

The Alchemical Art of Dyeing: The Fourfold Division of Alchemy and the Enochian Tradition

Matteo Martelli

Abstract What is Graeco-Egyptian alchemy? Which kinds of techniques and craft practices does it encompass? And what were its goals? The paper addresses these questions by investigating the earliest Greek alchemical texts preserved both in Byzantine and in Syriac manuscripts. Already during the first centuries AD, in the Graeco-Roman Egypt it is possible to recognize some disagreement over the definition of alchemy and its expected outcomes. On the one hand, ps.-Democritus's four books and the Leiden and Stockholm papyri support a fourfold division of alchemy including processes for making gold, silver, and precious stones (glass working included), and for dyeing wool purple. On the other hand, Isis's treatise focuses only on the making of precious metals, which is identified with the main goal of alchemy during the late Byzantine tradition. In the process that led to such a simplification of the technical background of alchemy Zosimus's work seems to represent an important turning point. In fact the author inherited the above mentioned polarity and discussed different ideas of alchemy in a key text (here edited and translated into English for the first time) on the revelation of alchemy based on the Enochian myth of the fallen angels.

Alchemy and the Making of Gold: An Overview of the Byzantine Tradition

Between the seventh and the eleventh century different people—including imperators, caliphs, and scholars moved by antiquarian curiosities—became interested in *chēmeia* (alchemy) and somehow identified this art with *chrysopoeia* (the making of gold) and *argyropoeia* (the making of silver). Sure enough, these people were not practitioners and they did not test the techniques described by alchemical recipes.

M. Martelli (✉)

Department of Classics, Humboldt Universität zu Berlin, Berlin, Germany
e-mail: martellm@cms.hu-berlin.de

However, if we consider that the Byzantine anthologies preserving most of the Greek and Byzantine alchemical writings were probably compiled from the seventh century onwards, we should wonder to what extent a similar attitude could have affected the selection of the works transmitted by these collections.¹ Did such a focus on the making of precious metals influence the choice of the treatises to be included into Byzantine anthologies and translated into Syriac and Arabic? Although a complete answer to this question would surpass the aim of this chapter and would require a wider analysis of the hundreds of alchemical manuscripts nowadays kept in several European and Middle-Eastern libraries, in the following I focus my attention especially on the polarity between the idea of alchemy as *chrysopoeia* attested by Byzantine scholars and a broader interest in different dyeing techniques attested by the most ancient alchemical writings (first to fourth century AD). Some of these works, in fact, covered a wider set of techniques focusing not only on how to dye metals yellow and white (that is, how to transform them into gold and silver), but also on how to dye crystal quartz different colours in order to produce precious stones, and how to dye wool purple.

In mid-eleventh century Constantinople, the Byzantine scholar Michael Psellos (1018–c.1078) composed a small treatise on the making of gold in the form of a letter addressed to the Patriarch Michael I Cerularius (1043–1059), who asked the philosopher to make an investigation on the ancient alchemical methods of χρυσοποιία (*chrysopoeia*). After some theoretical remarks, Psellos introduced and somehow justified the specific focus of his small treatise as follows (*Letter on the Making of Gold*, § 5 partim):

Since in my preface I have already insisted enough on the fact that transformations of matter happen according to natural changes, and not by means of magic spells, miracles, or some other secret practice (so, we must not wonder), it is time to pass on to this art of transformation. I would have liked to compose a complete discourse on this art and on how to work the matters [...] and to teach what makes quartz and sapphire porous, what produces a fake emerald and beryl, which nature can soften stones, which one can dilute pearls and make them watery, and which one can make then again solid and round, and how to whiten them [...] However, since you [Michael Cerularius] do not allow me to delay with such superfluous inquiries, wasting all my studiousness in a worthless research, but you want me to examine with which substances and according to which scientific method gold may be produced, I am going to explain only this topic.²

¹ See Mertens, “Greco-Egyptian Alchemy,” 220–5.

² Edition by Bidez, *Épître sur la Chrysopée*, 30, 16–31, 9: “Ἐπεὶ οὖν ἰκανῶς ἡμῖν πεπροιμίασται ὥς αἱ τῶν ὑλῶν μεταβολαὶ φυσικὴν τινὰ ἀλλοίωσιν ἔχουσιν καὶ οὐκ ἐξ ἐπωδῆς τινος ἢ τερατείας ἢ ἄλλης ἀρρητουργίας (διὸ καὶ θαυμάζειν οὐ χρή), ἐπ’ αὐτὴν ἦδη σοι τὴν τέχνην χωρῶ τῆς μεταβολῆς. Ἐβουλόμην μὲν οὖν καθολικὴν τινὰ σοι τεχνολογίαν ποιήσασθαι καὶ πᾶσαν ὑλουργίαν διερευνήσασθαι, [...] διδάξαι τε τί μὲν τὸ τὸν κρύσταλλον ἀραιοῦν, τί δὲ τὸ τὸν ὑάκινθον, καὶ πῶς ἂν τις καὶ σμάραγδον οὐκ ὄντα ποιήσῃ καὶ βήρυλλον, τίς δὲ ἡ φύσις τοῦ τὰς λίθους ἀπάσας μαλάττοντος, καὶ πῶς μὲν ἡ μαργαρίτις λυθεῖ καὶ εἰς ὕδωρ ἀναλυθεῖ, πῶς δ’ αἰθὴς συμπαγείῃ καὶ σφαιρωθεῖ, τίς δὲ ὁ λόγος τῆς τοῦτων λευκάνσεως [...]: ἐπεὶ δὲ σὺ σχολάζειν ἡμᾶς ἐν τοῖς περιττοῖς οὐκ ἄξς οὐδὲ ἐν τοῖς ἀσπουδάστοις καταναλίσκειν πᾶν τὸ φιλότιμον, τοῦτο δὲ μόνον διερευνῆσαι προήρησαι ἐκ τίνων ὑλῶν καὶ διὰ ποίας τῆς ἐπιστήμης χρυσὸν ἂν τις ποιήσῃ, ταύτην μόνην τὴν τεχνολογίαν σοι δίδειμι.” For an Italian commented translation, see Albini, *Michele Psello*.

The passage comes after a long introduction (§§ 1–4) in which Psellos rhetorically discusses the philosophical framework within which *chrysopoeia* is to be understood and assessed. At the very beginning (§ 1, ll. 5f.) the scholar identifies the main topic of his letter with ἡ ἐμπύριος τέχνη (the art of fire), whose first aim is said to be the transformation of lead, tin, and any other metal into gold (§ 1, ll. 12–15). The key concept of transformation is framed and expanded in the following paragraphs (§§ 2–4), where Psellos tries to set the basic principles guiding his κατ’ἐπιστήμης (scientific) explanation of this art. He insists on the four elements that compose the physical world, on their reciprocal changes, and on the alterations of the four qualities (namely wet, dry, hot, and cold). These changes are explained through examples taken from various meteorological phenomena mainly based on evaporation and condensation of water.³ For instance, “water becomes like a stone [i.e. changes into earth] when it freezes [and] becomes air when it evaporates.”⁴ Moreover, similar transformations of the basic elements/qualities also help to understand more complex phenomena, such as the case of a tree burned by a lightning strike, in which all the humidity of wood is consumed by the fire.⁵ In Psellos’s opinion, φυσικὴ ἀλλοίωσις (natural processes of alteration) of the same kind are to be detected behind the “art of fire,” which is redefined as ἡ τέχνη τῆς μεταβολῆς (the art of transformation) at the beginning of the section quoted above (II. 3–4). This art, in fact, included a wide set of practices and techniques dealing with the transformation of various ὕλαι (materials), such as metals, stones, and glasses. However, while a similar approach would have driven Psellos to consider all the methods listed in the passage, the narrower interests of Cerularius forced the scholar to focus his inquiry only on the making of gold.

In this respect, the attitude of Psellos’s patron seems to reflect a more general idea about alchemy that is confirmed by other Byzantine sources. First of all, various encyclopaedia and lexica provide a similar definition of the difficult term *chēmēia* (χημεία or χυμεία), probably introduced for the first time by Zosimus (third century AD) in reference to the art of dyeing metals.⁶ In the tenth century, the lexicon *Suda* (χ 280 Adler) explained the term *chēmēia* as ἡ τοῦ ἀργύρου καὶ χρυσοῦ κατασκευὴ (the preparation of gold and silver).⁷ Outside the Byzantine

³ Meteorology represents an important aspect of Psellos’s natural philosophy; the scholar devoted to this topic both many chapters of his *De Omnifaria Doctrina* (§§ 139–78 in Westerink, *Omnifaria Doctrina*) and some specific essays (see Bidez, *Épître sur la Chrysopée*, 51–70; and Duffy, *Michaelis Pselli*, texts 19–31). On the relations between Psellos’s alchemical interests and his investigation of the physical world, see Katsiampoura, “Transmutation of Matter,” 665–7.

⁴ “τὸ μὲν γὰρ ὕδωρ πηγνύμενον λιθοῦται εἰς κρύσταλλον [and] τοῦτο εἰς ἀτμίδα λυόμενον ἀήρ καθίσταται.”

⁵ In § 4 Psellos explains the petrification of an oak struck by a lightning strike: a quick and sharp lightning does not only make the oak black, but consumes all its humidity and transforms the wood into stone.

⁶ See *infra*, § 3.

⁷ The entry continues by telling how the emperor Diocletian (284–305) made to burn all the Egyptian books on alchemy (in the Greek text: “περὶ χημείας χρυσοῦ καὶ ἀργύρου”); this information probably depends on the *Chronicle* (Ἱστορία χρονική) of John of Antioch (active under Heraclius’s reign, 610–641): see fragment 280 in Roberto, *Ioannis Antiocheni Fragmenta*.

sell as authentic (*Chronographia* XVI 5). The Syrian city of Antioch was again the scene of an ‘alchemical affaire’ at the beginning of the eighth century, when Isaac, bishop of Harrān, is said to have become archbishop of the city (755–756) thanks to his alchemical knowledge. According to various Syriac chronicles, Isaac murdered a monk of Edessa and stole from him a powder that, when applied on lead, could transform it into gold.¹¹ By means of this powder, Isaac was able to find favour with the Caliph al-Mānṣūr (754–775), who turned out to be very interested in this substance and supported (at least for a little while) Isaac’s political career. Moreover, Arabic sources claim that the same caliph sent his emissary ‘Umāra ibn Ḥamza to the court of Constantine V (741–775), who led the guest into a big storehouse containing two kinds of powder: a white elixir that could transmute metals into silver, and a yellow/red one that could transform metals into gold.¹²

Two Early Alchemical Treatises: Ps.-Democritus and Isis

After the above-discussed passage, Psellos carries on his investigation by listing and commenting seven recipes describing how to prepare specific φάρμακα (medicines) with which to treat base metals (lead first of all) and transform them into gold. The section is concluded by the rhetorical question: “How so? Should I shortly reveal you all the wisdom of Democritus without leaving anything in the innermost sanctuary?”¹³

The reference to the Ἀβδηριτικὴ σοφία (the wisdom of Democritus), the philosopher from Abdera *par excellence*, is noteworthy, since Democritus (fl. 440–380 BC) is usually considered one of the most ancient authors of alchemical treatises handed down by Byzantine manuscripts. These treatises are obviously spurious and were composed by an anonymous author in the second half of the first century AD. However, in contrast with Psellos’s account focusing only on *chrysopoeia*, the alchemical tradition ascribes to the philosopher four books dealing with a wider set of interests that included not only the making of silver and gold, but also the making of precious stones and the purple dyeing of wool. For instance, the alchemist Synesius (fourth century AD), who wrote a commentary on ps.-Democritus’s

¹¹ See (a) the fourth part of the *Zuqnīq Chronicle* or *Chronicle of ps.-Dyonisius of Tell-Mahre*, edited by Chabot, *Pseudo-Dyonysianum*, 66; (b) the chronicle of Michael the Syrian, edited by Chabot, *Michel le Syrien*, 474; (c) the anonymous chronicle edited by Brooks, “Syriac Fragment,” 217–8.

¹² For instance, the story is told by the geographer Ibn al-Faqīh al-Hamaḍāni (Goeje, *Ibn al-Faqīh al-Hamaḍānī*, 137–9; French transl. by Massé, *Abrégé du Livre de Pays*, 164–6); see Strohmaier, “Umāra ibn Ḥamza,” 21–2.

¹³ Bidez, *Épître sur la Chrysopée*, 40,7–8: “Τί οὖν, πᾶσαν σοι τὴν Ἀβδηριτικὴν σοφίαν ἀνακαλύψομεν ἐν βραχεὶ καὶ οὐδὲν ἐντὸς τοῦ ἀδύτου ἀφήσομεν.”

alchemical writings, introduced the alleged production of the philosopher as follows (Syn. Alch. § 1, ll. 5–14 Martelli):

So now let me start telling you something about this man, the philosopher Democritus, who was a natural philosopher from Adbera, who investigated every natural question and explained every phenomenon on the basis of its own nature. Adbera is a Thracian town; but he became a very wise man when he came to Egypt and was initiated by the great magician Ostanēs with all Egyptian priests. He got from Ostanēs the bases [of the alchemical processes] and wrote four books on dyeing, that is, on gold and silver and precious stones and purple.¹⁴

The great relevance ps.-Democritus's four books had in the later alchemical tradition—that is unanimous in recognizing the atomist as one of the founders of this discipline—allows us to consider the four areas of expertise included in his work as relevant parts of the technical background from which alchemy took its first steps in the first-second century AD. The four books are concisely defined by Synesius as βαφικαὶ βίβλοι (books on dyeing), since ps.-Democritus dealt with a wide range of dyeing techniques based on various methods for changing the colours of metals, producing precious stones and using purple substitutes. The same areas of expertise are covered by the Graeco-Egyptian papyri of Leiden and Stockholm, which hand down several recipes describing (a) how to dye metals yellow or white (that is, how to transform them into gold or silver), (b) how to dye κρύσταλλος (quartz) and counterfeit different kinds of precious stones out of it, and (c) how to dye wool purple by means of various substitutes of the expensive Tyrian purple.¹⁵

Moreover, ps.-Democritus combined the technical explanation of these methods with a theoretical approach that emphasized the central role played by dyeing drugs and their properties.¹⁶ He analysed and classified τὰ φυσικά (the natural ingredients) according to their capacities of dyeing and of mixing each other properly.¹⁷ For instance, in the middle of the book on the making of gold, after a long criticism against young people who did not accurately investigate the properties of natural substances, ps.-Democritus claims (*PM* § 16, ll. 178–80 Martelli):

If these young men had practised for these kinds of investigations, they would not be in trouble, since they could set to work with judgement. But they do not know the antipathies

¹⁴ The Greek text reads: “Ἐν ᾧ οὖν πρόκειται ἡμῖν εἰπεῖν τίς ἂν εἴη ὁ ἀνὴρ ἐκεῖνος, ὁ φιλόσοφος Δημόκριτος, ἐλθὼν ἀπὸ Ἀβδήρων, φυσικὸς ὢν καὶ πάντα τὰ φυσικὰ ἐρευνήσας καὶ συγγραμμέως τὰ ὄντα κατὰ φύσιν. Ἀβδηρα δὲ ἐστὶ πόλις Θράκης, ἐγένετο δὲ ὁ ἀνὴρ λογιώτατος, ὃς ἐλθὼν ἐν Αἰγύπτῳ ἐμυσταγωγῆθη ὑπὸ τοῦ μεγάλου Ὀστάσιου ἐν τῷ ἱερῷ τῆς Μέμφεως, σὺν καὶ πᾶσι τοῖς ἱερεῦσιν Αἰγύπτου. Ἐκ τούτου λαβὼν ἀφορμὰς, συνεγράψατο βίβλους τέσσαρας βαφικὰς, περὶ χρυσοῦ καὶ ἀργύρου καὶ λίθων καὶ πορφύρας.” First edition in Berthelot & Ruelle, *Anciens alchimistes grecs*, vol. II, 57 (hereafter CAAG).

¹⁵ The most recent edition is by Halleux, *Papyrus de Leyde*; for a general overview on the contents of the two papyri, see, in particular, 13–7. English translation in Caley, “Leiden Papyrus X,” and “Stockholm Papyrus.”

¹⁶ See, for instance, ps.-Dem. Alch. *PM* § 20, ll. 215–24 in Martelli, *Pseudo-Democrito*, 202–4 (= CAAG II 49), 135–48.

¹⁷ On ps.-Democritus's catalogues of dyestuffs, see Martelli, *Pseudo-Democrito*, 83–90.

of natures, how one species upsets ten: a drop of oil has the capacity to remove much purple, and a pinch sulphur may burn many species.¹⁸

On the other hand, the form in which Byzantine manuscripts have preserved ps.-Democritus's writings does not allow us to reconstruct the exact content of each book and their reciprocal connection. In fact, only an epitomized version has been included in the Byzantine collections, which contain just two sections ascribed to the philosopher:

1. The book on the making of gold (or more probably a summarized version of it) is introduced by a very short section on purple dyeing and handed down under the title of *Φυσικά καὶ μυστικά* (*Natural and Secret Questions*).¹⁹
2. A selection of passages from the book on silver forms the second section entitled *Περὶ τῆς ἀσήμου ποιήσεως* (*On the Making of Silver*).²⁰

Some information about the book on stones—otherwise lost in its original Greek version—is provided only by the indirect tradition. In fact, a later recipe book preserved by a few Byzantine manuscripts under the title of *Deep Tincture of Stones, Emeralds, Rubies and Jacinth from the Book Taken out from the Innermost Sanctuary of Temples* includes some passages discussing the dyeing methods applied by ancient alchemists on stones.²¹ Along with Democritus, his pretended master Ostanes, Moses, and Maria the Jewish are also quoted.²² Regrettably, the writings of these ancient authors are lost, so that we cannot understand to what extent they actually dealt with similar topics. However, as far as ps.-Democritus is concerned, in all likelihood he attributed a certain relevance to the dyeing of stones, if it is true that he devoted an entire book to this subject. On the contrary, the exclusion of this book—along with most of the book on purple—from the epitomized version handed down by the Byzantine anthologies evidences the criteria adopted by the epitomiser of ps.-Democritus's writings: he seems to have focused his attention only on the transmutation of metals into gold and silver, so revealing an attitude that tallies with the approach we have already detected in the above-discussed Byzantine sources.

Nevertheless, although the relevance of *chrysopoieia* in Byzantine times can somehow explain the loss of part of ps.-Democritus's books, one of the manuscripts

¹⁸ The Greek text reads (= CAAG II 47–8): “Εἰ ἐν τούτοις ὑπῆρχον ἀσκούμενοι οἱ νέοι, οὐκ ἂν ἐδυστύχουν, κρίσει ἐπὶ τὰς πράξεις ὁρμῶντες· οὐ γὰρ ἐπίστανται τὰ τῶν φύσεων ἀντιπαθῆ, ὥς ἐν εἶδος δέκα ἀνατρέπει. Ῥανὶς γὰρ ἐλαίου οἶδε πολλὴν ἀφανίσαι πορφύραν, καὶ ὀλίγον θεῖον εἶδη κατακαῦσαι πολλά.”

¹⁹ See Martelli, *Pseudo-Democrito*, 180–205 (and 73–9) = CAAG II 41–9.

²⁰ See Martelli, *Pseudo-Democrito*, 206–16 (and 79–83) = CAAG II 49–53.

²¹ Edited in CAAG II 350–64; the Greek title reads: “καταβαρὴ λίθων καὶ σμαράγδων καὶ ὑακίνθων ἐκ τοῦ ἀδύτου τῶν ἱερῶν ἐκδοθέντος βιβλίου.” The earliest testimonies are the manuscripts *Parisinus* gr. 2325 (13th century; fols. 160v–173v), and *Parisinus* gr. 2327 (15th century; fol. 147r–159r).

²² See, in particular, for Democritus: CAAG II 353,11–25, and 354,12–357,19; for Ostanes: CAAG II 351,16–28, and 352,10 (fragments reedited by Bidez & Cumont, *Mages hellénisés*, vol. II, 323–4); for Moses: CAAG II 353,19; for Maria: CAAG II 351,23; 352,2–8; 355,1, and 257,19.

that hands down the above-mentioned recipe book on precious stones preserves another important treatise that introduces a new important element into the discussion. The *Parisinus* gr. 2325 (fols. 256^r–258^v), in fact, contains a book ascribed to the goddess Isis, which probably dates back to the second century AD and contains an important account of the revelation of the alchemical art. According to the beginning of the treatise, Isis received a revelation from two angels who descended from heaven because they were attracted by the beauty of the goddess (CAAG II 28–9):

Isis the Prophet to Her Son Horus. O son, as you were about to leave and fight a battle against the unfaithful Typhon for the kingdom of your father, I went to Hormanouthis [city, sanctuary?] of the holy art in Egypt, where I stayed a long time. According to the recession of the convenient time and to the necessary course of the spherical movement, it happened that one of the angels living in the first firmament, after watching me from above, wanted to have sexual intercourse with me. When he arrived and started taking this direction, I did not give myself, because I wanted to learn the preparation of gold and silver. After I asked him this question, he told me that he was not allowed to reveal this point, because these secrets surpassed him, but (he told me) that the next day his superior, the angel Amnaël, would come, and that he would be able to give a reply for a similar inquiry [...]. The next day, his superior Amnaël appeared when the sun was in the middle of its course, and he came down. Taken by the same desire for me, he did not await, but he hastened to get what he came for; but I was not less focused on what I was searching for. He longed for it, but I did not give myself and I was able to curb his desire until he showed me his mark on the head and revealed all the mysteries I was looking for, without envy and faithfully.²³

The *ἱερὰ τέχνη Αἰγύπτου* (Egyptian holy art) quoted at the beginning of the passage is clearly identified by Isis with ἡ τοῦ χρυσοῦ καὶ ἀργύρου κατασκευή

²³ I have followed the more recent edition by Mertens, *Lettre d'Isis*, 128–31: “Ἰσις προφήτις τῷ υἱῷ Ὁρῷ. Ἀπέναι σου μέλλοντος, ὃ τέκνον, ἐπὶ ἀπίστου Τυφῶνος μάχης καταγωνίσασθαι περὶ τοῦ πατρὸς σου βασιλείας, γεναμένης μου <πρὸς> Ὁρμανουθί, <...> ἱερὰς τέχνης Αἰγύπτου, καὶ ἐνταῦθα ἱκανὸν χρόνον διέτριβον. Κατὰ δὲ τὴν τῶν καιρῶν παραχώρησιν, καὶ τὴν τῆς σφαιρικῆς κινήσεως ἀναγκαίαν φοράν, συνέβη τινα τῶν ἐν τῷ πρώτῳ στερεώματι διατριβόντων, ἕνα τῶν ἀγγέλων, ἄνωθεν ἐπιθεωρήσαντά με, βουλευθῆναι τῆς πρὸς ἐμὲ μίξεως κοινωνίαν ποιῆσαι. Φθάσαντος δὲ αὐτοῦ καὶ εἰς τοῦτο γίγνεσθαι μέλλοντος, οὐκ ἐπέτρεπον ἐγώ, πειθάνεσθαι βουλομένη τὴν τοῦ χρυσοῦ καὶ ἀργύρου κατασκευήν. Ἐμοῦ δὲ τοῦτο αὐτῷ ἐρωτησάσης, <οὐκ> ἔφη ὁ αὐτὸς ἐφίεσθαι περὶ τοῦτο ἐξεῖπεῖν, διὰ τὴν τῶν μυστηρίων ὑπερβολήν, τῇ δὲ ἐξῆς ἡμέρᾳ παραγίγνεσθαι τὸν τοῦτου μεῖζονα ἄγγελον Ἀμναήλ, κάκεῖνον ἱκανὸν εἶναι περὶ τῆς τούτων ζητήσεως ἐπίλυσιν ποιήσασθαι. [...] Τῇ δὲ ἐξῆς ἡμέρᾳ ἐπεφανίσας καὶ τοῦ ἡλίου μέσον δρόμον ποιοῦντος, κατῆλθεν ὁ τοῦτου μεῖζον Ἀμναήλ. Τῷ αὐτῷ περὶ ἐμὲ ληφθεὶς πόθῳ οὐκ ἀνέμενεν, ἀλλ’ ἔσπευδεν ἐφ’ οὗ καὶ παρήν· ἐγὼ δὲ οὐχ ἤττον ἐφρόντιζον περὶ τούτων ἐρευνᾶν. Ἐγχρονίζοντος δὲ αὐτοῦ, οὐκ ἐπεδίδουν ἑαυτήν, ἀλλ’ ἐπεκράτουν τῆς τούτου ἐπιθυμίας ἄχρις ἂν τὸ σημεῖον τὸ ἐπὶ τῆς κεφαλῆς ἐπιδεικνύηται καὶ τὴν τῶν ζητουμένων μυστηρίων παράδοσιν ἀφθόμως καὶ ἀληθῶς ποιήσεται.” The beginning of the story clearly refers to the Egyptian myth of Horus fighting against Seth, the killer of his father Osiris. The identification between the Egyptian god Seth and Typhon is quite common in Hellenistic and Roman Egypt: see, for instance, Plutarch, *De Iside et Osiride* 41 (= 367d): “τὸν Τυφῶνα Σῆθ Αἰγύπτῳ καλοῦσι.” – “Egyptians give to Seth the name of Typhon.” On the other hand, the toponym *Ὁρμανουθί* is not clear and not otherwise attested. Probably it refers to an Egyptian city, although it does not match any of the five towns, where alchemy was practiced according to CAAG II 26. Various corrections of the form *Ὁρμανουθί* have been proposed: see, in particular, Reitzenstein, *Poimandres*, 141, no. 3 (who proposed *Ὁρμαχουθί*, lit. ‘Horus of Edfu’), and Mertens, *Lettre d'Isis*, 56–60 (who proposed *Μευουθί*, that is an area in the Egyptian city of Canopus).

(the preparation of gold and silver), that is, the same definition of alchemy attested by the *Lexicon Suda* (χ 280) and supported by the Byzantine sources that have been briefly analyzed in the first paragraph. The inclusion of this definition in such an ancient text is noteworthy, since it proves that some of the earliest authors already focused their treatises only on metallurgical practices.

Consequently, the last part of Isis's work lists five metallurgical recipes describing: (a) how to make mercury solid and mix it with lead; (b) how to prepare a white dyeing drug by which, according to the third recipe (c), an iron-copper alloy was treated and dyed white (the same alloy is dyed yellow in the second part of the recipe); (d) how to mix the substances prepared according to the first three recipes; (e) how to process a metallic body before dyeing it white.²⁴ This section is concluded by a more general statement according to which all the *οικονομίαι* (treatments), the *δίπλωσις* (techniques for doubling the weight of gold or silver objects), and the *καταβαφαί* (dyeing processes) were moved by the same aim, that was, according to the beginning of the treatise, the making of gold and silver.²⁵

Towards a Definition of Alchemy: Zosimus and the Enochian Myth

The plot of Isis's story, although set in a new Egyptian framework, clearly depends on the Enochian account of the fallen angels who taught mankind about a divine and forbidden knowledge that included a wide set of crafts. The myth is fully developed in the very first part of the so-called *Book of Enoch* (or *1Enoch*), one of the *pseudepigrapha* of the Ancient Testament ascribed to Enoch, the grandfather of Noah. The book is composed of different segments (or treatises), and in its most developed form it is preserved only by a translation in Classical Ethiopic (fifth-sixth century AD). However, the major part of it is much earlier, as one can infer from various sections that have been preserved by the Aramaic manuscripts discovered in Qumran's caves.²⁶ In particular the first part, usually called *The Book of Watchers* (= *1Enoch*, chap. 1–36), is handed down in several Dead Sea scrolls and in all likelihood dates back to the third century BC.²⁷ Moreover, this book has

²⁴ Mertens, *Lettre d'Isis*, 134–8 = CAAG II 31–3.

²⁵ Mertens, *Lettre d'Isis*, 138, ll. 113–6 = CAAG II 33, § 16.

²⁶ The secondary literature on *1Enoch* is vast; for a general introduction on its content, see, for example, Knibb, *Book of Enoch*, 7–35. For a recent English translation of the Ethiopic text, see Black, *Book of Enoch*.

²⁷ These manuscripts have been found in cave 4; the Aramaic text has been edited and translated by Milik, *Books of Enoch, Aramaic fragments*.

been translated into Greek quite early, probably already in the second century BC, within the same cultural context that produced the Septuagint translation of *Daniel*.²⁸

At the beginning of *The Book of Watchers* (*Enoch*, chap. 6–8) the author explains that two hundred angels—called ἐγγήγοροι (watchers) or ἄγγελοι υἱοὶ οὐρανοῦ (the angels, sons of the Heaven) in the Greek version—started desiring the daughters of men and descended from heaven in order to have intercourse with them. The Greek version of the passage, extensively quoted by the chronographer Syncellus, goes on as follows (Sync. p. 12, ll 8–17 Mosshammer):

The leaders [of these angels] and all the rest [of the two hundred watchers] took for themselves wives in AM 1170, and they began to defile themselves with them up to the Flood. [...] And they were increasing in accordance with their greatness, and they taught themselves and their wives the uses of potions and spell. First Azaēl, the tenth of the leaders, taught them to make swords and armours and every instrument of war and how to work the metals of the earth and gold, how to make them into adornments for their wives, and silver. He showed them also the use of cosmetics and beautifying the face and choice stones and colouring tinctures.²⁹

The list of crafts revealed by Azaēl, which includes the working of metals (with explicit mention of gold and silver) and of precious stones along with τὰ βαφικά (dyeing procedures) in a more general sense, shows clear similarities with the topics covered by ps.-Democritus's four books, which nevertheless do not refer back to this myth (at least in the preserved sections). On the contrary, the myth was reworked in Isis's treatise, where the secret teaching of the angels was limited only to the preparation of gold and silver. These different approaches to what was considered part of the alchemical art were inherited and discussed by Zosimus, a third century author who clearly reused the Enochian myth in his own account of the origins and developments of alchemy. In fact, Zosimus first introduced the term *chēmeia* with reference to fallen angels' revelation, which was written down in specific and secret books. Regrettably, Zosimus's treatise is lost in its Greek original form, and just its beginning is quoted by Syncellus straight after the above-mentioned passage taken from *Enoch*. However, a more complete version is preserved by an unedited Syriac translation handed down in the Cambridge manuscript Mm. 6.29. The two versions read as follows:

1. Sync. p. 14, ll. 2–14 Mosshammer:

But it is also fitting to cite a passage regarding them [i.e. the divine scriptures] from Zosimus, the philosopher of Panopolis, from his writings to Theosebeia in

²⁸ Baar, "Aramaic-Greek Notes," 191–2.

²⁹ Translation by Adler & Tuffin, *George Synkellos*, 17. The Greek text reads: "Οὗτοι καὶ οἱ λοιποὶ ἐν τῷ ἀρὸ' ἔτει τοῦ κόσμου ἔλαβον ἑαυτοῖς γυναῖκας καὶ ἤρξατο μιαινεσθαι ἐν αὐταῖς ἕως τοῦ κατακλυσμοῦ. [...] καὶ ἦσαν αὐξανόμενοι κατὰ τὴν μεγαλειότητα αὐτῶν, καὶ ἐδίδαξαν ἑαυτοὺς καὶ τὰς γυναῖκας ἑαυτῶν φαρμακείας καὶ ἐπαοιδίας. πρῶτος Ἀζαήλ ὁ δέκατος τῶν ἀρχόντων ἐδίδαξε ποιεῖν μαχαίρας καὶ θώρακας καὶ πᾶν σκεῦος πολεμικὸν καὶ τὰ μέταλλα τῆς γῆς καὶ τὸ χρυσίον πῶς ἐργάζονται, καὶ ποιήσωσιν αὐτὰ κόσμια ταῖς γυναξί, καὶ τὸν ἄργυρον. ἔδειξε δὲ αὐτοῖς καὶ τὸ στίλβειν καὶ τὸ καλλωπίζειν καὶ τοὺς ἐκλέκτους λίθους καὶ τὰ βαφικά."

the ninth book of *Imouth*, reading as follows:³⁰ “The Holy Scriptures, that is the books, say, my lady (i.e. Theosebeia),³¹ that there is a race of demons who avail themselves of women. Hermes also mentioned this in his *Physika*, and nearly every treatise, both public and esoteric, made mention of this. Thus the ancient and divine scriptures said this, that certain angels lusted after women, and having descended taught them all the works of nature. For this reason they fell into disgrace, he (Hermes?) says, and remained outside heaven, because they taught mankind everything wicked and nothing benefiting the soul. The same scriptures say that from them the giants were born. So theirs is the first teaching concerning these arts [Chemeu]. They called this book *Chêmeu*,³² whence also the art is called Alchemy (i.e. *chêmeia*),” and so forth.³³

2. Syriac Zosimus (for a preliminary edition of this text see [Appendix](#))

Eighth Treatise on the Working of Tin; Letter Ḥēr^h. The Book tells us about tin and Zosimus gives his best greetings to the queen Theosebeia. The holy scriptures say, my lady, that there is a race of demons who has intercourse with the women and has authority over them. Hermes also mentions this story in his *Physika* as well as, so to say, every clear or secret treatise recalls it. In this way,

³⁰ The title *Imouth* is not elsewhere attested in Zosimus’s treatises handed down by the Byzantine tradition. Moreover, the reference to the ninth book is not confirmed by the Syriac tradition, where this passage is included in the eighth book by Zosimus. The Arabic *Tome of Images* (*Muṣḥaf as-suwar*), preserved under the name of the Egyptian alchemist (although its authenticity is questioned; see Hallum, “Tome of Images”) preserves a similar account in the sixth book, entitled *Book About the Nature* or *Book of Imouth* (see Abt & Fuad, *Book of Pictures*, 393, 22).

³¹ The woman to whom Zosimus usually addresses his treatises; perhaps a pupil of the alchemist: see Hallum, “Theosebeia.”

³² The term *Chêmeu* (*hapax*) is likely to be the title of the book in which the teaching of angels was revealed. The alchemist Olympiodorus (CAAG II 80,13) refers to a similar book entitled *βιβλος χημεντική*. Moreover, in the *Corpus alchemicum graecum* several authors mention the alchemist *Chēmēs* (Χημής) or *Chymēs* (Χυμής), whose name seems to be related to the book *Chêmeu*; see Letrouit, “Alchimistes grecs,” 72–4.

³³ Translation by Adler & Tuffin, *George Synkellos*, 18–9 (slightly modified). The Greek text reads: “Ἀξιόν δὲ καὶ Ζωσίμου τοῦ Πανοπολίτου φιλοσόφου χρήσιν τινα παραθέσθαι περὶ αὐτῶν ἐκ τῶν γεγραμμένων αὐτῷ πρὸς Θεοσέβειαν ἐν τῷ ἐνάτῳ τῆς Ἰμουθ βίβλῳ, ἔχουσιν ὧδε. ‘φάσκουσιν αἱ ἱεραὶ γραφαὶ ἦτοι βίβλοι, ὧ γύναι, ὅτι ἔστι τι δαιμόνων γένος ὃ χρήται γυναιξίν. ἐμνημόνευσε δὲ καὶ Ἑρμῆς ἐν τοῖς φυσικοῖς, καὶ σχεδὸν ἅπας λόγος φανερός καὶ ἀπόκρυφος τοῦτο ἐμνημόνευσε. τοῦτο οὖν ἔφασαν αἱ ἀρχαῖαι καὶ θεῖαι γραφαί, ὅτι ἄγγελοι τινες ἐπεθύμησαν τῶν γυναικῶν καὶ κατελθόντες ἐδίδαξαν αὐτάς πάντα τὰ τῆς φύσεως ἔργα, ὧν χάριν, φησί, προσκρούσαντες ἔξω τοῦ οὐρανοῦ ἔμειναν, ὅτι πάντα τὰ ποιηρὰ καὶ μηδὲν ὠφελοῦντα τὴν ψυχὴν ἐδίδαξαν τοὺς ἀνθρώπους. ἐξ αὐτῶν φάσκουσιν αἱ αὐταὶ γραφαὶ καὶ τοὺς γίγαντας γεγενῆσθαι. ἔστιν οὖν αὐτῶν ἡ πρώτη παράδοσις [Χημεῦ] περὶ τούτων τῶν τεχνῶν. ἐκάλεσαν (ἐκάλεσε in Mosshammer’s edition) δὲ ταύτην τὴν βίβλον Χημεῦ, εἵθεν καὶ ἡ τέχνη χημεία καλεῖται’ καὶ τὰ ἐξῆς.” I have introduced two changes in Mosshammer’s edition. First, I’ve followed Mertens’s suggestion (*Lettre d’Isis*, 67) to expunge the first *Χημεῦ* as an interpolation (the term is not attested in this position by the Syriac tradition). Secondly, in the last line I corrected *ἐκάλεσε* into *ἐκάλεσαν* in accordance with the Syriac translation that ܡܫܬܠܡ ܕܥܡܐ.

in fact, the ancient and holy books tell that some angels fell in love passionately with the women, came down <and> taught them about all the works of nature. For this reason, as the book says, those who acted haughtily remained outside heaven, since they taught mankind all the malicious things which do not benefit the soul at all. The books claim that the works (of nature?) started up from them and theirs is the first exposition concerning these crafts. They called these books *Kwmw*, whence also alchemy (*kumiya*) takes its name. There are 24 treatises in this book. Each of them is given a specific title that is either a letter (of the alphabet) or a word. They are explained by the words of priests. One of these is entitled 'Imus', another 'Imuth', another 'Face'—so it was interpreted (or translated). One of these is entitled 'Key', another 'Seal' or 'Signet', another 'Handbook' (see gr. ἐγχειρίδιον), another 'Position' (of the stars? see gr. ἐποχή). As I said, each one is given a specific title. This book contains the crafts and many thousands of words. Then those who came afterwards, with the intent of doing well, divided the book in many parts; as someone would say: (they did so) in order to compose short versions (of the book) for themselves. And they were not even able to write something useful. For they did not only damage the books of *alchemy*, but also hidden them. The philosopher (i.e. Democritus) claims: 'they hid the writings on the natural substances under the multiplicity of matter.' Perhaps they wanted to exercise our souls. Now, if they exercise the souls, well, philosopher, why to deny it? But you know how to exercise either the body or the soul, and it always leads you to achieve the perfection. In fact a wise saying reads: 'studying is everything.' And also Isidoros says: 'studying increases your work.' I know, this is not beyond your understanding (my lady), but you know it well, since you are one of those who would have liked to hide the art, if it had not been put in writing. For this reason you formed an assembly and administered the oath to each other. But you (my lady) moved away from the various topics (of this book); you presented them in a shorter form and you taught them openly. But you claim that this book cannot be possessed unless in secret. Now, even though secrets are necessary, it is quite fair that anyone has a book of *alchemy*, since it is not kept secret for them. You must know, my lady, he (i.e. Democritus?)³⁴ claimed that those who wrote short versions (of the book) said that just silver can be dyed gold. But the book of *alchemy* they have hidden assured that lead and tin and iron and silver take the color of gold, each metal (takes the color of) the other one, and again the same metals (take the color of) silver, the same metals (the color of) copper, the same metals (the color of) iron. Lead produces tin, copper (produces) iron, silver (produces) gold. In the same way tin

³⁴ Berthelot & Duval, *Chimie*, 239, considered the philosopher (i.e. ps.-Democritus) as the author of the following quotation. Although the ancient alchemist is cited few lines before (49v18), this identification is not certain.

(produces) the same metals as well. And again from the beginning to the end and from the end to the beginning.

The Syriac text may be divided into two parts. The first section (49^r12–49^v6) matches the Greek passage cited by Syncellus and rephrases the story told by *The Book of Enoch*: in all likelihood Zosimus refers to this book when he mentions the holy scriptures (Sync. 14,3 ἱερὰ ἱεροῦ βιβλίοι=SyrZos. 49^r14 ܡܬܢ ܡܠܟܐ). The second section gives a detailed description of the book entitled *Chēmeu* and explains how it was transmitted and somehow corrupted.

In the first part Zosimus attributes the revelation of *chēmeia* both to angels (Sync. 14,6 ἄγγελοι τινες=SyrZos. 49^r18 ܡܠܟܐ) and to demons (Sync. 14,3 δαιμόνων γένος=SyrZos. 49^r15 ܡܠܟܐ ܕܡܝܬܐ), so introducing a slight variation into the Enochian myth, where fallen angels usually play the most important role. Although the name of demons is mentioned only at the very beginning of the passage, their presence allows us to read Zosimus's account in the light of the complex (and still unclear in many respects) demonology developed by the author in two other treatises, namely *On the Letter Omega* (CAAG II 228–234) and the *First Book of the Final Account* (CAAG II 239–245).³⁵ According to the second work, the two main sources of wealth for Egypt were gold mines and the dyeing techniques, in particular the so-called καιρικαὶ βαφαί (opportune tinctures), that is, the dyeing processes whose success depended on the influence of demons and on the astrological time in which they were performed.³⁶ This knowledge was considered secret and no ancient authors could reveal it; only Democritus—Zosimus claims—hinted at these tinctures in his explanation of the four τέχνηαι τιμίαι (valuable arts), which must be identified with the topics covered by the four books, namely the making of gold, of silver, of precious stones, and the purple dyeing of wool.³⁷ These opportune tinctures were originally called φυσικαὶ βαφαί (natural tinctures) and had been explained by Hermes in his βιβλος φυσικῶν βαφῶν (*Book of Natural Dyes*). However, demons became jealous of this knowledge and wanted to make it secret and dependent on their own control (i.e. on the influences of the stars they governed). They started revealing these tinctures, or even a counterfeited form of them (called at some point “unnatural tinctures”), only to their priests in order to be worshipped and receive the appropriate sacrifices.³⁸

³⁵ See Fraser, “Zosimos of Panopolis.” For a new and reliable edition of the first treatise, see Mertens, *Zosime de Panopolis*, 1–10. The second treatise has been reedited by Festugière, *Révélation d'Hermès*, 363–8 (translation at 275–81).

³⁶ Festugière, *Révélation d'Hermès*, 363–5 (=CAAG II 239–40). See also Mertens, *Zosime de Panopolis*, 62–3 notes 9–10.

³⁷ Festugière, *Révélation d'Hermès*, 364, ll. 22–4 (= CAAG II 242,17), 365, ll. 12–4 (= CAAG II 242,8–17). In addition, it is worth mentioning the passage edited in CAAG II 242,9–24 (not reedited by Festugière, because ‘assez obscure’, see 278 note 1), which gives a kind of summary of ps.-Democritus's work by presenting several dyestuffs used by the alchemist as example of καιρικαὶ βαφαί.

³⁸ Festugière, *Révélation d'Hermès*, 366–7, §§ 6–7 (= CAAG II 243–4, §§ 6–7).

Not surprisingly, if we come back to the above-edited passages, Zosimus interpreted Azaël's revelation in *The Book of Enoch* as referring to the knowledge of tinctures he considered at the basis of any alchemical activity. Τὰ βαφικά are in fact explicitly mentioned by the apocryphal book (see *supra*) along with a specific set of crafts, which is in many respects comparable with the arts explained in ps.-Democritus's four books on dyeing (βαφικαὶ βίβλοι according to Synesius). Moreover, next to *The Book of Enoch* Zosimus mentions also a book of Hermes entitled *Physika* as one of the sources from which he took the account on the angelic/demonic revelation. The identification of this treatise is far from certain, even though the title and the context in which *Physika* is cited remind us of Hermes's *Book of Natural Dyes* quoted in the *First Book of the Final Account*: there Zosimus claimed that Hermes's treatise was addressed to Isidoros,³⁹ an enigmatic figure that is mentioned also in the Syriac text (50^r2).⁴⁰

On the other hand, the Syriac passage emphasises the central role played by books in the revelation and transmission of alchemical knowledge. While *The Book of Enoch* presented Azaël's revelation in the form of oral teaching, Zosimus underlines the written form in which mankind received this secret knowledge. The arts and all the natural procedures (Sync. 14,7 πάντα τὰ τῆς φύσεως ἔργα=SyrZos. 49^r19–20 ܡܠܟܐ ܕܚܝܠܐ) disclosed by demons had been somehow summarized in the enigmatic books called *Chēmeu*, from which the related term *chēmeia* (χημεῖα or ܚܝܡܝܐ, *kumiya*) derives. However, while the *Final Account* insists on demons' increasing jealousy towards mankind and on their attempt to gain control of the revealed techniques, the Syriac text stresses the point that the original knowledge started deteriorating because of the improper use human beings made of the revealed books. In the same way as the demons (or maybe under their influence) some people tried to hide the books, to summarize them, and disperse their content by focusing only on specific topics.

In this respect, the last part of the Syriac passage is particularly relevant, since Zosimus explains that some alchemists narrowed their inquiry to the methods for gilding silver. Whereas, the art called *chēmeia*, at least in its original form, included a wider set of dyeing techniques that were applied to all kinds of metals in order to dye them different colours. This explanation is consistent with Zosimus's other

³⁹ Festugière, *Révélation d'Hermès*, 365, ll. 15–20 (= CAAG II 242,10–6). The name of Isidoros appears also in the list of alchemists handed down by the *Marcianus gr.* 299 (fol. 7v); see CAAG I 110.

⁴⁰ We cannot exclude the possibility that other treatises circulating under the name of Hermes referred to or reused the Enochian myth of the fallen angels. In particular, according to a passage of the alchemist Olympiodorus (CAAG II 89,9–15), we know that the above-mentioned treatise ascribed to Isis (see *supra*, § 2), or at least some parts of it, was attributed to Hermes. This overlap between Hermes and Isis is not surprising, especially if read in the light of the so-called *Corpus Hermeticum*, which includes several writings where the Egyptian goddess addresses her teaching to Horus (see, for instance, *Stobei fragmenta*, xxiii–xxvii). Therefore, Zosimus could have had in mind Isis's book, when he mentioned Hermes's *Physika*: see Scott, *Hermetica*, 151.

alchemical books that have been preserved by the Syriac manuscript Mm. 6.29. In fact, among the twelve treatises handed down by the codex under the name of the Egyptian alchemist, we find many writings devoted to the dyeing of various metals, such as silver (e.g. Book 2; Berthelot-Duval, *La chimie*, 217–21), tin (Book 8; *idem*, 238–42), lead (Book 10; *idem*, 253–57), and iron (Book 11; *idem*, 257–60).⁴¹ In particular Book 6 (Mm. 6.29, fol. 32x^v17–45^r8), entitled *Beginning of the Treatise on the Working of Copper: Letter Waw*, includes several recipes explaining how to process copper and dye it black, purple, coral red, white, and yellow (Berthelot-Duval, *La chimie*, 222–32). Scholars have so far focused their attention especially on the recipes dealing with the production of black copper alloys. Three recipes have been recently published by Erika Hunter and fully commented by Alessandra Giumlia-Mair, who recognized in them the description of different methods for producing a black and shiny patina on copper-alloys.⁴² This black copper was already known in Ancient Egypt, as we can infer, for instance, from a beautiful black image of the pharaoh Amenemhat III (1842–1794 BC) today displayed at the Ortiz Collection in Geneva.⁴³ It represents one of the most ancient examples of artificially black patinated statues found in Egypt (Fig. 1).

Conclusion

If we go back to the above-quoted Syriac passage, in the very last part Zosimus criticizes the attitude of those alchemists who were only interested in the making of precious metals by quoting a sentence presumably taken from an ancient author (perhaps ps.-Democritus) who claimed: “those who wrote short versions [of the books of *chēmeia*] said that just silver can be dyed gold” (50^r12–3). In this way the debate between people supporting a wider idea of alchemy, which included a broader set of dyeing techniques, and people accepting a narrower idea just focused on the making of gold seems to be traced back to the earliest phases of alchemy in Egypt. A possible target of such a criticism might be recognized in Isis’s treatise, a work that mentioned only the making of gold and silver among the secrets revealed by the angels. On the contrary, a different position was endorsed by ps.-Democritus with the fourfold division of his books. Significantly, as we have already noted, the

⁴¹ The Syriac text of these twelve treatises is still unedited (an edition with English translation is scheduled to be published within the new series ‘Sources of alchemy and chemistry’ distributed as a supplement of *Ambix*); a partial French translation is available in Berthelot & Duval, *Chimie*, 210–66.

⁴² Hunter, “Beautiful Black Bronzes,” 656–7. The three recipes that have been edited correspond with the texts translated or summarized by Berthelot & Duval, *Chimie*, 223 (rec. 2), 224–5 (rec. 8–9), 225 (rec. 12); and Giumlia-Mair, “Zosimos the Alchemist,” 319–21.

⁴³ See, for example, Giumlia-Mair, “Krokodil.”



Fig. 1 Black copper statue of King Amenemhat III in kneeling posture (1843–1798 BC) (Courtesy of Werner Forman Archive, The Bridgeman Art Library)

chemical Papyri seem to preserve a similar division, which should lead us to speculate on how widespread or how standard such a division might actually have been in the first centuries AD.

Such a background was well known to Zosimus, who took for granted that *chēmeia* was related to a plurality of dyeing techniques. The proper alchemist, Zosimus claims, was expected to put into practice any possible transformation of colour without focusing only on gold. Nevertheless, the Egyptian alchemist, though very familiar with ps.-Democritus's books, never mentions stones working and purple dyeing in the passage. These kinds of crafts seem to have been somehow left apart within the debate on the contents of the original books of alchemy. Although Zosimus stresses the central role played by dyeing techniques, the polarity between

a wider idea of alchemy and the bare making of precious metals seems to have been reduced to a simpler discussion on metalworking: Zosimus underscores all the possible chromatic transformations of metals, which seem to become the most relevant topic of any alchemical inquiry.

Such a variety of positions already detectable during the earliest phases of the western alchemical tradition makes clear how fluid were the boundaries of an art primarily focusing on the chromatic transformations of the treated substances. If the Byzantine sources analysed at the beginning of the chapter emphasizes the identification of *chēmeia* with the making of gold and silver, such a position—although dominant to some extent—never interrupted the transmission of technical knowledge dealing with a wider set of dyeing techniques. A similar kind of expertise, for instance, is well attested by the Latin recipe books of the Middle Age, which covered a variety of topics more similar to ps.-Democritus's four books and to the Leiden and Stockholm papyri than to the simple selection of recipes made by Psellos.⁴⁴ A well-known example is the so-called *Mappae clavicula*, a large collection of recipes probably assembled between the ninth and the twelfth century. Recent studies have shown that this work in all likelihood derives from a lost Greek source that could be perhaps identified, according to Halleux-Meyvaert's investigation, with a lost part of Zosimus's treatises.⁴⁵ Although the extant sources do not allow us to confirm such a hypothesis, the Greek origin of the *Mappae clavicula* confirms the transmission of a set of practices originally covered by those texts considered at the basis of the Byzantine alchemical tradition. To sum up, the mere practice of *chrysopoeia* does not seem to be sufficient for getting a full understanding of the different historical evolutions of a complex art, whose exact definition was debated even among the authors usually considered as the founders of this discipline. On the contrary, a deeper investigation of their treatises—many of them still waiting for editions and translations—provide us with new and fresh material for building a more complete picture of the evolution and transformation of the different technical aspects somehow encapsulated in the enigmatic word *chēmeia*.

Appendix

Zosimus's passage on the relevation of alchemy as preserved by the Syriac manuscript Mm. 6.29, fols. 49^r–50^r.⁴⁶

⁴⁴ See, for instance, Halleux, *Papyrus de Leyde*, 53–62.

⁴⁵ Halleux & Meyvaert, "Mappae clavicula," 12–3.

⁴⁶ A French translation of the passage is available in Berthelot & Duval, *Chimie*, 238–9.

فكحه. ه' سو' ا'ع' نام'ن. ا'سو' و'خ'ف'ع'ه'ه' ف'س'ق'ا'
 ح'ب'م' (?) ⁴⁸ ه'ه'ه' ا'ف'لا' و'م' ه'ه' ا'ح'م' م'ب'م' و'ع'ن' ا'م'ل'ج'ه'.
 ا'لا' لا' ه'م' (?) ح'ك'س'ه' و'ه'ن'س'ه' ح'ك'ل'ك'ا' و'م'م'ص'ا'. ا'لا' ا'ف' ل'ع'ب'ه'.
 ا'م'ن' و'م' ف'م'ل'ك'ه'م'ه'ف'ا'. و'ح'م'ه'ك'ا' و'م'ك'ه' ا'ا' ل'ع'ب'ه' ا'ن'ت'م'
 ح'ك'ل'ت'ح'ا' ص'ت'م'ا'. ح'ن' و'م' و'خ'ف'ق'ل'ص' و'ج'م' و'ب'و'ع'ه'. ا'
 ه'ص'ك' ح'ف'ق'ل'ا' م'ب'و'ع'م': ا'ه' ف'م'ل'ك'ه'م'ه'ف'ا' ح'م'ل'ا' ا'ل'
 م'ب'ج'ك'ل'. ا'لا' ن'ب'ج'ل' و'و'ه'و'ع'ا' ه'ه'ه'ه' ا'ه' و'ج'ه'م'ص'ل'ا' ه'ه'ه'ه' a' و'ب'ع'ل'

[50^f1-18]

ه'ه'ه' ه'ح'ك'ل'ر'ج' ل'ع'م'م'ص'ل'ا' م'ص'ل'ا'. ا'م'ن'ا' ح'ن' ه'م' م'ص'ل'ا'
 م'ص'ص'ل'ا'. و'ح'م'م'p' ه'و'ك'ا' ه'ه'ه'ه' ه' a'ف' ا'م'س'ب'ه'ه' (sic) ا'م'ن'.
 و'ه'و'ك'ا' ح'خ'ب'ا' م'ص'ك'ا'. ن'ب'ك' a'ل' و'ا'ف'لا' ذ'خ'ل'ا' ح'ص'. ا'لا' a'ف'
 a'ل'ل'ل' م'ب'ج'ل' a'ل'ل'ل'. و'س'ب' م'م' a'ح'م' a'ل'ل'ل'ل' و'ر'ج'م' و'ل'ع'ب'ه'
 a'm'ص'ل'ا'. ا'ك'ه' م'ل'ح'ه'h'. م'ل'ح'h'ل' a'ف' م'ص'ع'ل'ا' ح'ج'ب'ل'h'.
 ه'م'ق'e'م'ص'ل'ا' و'ح'ل' ن'ت'ب'وا' م'ص'ل'h'. a'لا' a'ل'l'l'l'l'l'l'l' M'm'
 ق'ك'h' a'f' ه'ت'م'l'. ه' a'l'l'l'l'l'l' a'f' ح'ص'ل'h' a'f' ر'ح'ه'w'a'. ه'ل'k'f'l'l'
 a'f' ح'ح'l'l'l'l'. a'la' a'f'z'a' a'l'l'l'l'l'l'l'l'l'l'l'l'l'l'l'l'l' a'la' h'z'a'w'a'. a'
 ه'h' h'v'k' و'w'a'w'a' M'v'k'h'p' h'h'h'h' h'z'a'w'a' a'f' و'h'v'k'f'
 h'h' h'k'k' h'v'v'v'v' ⁴⁹ v' l'a' M'v'k'h'p' h'h' h'v'v'v'v'. و'ج'

⁴⁸ The word is indecipherable; see *infra*, fol. 50^f11 م'ل'ج'ه'.

⁴⁹ The term م'ص'م' (see also 50^f12) is likely to be a slightly different spelling of م'ص'ل'.

١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠
 ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠ ١٥٠٠

Bibliography

- Abt, Theodor, and Salwa Fuad. 2011. *The Book of Pictures by Zosimos of Panopolis*. Zurich: Living Human Heritage Publication.
- Adler, William, and Paul Tuffin. 2002. *The Chronography of George Synkellos. A Byzantine Chronicle of Universal History from the Creation*. Oxford: Oxford University Press.
- Albini, Francesca. 1988. *Michele Psello. La Crispoea, ovvero come fabbricare l'oro*. Genova: ECIG.
- Baar, James. 1979. Aramaic-Greek Notes on the Book of Enoch (ii). *Journal of Semitic Studies* 24: 179–192.
- Berthelot, Marcelin, and Charles-Émile Ruelle. 1887–1888. *La Collection des anciens alchimistes grecs*, 3 vols. Paris: G. Steinheil.
- Berthelot, Marcelin, and Rubens Duval. 1893. *Histoire des Sciences: La Chimie au Moyen-Âge*, vol. 2: *L'alchimie syriaque*. Paris: Imprimerie nationale.
- Bidez, Joseph. 1928. *Michel Psellus. Épitre sur la Chrysopée, opusculs et extraits sur l'alchimie, la météorologie et la démonologie (Catalogue des manuscrits alchimiques grecs, vol. 6)*. Brussels: M. Lamertin.
- Bidez, Joseph, and Franz Cumont. 1938. *Les Mages hellénisés. Zoroastre, Ostanès et Hystaspe d'après la tradition grecque*, 2 vols. Paris: Les Belles Lettres.
- Black, Mathew. 1985. *The Book of Enoch or 1 Enoch: A New English Edition with Commentary and Textual Notes*. Leiden: Brill.
- Brooks, Ernest W. 1900. A Syriac Fragment. *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 3: 195–230.
- Caley, Earle R. 1926. The Leyden Papyrus X: An English Translation with Brief Notes. *Journal of Chemical Education* 3: 1149–1166.
- Caley, Earle R. 1927. The Stockholm Papyrus: An English Translation with Brief Notes. *Journal of Chemical Education* 4: 979–1002.
- Chabot, Jean-Baptiste. 1910. *Chronique de Michel le Syrien*, vol. 4: *Texte syriaque*. Paris: Pierre Leroux.
- Chabot, Jean-Baptiste. 1933. *Incerti auctoris Chronicum Pseudo-Dionysianum vulgo dictum*, vol. 2 (CSCO 104, syr. 53). Louvain: Peeters.
- Dodge, Bayard. 1970. *Abū 'l-Faraj Muḥammad ibn Ishāq al-Nadīm, The Fihrist, a 10th Century AD Survey of Islamic Culture*. New York: Columbia University Press.
- Duffy, John M. 1992. *Michaelis Pselli philosophica minora*. Leipzig: Teubner.

- Duval, Rubens. 1888–1901. *Lexicon Syriacum auctore Hassano bar Bahlule*, 3 vols. Paris: E. Reipublicae typographaeo.
- Festugière, André-Jean. 1950. *La Révélation d'Hermès Trismégiste*, vol. 1: *L'Astrologie et les sciences occultes*. Paris: J. Gabalda et Cie.
- Flügel, Gustav. 1872. *Kitāb al-Fihrist*, 2 vols. Leipzig: F.C.W. Vogel.
- Fraser, Kyle A. 2004. Zosimos of Panopolis and the Book of Enoch: Alchemy as Forbidden Knowledge. *Aries* 4: 125–147.
- Fück, Johann W. 1951. The Arabic Literature of Alchemy According to al-Nadīm (A.D. 987). A Translation of the Tenth Discourse of the Book of the Catalogue (*Al-Fihrist*) with Introduction and Commentary. *Ambix* 4: 81–144.
- Gildemeister, Johannes. 1876. Alchymie. *ZDMG* 30: 534–538.
- Giumlia-Mair, Alessandra. 1996. Das Krokodil und Amenemhat III. aus el-Faiyum. *Antike Welt* 27: 313–321.
- Giumlia-Mair, Alessandra. 2002. Zosimos the Alchemist – Manuscript 6.29, Cambridge, Metallurgical Interpretation. In *I bronzi antichi: produzione e tecnologia* (Atti del XV Congresso Internazionale sui Bronzi Antichi, organizzato dall'Università di Udine, sede di Gorizia, Grado-Aquileia, 22–26 maggio 2001), ed. Alessandra Giumlia-Mair, 317–323. Montagnac: Éditions Monique Mergoil.
- Goeje, Michael Jean de. 1885. *Ibn al-Faḳīn al-Hamaḍānī, Mukhtaṣar kitāb al-buldān*. Leiden: Bibliotheca Geographorum Arabicorum.
- Halleux, Robert. 1981. *Alchimistes grecs*, vol. 1: *Papyrus de Leyde. Papyrus de Stockholm. Fragments de recettes*. Paris: Les Belles Lettres.
- Halleux, Robert, and Paul Meyvaert. 1987. Les Origines de la Mappae clavicula. *Archives d'Histoire Doctrinale et Littéraire du Moyen-Age* 54: 7–58.
- Hallum, Bink. 2008. Theosebeia. In *Encyclopedia of Ancient Natural Scientists*, eds. Paul Keyser and Georgia Irby-Massie, 302–303. London/New York: Routledge.
- Hallum, Bink. 2009. The Tome of Images: An Arabic Compilation of Texts by Zosimos of Panopolis and a Source of the *Turba Philosophorum*. *Ambix* 56: 76–88.
- Hunter, Erika C.D. 2002. Beautiful Black Bronzes. Zosimos' Treatises in Cam. Mm. 6.29. In *I bronzi antichi: produzione e tecnologia* (Atti del XV Congresso Internazionale sui Bronzi Antichi, organizzato dall'Università di Udine, sede di Gorizia, Grado-Aquileia, 22–26 maggio 2001), ed. Alessandra Giumlia-Mair, 655–660. Montagnac: éditions Monique Mergoil.
- Katsiampoura, Gianna. 2008. Transmutation of Matter in Byzantium: The Case of Michael Psellos, the Alchemist. *Science & Education* 17: 663–668.
- Knibb, Michael A. 2009. *Essays on the Book of Enoch and Other Early Jewish Texts and Traditions*. Leiden: Brill.
- Letrouit, Jean. 1995. Chronologie des alchimistes grecs. In *Alchimie: art, histoire et mythe* (Actes du 1er Colloque International de la Société d'Étude de l'Histoire de l'Alchimie), eds. Didier Kahn and Sylvain Matton, 11–93. Paris/Milan: S.É.H.A.-Arché.
- Martelli, Matteo. 2011. *Pseudo-Democrito. Scritti alchemici con il commentario di Sinesio*. Paris/Milan: S.É.H.A.-Arché.
- Massé, Henry. 1973. *Ibn al-Faḳīn al-Hamaḍānī. Abrégé du livre de Pays*. Damascus.
- Mertens, Michèle. 1983–1984. *Un traité gréco-égyptien d'alchimie: la lettre d'Isis à Horus. Texte établi et traduit avec introduction et notes*. Université de Liège: Mémoire de licence.
- Mertens, Michèle. 1995. *Zosime de Panopolis. Mémoires authentiques*. Paris: Les Belles Lettres.
- Mertens, Michèle. 2006. Greco-Egyptian Alchemy in Byzantium. In *The Occult Sciences in Byzantium*, eds. Paul Magdalino and Maria Mawroudi, 205–229. Geneva: La Pomme d'Or.
- Milik, Jafez T. 1976. *The Books of Enoch, Aramaic Fragments of Qumrān Cave 4*. Oxford: Clarendon.
- Reitzenstein, Richard. 1904. *Poimandres. Studien zur griechisch-ägyptischen und frühchristlichen Literatur*. Leipzig: B.G. Teubner.
- Roberto, Umberto. 2005. *Ioannis Antiocheni Fragmenta ex Historia Chronica*. Berlin: De Gruyter.

- Scott, Walter. 1985. *Hermetica*, vol. 4: *Testimonia with Introduction, Addenda and Indices by A.S. Ferguson*. Boston: Shambhala.
- Strohmaier, Gotthard. 1991. Umāra ibn Ḥamza, Constantine V and the Invention of the Elixir. *Graeco-Arabica* 4: 21–24.
- Westerink, Leendert G. 1948. *Michael Psellus, De Omnifaria Doctrina*. Nijmegen: Centrale Drukkerij N.V.