της άσκησης της επιστήμης, it would be fit to create an image which will
value both the special traits of a scientist’s personality and the particular research methods s/he adopts as well as the way these methods invest her/his thoughts with new meaning.

- Writing a biography is balancing between creating a reality which shapes traits that are familiar with reality as perceived by the student now, so that it is more direct and stimulates her/his interest (Solomon 2002); however, it should not commit the error of completely recreating the narrative under the perspective of present perceptions. (Mayr 1990).

- Through the biographies, it is possible to upgrade the contribution of female scientists and minority groups to the production of scientific knowledge (Brush 1985).

a. Methodological Considerations
First of all, using biographies as a method to teach Science, means they are not exhaustive. Its extent and completeness serve particular teaching goals. However, it is recommended to produce different biographies on the same person as it encourages students to accept multiple representations of the same reality. (Milne 1998). The successive phases of writing a biography could be summarized to the following:

- First, we collect all of the events/occurrences to be used through available historical sources. They should be quite balanced in terms of the aforementioned aspects.

- Then, we include those events/occurrences in different categories, each one of which corresponds to a different level of teaching science, as they are described in the theoretical framework of the Story-Driven Contextual Approach (SDCA). Those contexts are the theoretical, the practical, the social, the historical and the emotional context each one of them aiming to bring out different aspects of the scientific task (Klassen 2006).

- After the events/occurrences put into categories, we use the theoretical context of the semiotic circle of Scholes (1981), the way Milne leverages it (1998). The semiotic circle is mainly constituted by facts which are chosen among others.
Once the text is invested with meaning and values, we proceed to its interpretations, which could transcend the historical live of events. In this way, under the light of new interpretations, the events may be invested with a new meaning and values, so that the narrative uses feedback to maintain a circular feed.

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