

Alchemical lexica in Syriac : planetary signs, code names and medicines

Autor(en): **Martelli, Matteo**

Objektyp: **Article**

Zeitschrift: **Asiatische Studien : Zeitschrift der Schweizerischen
Asiengesellschaft = Études asiatiques : revue de la Société
Suisse-Asie**

Band (Jahr): **75 (2021)**

Heft 2

PDF erstellt am: **21.07.2024**

Persistenter Link: <https://doi.org/10.5169/seals-956725>

Nutzungsbedingungen

Die ETH-Bibliothek ist Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Inhalten der Zeitschriften. Die Rechte liegen in der Regel bei den Herausgebern.

Die auf der Plattform e-periodica veröffentlichten Dokumente stehen für nicht-kommerzielle Zwecke in Lehre und Forschung sowie für die private Nutzung frei zur Verfügung. Einzelne Dateien oder Ausdrucke aus diesem Angebot können zusammen mit diesen Nutzungsbedingungen und den korrekten Herkunftsbezeichnungen weitergegeben werden.

Das Veröffentlichen von Bildern in Print- und Online-Publikationen ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Die systematische Speicherung von Teilen des elektronischen Angebots auf anderen Servern bedarf ebenfalls des schriftlichen Einverständnisses der Rechteinhaber.

Haftungsausschluss

Alle Angaben erfolgen ohne Gewähr für Vollständigkeit oder Richtigkeit. Es wird keine Haftung übernommen für Schäden durch die Verwendung von Informationen aus diesem Online-Angebot oder durch das Fehlen von Informationen. Dies gilt auch für Inhalte Dritter, die über dieses Angebot zugänglich sind.

Matteo Martelli*

Alchemical lexica in Syriac: planetary signs, code names and medicines

<https://doi.org/10.1515/asia-2020-0042>

Received September 15, 2020; accepted February 1, 2021; published online May 20, 2021

Abstract: Technical terminology and *Decknamen* represent key hallmarks of the alchemical literature in different traditions. The opacity of this vocabulary makes the reading of alchemical texts difficult and, in order to cope with similar challenges, Byzantine, Syriac and Arabic scholars soon started compiling technical vocabularies. In my paper I shall investigate two (partially overlapping) lexica, which open the BL Syriac alchemical MSS Egerton 709 and Oriental 1593. On the one hand, I will explore the variety of sources used by the anonymous compiler(s) to assemble these useful tools (Byzantine alchemists as well as the Greek medical tradition; Syro-Arabic lexicography). On the other, particular attention will be given to the structure and *mise en page* of the two lexica, which will be compared with analogous alchemical dictionaries in the Byzantine (e.g. MS Marcianus gr. 299) and Arabic (e.g. MS Gotha 1261) traditions.

Keywords: alchemical signs; codenames; Syriac alchemy

1 Graeco-Egyptian, Byzantine, and Arabic Alchemical Exegesis: an entangled tradition

Since the earliest phases of Graeco-Egyptian alchemy, ancient authors and scribes tried to develop a set of textual tools that could help the practitioners understand the technical terminology used in alchemical recipes. We can assume that this tendency was not simply moved by purely lexicographical or scholarly interests. Indeed, a correct identification of the ingredients and substances that entered ancient alchemical procedures was critical in the transition from words to deeds, when a described procedure was to be put into practice in ancient workshops. This exegetical approach emerges from the earliest alchemical recipe books that came to us on papyrus, namely the so-called Leiden and Stockholm papyri (third–fourth

*Corresponding author: Matteo Martelli, Department of Philosophy and Communication Studies, University of Bologna, via Zamboni 38, 40126 Bologna, Italy, E-mail: matteo.martelli@unibo.it

centuries CE).¹ These collections include more than two hundred recipes describing how to dye metals, stones and textiles, as well as how to produce metallic alloys and inks. The two papyri are also the earliest witnesses of a writing practice that will become a critical mark of later Byzantine and Syriac alchemical manuscripts: the use of planetary symbols to refer to specific alchemical ingredients.² In recipe 88 of the Leiden Papyrus, in fact, the signs for “sun” (♁) and “moon” (♃) are introduced instead of the terms “gold” (χρυσός) and “silver” (ἄργυρος).³

The Leiden papyrus closes with two folios that preserve a kind of medical or alchemical lexicon, namely a collection of various entries taken from Dioscorides’ pharmacological treatise *De materia medica* (*On Medical Substances*). Divided into five books, this work (early first century CE) describes about 1,600 drugs, among which we find several minerals. The anonymous compiler of the Leiden alchemical papyrus excerpted and epitomized 10 entries dealing with various minerals, such as orpiment, realgar, and quicksilver.⁴ He selected those mineral ingredients that are mentioned most frequently in the alchemical recipes and, for each mineral, he only kept those sections that describe the substance, while leaving all the medical information aside. For instance, the entry on soda reads:

Νίτρον. Νίτρον δὲ προκριτέον τὸ κοῦφον, καὶ ῥοδωπὸν ἢ λευκὸν τῇ χροῖα, κατατετριμένον.

Soda. One must choose the soda that is light and either rosy or white in colour, having holes.⁵

Only the first lines of Dioscorides’ entry were copied by the compiler of the alchemical recipe book, who entirely omitted the following sections that deal with “the foam of soda” along with various medical applications of both mineral substances. As we shall see, a similar reshaping of medical sources, along with a more extensive use of planetary symbols, represent two peculiar features of the Syriac alchemical manuscripts that will be examined in this paper.

On the other hand, a certain attempt to provide correct identifications of ingredients already emerges in the Stockholm papyrus. At the end of the recipe 51 on how to soften quartz, we find an additional note explaining that the term “human excrement” actually meant “garlic”:

¹ Edition and French translation in Halleux 1981.

² See Berthelot/Ruelle 1887–1888: vol. 1, 92–126; Lippmann 1919: 347–354.

³ Recipe edited in Halleux 1981: 105 (see also pp. 10–11). Similar symbols for the sun and the moon also appear in Greek magical papyri, such as *PGM XIII* 270 and 274 (ed. Preisendanz 1928–1931: vol. 1, 44), as well as in a few horoscopes preserved on papyrus (see Neugebauer/Van Hoesen 1987: 163).

⁴ This section of the papyrus is edited in Leemans 1885: vol. 2, 243–249.

⁵ Ed. Leemans 1885: vol. 2, 247. I have corrected some misspellings due to the identical pronunciation of ω/o and ε/ι. The entry corresponds to Diosc. V 113 (ed. Wellmann 1906–1914: vol. 3, 83). Translation by Beck 2011: 389.

Κρυστάλλου στῦψις. Πρὸ τοῦ βάλλειν αὐτὸν βάπτεσθαι. Ἀσβέστου μέ(ρος) α', θείου ἀπύρου μέ(ρος) α' τρίψας πρόσμειξον ὄξος καὶ θές τοὺς λίθους. Καὶ ἐν τῷ γ' τόμῳ οὕτως· ἀνθρωπίνη κόπρος ἐστὶν τὸ λεγόμενον σκόρδον.

How to steep quartz (in a mordant). Before one puts it for coloring. Grind 1 part of quicklime and 1 part of unburnt sulphur, mix vinegar and put the stones in it. And in the third scroll it is said thus: human excrement is, as they say, garlic.⁶

The recipe describes a preliminary treatment of quartz: mordants were used to loosen up its structure, so that dyeing substances could soak into the stone more easily. Human excrement, however, does not appear among the ingredients used as mordants in the recipe: hence, scholars agree that the exegetical note was probably misplaced in the Stockholm papyrus and originally referred to a different recipe, which was not included in the collection.⁷ Both garlic and human excrements are indeed mentioned as mordants in a recipe on the making of an artificial gemstone,⁸ which is preserved by the Byzantine tradition in a long compendium entitled *Deep Tincture of Stones, Emeralds, Rubies and Jacinths from the Book Taken from the Sancta Sanctorum of the Temples*.⁹

The note in the Stockholm papyrus points to an exegetical approach that was often endorsed by late antique alchemists, who read the earlier alchemical texts as if their authors had concealed the described procedures on purpose by introducing *Decknamen* or code names. Expressions like “human excrement” were not used in their common sense, but encoded a secret meaning (garlic, in our example), which were a challenge for the exegetes to decipher. The book *Deep Tincture of Stones* represents a remarkable example of this approach. The compendium combines clusters of recipes with doxographical sections that discuss different identifications of ingredients and various interpretations of technical terminology. For instance, a considerable debate about the nature and properties of *komaris* (also spelled *komaron*)¹⁰ emerges in various passages of the book. This substance – which modern scholars have tentatively identified with a dyeing plant, perhaps the root of *Comarum palustre* L. – was already valued by ancient alchemists, who used it in different dyeing procedures for both stones and textiles (especially wool).¹¹ In this

⁶ Greek text edited in Halleux 1981: 124; translation (slightly modified) by Caley 1927: 987.

⁷ Caley 1927: 987 writes, for instance: “This latter sentence, which appears to have no connection with the remainder of the recipe, is apparently a reference to some other work. It is of value in showing the use of cryptic words and secret meanings”. See also Halleux 1981: 194.

⁸ Text edited in Berthelot/Ruelle 1887–1888: vol. 2, 360, l. 13–20.

⁹ Ed. Berthelot/Ruelle 1887–1888: vol. 2, 350–364.

¹⁰ The spelling of this term is quite fluid in the Byzantine manuscripts, where, along with κόμαρις and κόμαρον we also find κόμ(μ)αρι and κώμαρις.

¹¹ See Halleux 1981: 218, s.v. κόμαρι.

regard, *Deep Tincture of Stones* cites the opinions of Graeco-Egyptian authors, such as Pseudo-Democritus (first century CE) and Zosimus of Panopolis (third–fourth centuries CE): Zosimus is credited with a treatise entitled *On komaron and “moon foam” according to Democritus*, in which he argued that the two terms actually referred to the same ingredient.¹² Furthermore, the book *Deep Tincture of Stones* also mentions later attempts to identify the substance:

Τοῦτο τὸ ἀφροσέληνον καὶ τὸ κόμαρον αἰνιγματωδῶς οἱ φιλόσοφοι εἶπον [...] ἀλλ’ οἱ σοφοὶ τῶν Ἰσσημιτικῶν σαφῶς εἶπον τοῦτο, καὶ οὕτως εἰρμήνευσαν, οἱ μὲν τάλκ <ῆ> κάλκ, οἱ δὲ χάλκ κτλ.

Philosophers used these words, ‘moon foam’ and *komaron* in a cryptic way [...]. But wise scholars among the Arabs have employed a clear terminology, providing this interpretation: some *talk* <or> *kalk*, others *chalk*.¹³

The Greek term *aphroselēnon* (“moon foam”)¹⁴ probably referred to different white silicate minerals (such as mica).¹⁵ The passage lists various names given to this substance, which suggest a Semitic origin and point to a certain influence of Arabic sources on Byzantine alchemical texts.¹⁶ Indeed, the term *talk* (τάλκ) can be interpreted as a Greek transcription of the Arabic *ṭalq* (“talc, talcum powder”), for which slightly different spellings (κάλκ, χάλκ) seem to have been recorded in the Byzantine passage quoted above.

The identification of *aphroselēnon* with *ṭalq* is confirmed by Arabic and Syriac texts. The Greek term “moon foam” had different translations in Arabic such as *buṣāq al-qamar* (lit. “moon saliva”), *ḥajar al-qamar* (“moon stone”), and *zabad al-qamar* (“moon foam”)¹⁷ – all expressions that al-Bīrūnī (362–after 442 H/ 973–after 1050 CE), for instance, considers synonyms for *ṭalq* in his dispensatory entitled *Kitāb al-Ṣaydana fī l-ṭibb* (*Book of remedies for the physician*).¹⁸ Likewise, an entry of the tenth-century lexicographer Bar Bahlūl confirms these identifications. The passage seems to merge two different lemmas referring to the same substance:

¹² Berthelot/Ruelle 1887–1888: vol. 2, 356.

¹³ Ed. Berthelot/Ruelle 1887–1888: vol. 2, 358, l. 23–27. According to a recipe included in *Deep Tincture of Stones*, Persians and Egyptians gave to κόμαρον the names of τάλκ and τάλακ, see Berthelot/Ruelle 1887–1888: vol. 2, 350, l. 8.

¹⁴ The masculine form ἀφροσέληνος is interpreted as another name for σεληνίτης in Dioscorides (V 141; ed. Wellmann 1906–1914: vol. 3, 100).

¹⁵ Berthelot/Ruelle 1887–1888: vol. 1, 267; Bailey 1929: 202.

¹⁶ The first traces of this influence are earlier than the late tenth century CE, since they are detectable in Byzantine texts included in MS Marcianus gr. 299 (late tenth century): see Mavroudi 2002: 400–403.

¹⁷ See Käs 2010: vol. 1, 321–323, 495–498.

¹⁸ See Sa‘id 1973: 114; see also Käs 2010: vol. 1, 496.

from the first century CE up to the Byzantine period. We cannot exclude the possibility that Syriac translators relied on anthologies of Greek texts that differ from the selection of writings handed down by the Byzantine tradition. The date of the translations collected in Syriac manuscripts can vary from text to text:²² for some Greek treatises, such as Pseudo-Democritus' four books on dyeing, more than a single translation seems to have been preserved,²³ while other texts, such as the Syriac epitome's of Galen's work *On the Properties of Simple Drugs*, may draw on Sergius of Rēš 'Aynā's sixth-century translation of that pharmacological treatise (see below).

Scholars and compilers who selected and translated Hellenistic, late antique, and early Byzantine alchemical texts into Syriac were committed to interpreting and making sense of their technical vocabulary. In fact, some Syriac alchemical anthologies include introductory texts which were probably composed to provide the readers with the hermeneutical tools necessary to get a deeper understanding of the collected writings. Two manuscripts are particularly relevant in this respect, both held by the British Library in London: MSS Oriental 1593 (fifteenth–sixteenth century) and Egerton 709 (sixteenth century).²⁴ The two codices preserve a similar collection of 10 alchemical treatises – mostly attributed to the Greek philosopher Democritus²⁵ – along with a second section in *garšūnī*.²⁶ Among other texts, the *garšūnī* section includes an alchemical lexicon, which provides long lists of code names or *Decknamen* for seven metallic bodies, i.e. gold, silver, iron, copper, tin, lead and mercury, and seven spirits (i.e. substances that easily evaporate when heated), namely mercury,²⁷ sal ammoniac, red and yellow arsenic, yellow, red and white sulphur.²⁸ The same glossary, in Arabic, is handed down by MS Berlin, Staatsbibliothek Preußischer Kulturbesitz, Orientabt., Sprenger 1908 (seventeenth century).²⁹ The Syriac part, on the other hand, opens with an instrumental set of texts that are organized in five distinct sections, each introduced by a specific title.

22 On the difficult chronology of Syriac translations of alchemical texts, see Martelli 2014: 191–199; Пигулевская (Pigulevskaya) 1979: 168–180. See also Berthelot/Duval 1893: I–XVIII.

23 Martelli 2013: 8–11.

24 Berthelot/Duval 1893: XLIV–XLVIII. On MS Egerton 709, see Wright 1870–1872: vol. 3, 1190–1191; on MS Oriental 1593, see Margoliouth 1899: 2–3.

25 Berthelot/Duval 1893: 1–60 (edition); 1–106 (French translation).

26 Berthelot/Duval 1893: 61–104 (edition); 141–201 (French translation).

27 A certain hesitation in classifying mercury, listed both among bodies and among spirits, already emerges in Graeco-Egyptian alchemical texts (Martelli 2013: 245–246). Similar classifications are found in Arabic treatises as well, such as in the *Corpus* of writings attributed to Ġābir ibn Ḥayyān (Kraus 1942: 18–30) and in al-Rāzī (Stapleton/Azo/Ḥusain 1905: 321–324).

28 Berthelot/Duval 1893: 70–76 (edition); 156–164 (French translation).

29 See Ruska/Wiedemann 1924; Ferrario 2009. The manuscript is described in Ahlwardt 1887–1899: vol. 9, 614–615 (MS no. 10361).

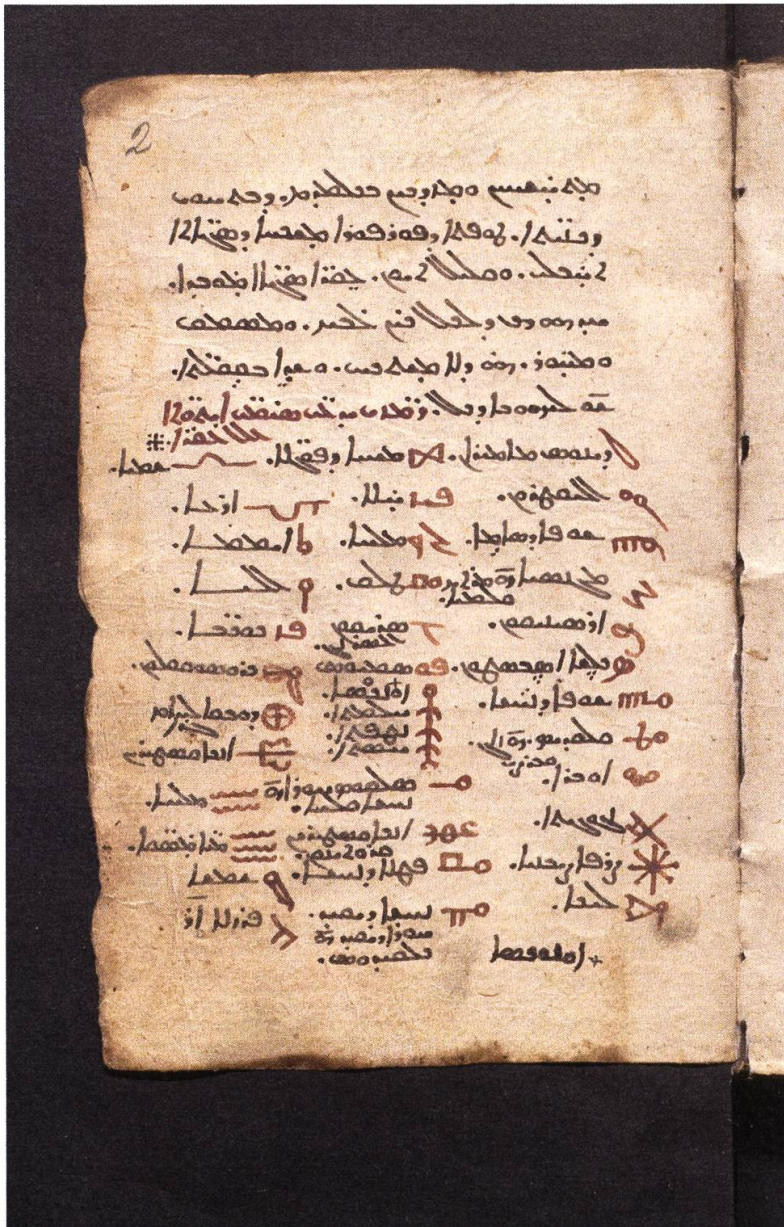


Image 1: MS Egerton 709, fol. 2r: Alchemical signs.









that which is found in the technical writings of philosophers, especially for that philosophy which they call secret (philosophy)”³⁷

The list – which records 144 alchemical signs – follows a simple pattern: each alchemical sign is depicted in front of the name of the substance that it represents. A similar pattern also emerges in the first section of the two Syriac manuscripts,

37 Σημεῖα τῆς ἐπιστήμης τῶν ἐγκειμένων ἐν τοῖς τεχνικοῖς συγγράμμασι τῶν φιλοσόφων καὶ μάλιστα τῆς μυστικῆς παρ’ αὐτοῖς λεγομένης φιλοσοφίας. Edition in Zuretti 1932: 1–3. See already Berthelot/Ruelle 1887–1888: vol. 1, 92–126.

which introduce a set of alchemical signs that clearly draw on the Byzantine tradition. As we shall see, in some cases, these Syriac signs can be identified with Syriac letters that simply transcribe the Greek letters used to abbreviate the Greek names of the corresponding substances.³⁸

For instance, MS Egerton 709, on fol. 2r, displays the following signs:

(1) “μαγνησία, that is, litharge (cf. Ar. <i>murtak</i>), calamine (QLMY’ = καδμεία)”	
(2) “χαλκίτις, that is, vitriol (cf. Ar. <i>zāḡ</i>)”	
(3) “vinegar”	
(4) “talc (cf. Ar. <i>ṭalq</i>)”	
(5) “the day”	
(6) “night”	
(7) “χρυσόκολλα (i.e. ‘malachite’)”	
(8) “distilled water”	

The alchemical signs in the manuscript do not seem to have been organized according to any specific criterion, but simply to have been copied one after the other.³⁹ Different kinds of explanations are provided. Signs referring to “vinegar”, “day”, “night”, and “distilled water” (3; 5; 6; 8) are simply followed by the corresponding Syriac terms or expressions. Likewise, MS Marcianus gr. 299 has: Ⲡ ⲟⲗⲟⲥ (i.e. “vinegar”),⁴⁰ 66 ἡμέραι (i.e. “days”)⁴¹, ϩϩ νύκτες (i.e. “nights”)⁴² and






³⁸ This use of Syriac letters departs from more common scribal abbreviations or cryptographies, such as the so-called ‘alphabet of Bardesanes’ and arithmetical figures, which allowed scribes to encode their names in colophons by taking advantage of the numeric values of Syriac letters: see Hatch 1946: 17; Carlson 2015: 387–389.


³⁹ Berthelot/Duval (1893: XIII) writes: “Mais les signes du manuscrit syriaque ne présentent plus cette ordonnance méthodique, qui caractérise le début de la liste du plus vieux manuscrit grec, celui de la bibliothèque de Saint-Marc”.

⁴⁰ Zuretti 1932: 3 (entry no. 124).

⁴¹ Zuretti 1932: 2 (entry no. 83).



⁴² Zuretti 1932: 2 (entry no. 85).

≈ θαλάσσια ὕδατα (i.e. “sea water”).⁴³ While the first sign for vinegar is quite different from the symbol recorded in the Syriac manuscript, the other signs show evident similarities. In other cases, transliterations of Greek terms in Syriac script are used to explain the alchemical signs, such as for *chrysokolla* (7), which is also recorded in the MS Marcianus gr. 299:  χρυσόκολλα (*chrysokolla*).⁴⁴ If turned upside down, this sign in the Byzantine manuscript is not dissimilar to the Syriac version. Other explanations are more complex, since the compiler added further information to the simple transcriptions of Greek terms. For instance, the Greek *magnēsia* (1) – the correct identification of which is still debated among scholars⁴⁵ – is clarified with two additional terms: the Syriac *MRTQ*, which seems the transcription of the Arabic *murtak*, a term of Persian origin that refers to litharge;⁴⁶ and a second Greek loanword, namely καδμεία (“calamine”, a zinc oxide).⁴⁷ The same identification of *magnēsia* with *kadmeia* is also recorded in the Byzantine *Lexicon on the Making of Gold* (see above): καδμεία ἐστὶ μαγνησία, “calamine is *magnēsia*”.⁴⁸ The Syriac list also includes the Greek term *chalkitis* (2), “copper ore, vitriol”, followed by the explanation Z’G, which stems, like the Arabic *zāḡ*, from a Middle Persian term for vitriol.⁴⁹ The Byzantine MS Marcianus gr. 299 records specific alchemical signs for both  μαγνησία (*magnēsia*)⁵⁰ and  χαλκίτης (sic; i.e. *chalkitis*):⁵¹ the first one can be compared to the Syriac version, where only the Greek letter *Mu* has been transliterated as *Mīm* and turned upside down; the Syriac sign for *chalkitis* is a simple transliteration of the Greek letters *Chi* and *Tau* (combined in ), which correspond to the Syriac letters *Kāp* and *Ṭēt*. As for the term talc in the Syriac list (4), the comparison with the Byzantine tradition is not straightforward. Berthelot and Duval linked the Syriac entry to the Greek *kōmaris*, which, however, has a different sign in MS Marcianus gr. 299:  κώμαρις.⁵² The presence of the moon (☾) in this sign might point to a certain overlapping with the “moon foam” (ἀφροσέληνον),

43 Zuretti 1932: 2 (entry no. 80). See also entry no. 81,  ὄμβρια (ὕδατα), “rainwater”. We must note that a distilled ‘water’ (actually a liquid produced by distilling eggs) is given the name of “rainwater” in a chapter of Zosimus’ *Authentic Memoirs*: see Mertens 1995: 32.

44 Zuretti 1932: 1 (entry no. 15).

45 See Halleux 1981: 221–222.

46 Kazimirski 1860: vol 2, 1086. The Persian term appears more clearly in the Syriac forms  and , the first from Middle Persian terms such as *murtak*, *murdak*, and *murdag*, the second from the Farsi term *murdāsang*, “litharge”: see Ciancaglini 2008: 209.

47 Duval 1893: 331–332; Sokoloff 2009: 1373. See also the Medieval Latin *calamina* (from the *cadmia*, Latin transcription of καδμεία).

48 Berthelot/Ruelle 1887–1888: vol. 2, 9, l. 21.

49 Ciancaglini 2008: 171, s.v. .









50 Zuretti 1932: 2 (entry no. 67).

51 Zuretti 1932: 2 (entry no. 77).

52 Zuretti 1932: 3 (entry no. 134).

a substance that, as we have seen, was identified with *kōmaris* in Byzantine sources and with talc in the Syriac and Arabic traditions. Byzantine manuscripts record the following sign: ♂⊕ ἀφροσέληνον (*aphroselēnon*).⁵³

On the other hand, a closer relationship between the Syriac and the Byzantine traditions is detectable in MS Oriental 1593, which organizes the alchemical signs according to a criterion that also emerges in MS Marcianus gr. 299: signs linked to a single metal (e.g. copper) and its by-products (e.g. copper leaves, copper rust, etc.) are grouped together. For instance, in the first column of fol. 1v, the Syriac manuscript features two sets of signs, which refer to copper and lead respectively:

⁵⁴ [ⲕⲓⲁⲱ ⲱⲁⲙⲗⲱ] .ⲕⲁⲙⲗⲱ ⲕⲉⲙⲱ	
“Roasted copper (<i>nḥāšā</i>) [white copper (<i>SLQWS</i> = χαλκός?)]”	
ⲱⲁⲙⲗⲱ ⲙⲉⲛⲓ ⲕⲓⲁⲱ ⁵⁵ .ⲕⲉⲙⲱⲓ ⲕⲁⲙⲗⲱ	
“Leaf (<i>PṬL</i> = πέταλον) of copper (<i>nḥāšā</i>)”	
ⲙⲉⲛⲓ ⲕⲉⲙⲱ	
“Burnt copper (<i>nḥāšā</i>)”	
ⲕⲉⲙⲱⲓ ⲕⲁⲙⲗⲱⲉ	
“Rust of copper (<i>nḥāšā</i>)”	
⁵⁶ ⲓⲕ ⲕⲁⲙⲗⲱ	
“Iron (<i>parzlā</i>), Ares (<i>AR<YS></i> = Ἄρης)”	
⁵⁷ ⲁⲓ ⲕⲁⲙⲗⲱ	
“Leaf (<i>PṬL</i> = πέταλον) of iron (<i>p<arzlā></i>)”	
ⲕⲁⲙⲗⲱⲓ ⲕⲁⲙⲗⲱⲉ	
“Filings of iron (<i>parzlā</i>)”	
ⲕⲁⲙⲗⲱⲓ ⲕⲁⲙⲗⲱⲉ	
“Rust of iron (<i>parzlā</i>)”	

53 Zuretti 1932: 2 (entry no. 58).

54 The part in brackets has been copied above the line in the MS. The term ⲱⲁⲙⲗⲱ is not recorded in modern dictionaries: it should be interpreted as an erroneous form of ⲱⲁⲙⲗⲱ or ⲱⲁⲙⲗⲱ, two different transliterations of the Greek term χαλκός, “copper”. We must note that a similar entry (that features the same mistake) occurs in MS Egerton 709 (fol. 2r) next to the sign of copper: ⲕⲁⲙⲗⲱ ⲙⲉⲛⲓ ⲕⲓⲁⲱ ⲱⲁⲙⲗⲱ. See Berthelot/Duval 1893: 2 (where the first term is misspelled as ⲱⲁⲙⲗⲱ).

55 Between this entry and the next one, the copyist added ⲱⲁⲙⲗⲱ ⲙⲉⲛⲓ ⲕⲓⲁⲱ, “white burnt (copper?), *KLQYDWS* (= χαλκίδιον?)”. Likewise, MS Egerton 709 (fol. 2r) records the following explanation next to the sign of copper leaf: ⲱⲁⲙⲗⲱ ⲙⲉⲛⲓ ⲕⲓⲁⲱ ⲙⲉⲛⲓ ⲕⲉⲙⲱ. See Berthelot/Duval 1893: 3.

56 This is the abbreviation for ⲓⲕ. On the association between planets and metals, see below.

57 This is the abbreviation for ⲕⲁⲙⲗⲱ.

3 Loanwords and *Decknamen*

After the 12 astrological signs, the two London manuscripts add a list of 29 Greek terms along with *GWLN'R*, a Persian word explained as “pomegranate blossom” (Syr. *habābā d-rūmāne*).⁸⁰ Each foreign entry is transliterated and supplemented by a short explanation or ‘translation’ into Syriac.⁸¹ This addition is not a distinctive mark of the section on the zodiac. As discussed above, the first section on alchemical signs also features a large amount of lexical entries: in both sections, the Greek and Persian lemmas have been written with red ink, followed by their explanations in black ink.

The many lexical entries (almost 130 terms) scattered in the first folios of MSS Oriental 1593 and Egerton 709 may be interpreted, like the lists of alchemical signs, as hermeneutical tools introduced to help the readers of the alchemical texts collected in the Syriac manuscripts. These texts, indeed, make use of the same terminology and signs. On the other hand, Greek names of plants and, to a lesser extent, of minerals and animal products are common in Syriac technical literature, especially in medical treatises.⁸² Their inclusion in those sections which explain alchemical signs – and which do require ad-hoc guidelines in order to be interpreted – is somehow puzzling. Were these terms no longer understood or considered to be a kind of code names in need of explanation? In his study of Arabic alchemical *Decknamen*, Alfred Siggel tentatively included loanwords (mainly Greek or Syriac terms in transcription) among the code names used by alchemists in their treatises.⁸³ MS Gotha A 1261, for instance, organizes different Arabic *Decknamen* in six lexical tables, which also record transcriptions of Greek words in red ink along with their explanations in black ink. In table 5 of Siggel’s book, among other examples we read:⁸⁴

القياون الشب, “ἀλκυόνιον alum”;

بوريطس المرقسيتا, “πυρίτης, marcassite”.

⁸⁰ Ciancaglini 2008: 138.

⁸¹ MS Oriental 1593, fol. 2v; MS Egerton 709, fol. 3v. See Berthelot/Duval 1893: 7.

⁸² See, e.g., Gignoux 2011: 93–96; Fiori 2017: 225–227; Kessel 2017: 238–244.

⁸³ Siggel 1951: 13.

⁸⁴ Siggel 1951: 16.

The names of the same substances appear as lexical entries in the two Syriac manuscripts. The first section on alchemical signs includes the entry:

ܩܘܨܘܢܐ ܡܥܩܘܨܐ, “πυρίτης, marcassite”.⁸⁵

The term *alkyonion* is clarified in the section on zodiac signs:

ܩܘܨܐ ܩܘܨܘܢܐ ܩܘܨܘܢܐ, “άλκυόνιον, sea foam”.⁸⁶

It is clear that the term *pyritēs*, which refers to iron-copper ores, is interpreted in the same way by the Syriac and the Arabic entries, which are in line with a rich lexicographical and medical tradition: this identification is confirmed by the two Arabic translations of Dioscorides as well as by al-Rāzī, Bar Bahlūl and Bar Hebraeus to name but a few.⁸⁷ On the other hand, a different explanation is provided for the Greek term *alkyonion*, which refers to various kinds of sea sponges in Greek pharmacological treatises, such as Dioscorides’ *De materia medica* and the 11 books of Galen’s *On the Properties of Simple Drugs*.⁸⁸ The Arabic entry, in fact, does not simply translate the regular meaning of “sea sponge” into Arabic, but it seems to interpret the Greek term as a code name for alum (*al-šabb*). The Syriac entry provides a more ‘literal’ interpretation, which can be traced back to Sergius of Rēš ‘Aynā’s Syriac translation of Galen’s *On Simple Drugs*. His translation of Galen’s book 6–8 is preserved in an important and ancient witness kept at the British Library, MS Add. 14,661 (seventh century CE).⁸⁹ Even though these books deal with medical plants, Galen does mention *alkyonion* in a section of book 7 devoted to the onion (Περὶ κρομμύου).⁹⁰ In translating this passage, Sergius transliterates and glosses the Greek term (MS Add. 14,661, fol. 46r, l. 20) as follows:

ܩܘܨܐ ܩܘܨܘܢܐ ܩܘܨܘܢܐ ܩܘܨܘܢܐ, “άλκυόνιον, that is called sea foam”.

⁸⁵ MS Oriental 1593, fol. 1r; Egerton 709, fol. 2v; see Berthelot/Duval 1893: 3.

⁸⁶ MS Oriental 1593, fol. 2v; Egerton 709, fol. 3v (ܩܘܨܘܢܐ); see Berthelot/Duval 1893: 7.

⁸⁷ For a full list of the sources, see Käs 2010: vol. 2, 992–997.

⁸⁸ See Dioscorides, *De materia medica*, V 118 (ed. Wellmann 1906–1914: vol. 3, 87–88); Galen, *On Simple Drugs*, XI 2.3 (Περὶ ἀλκυονίων, ed. Kühn 1821–1833: vol. 12, 370).

⁸⁹ Furthermore, a precious witness to the Syriac translation of *On Simple Drugs*, books 6–9, has been recently identified in a privately-held palimpsest (the so-called “Syriac Galen Palimpsest”) and is currently under investigation by a team of scholars working with Peter Pormann, who is preparing a critical edition of the Syriac text: see Bhayro et al. 2013; Hawley 2014; Afif et al. 2016.

⁹⁰ Galen, *On Simple Drugs*, VII 58 (ed. Kühn 1821–1833: vol. 12, 48, l. 17).

Moreover, an epitomized version of book 9–11 has been discovered in an alchemical manuscript kept at the Cambridge University Library: MS Mm. 6.29 (fifteenth century).⁹¹ In the summary of Galen’s book 11, only a short reference to the chapter on *alkyonion* remains (fol. 128v, l. 14):

ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ ܡܘܟܘܠܘܢ, “ἀλκυόνιον, that is sea foam”.

Along with this lexical entry, the first sections of MSS Egerton 709 and Oriental 1593 include many other Greek terms which are given explanation that can be located in Sergius’ Syriac translation of *On Simple Drugs*, in particular the books 6–8, which Sergius opens with an alphabetical list of Greek plant names (in transcription) that worked as a *pinax*, or ‘table of contents’. For many names, he also provided a Syriac translation, which often coincides with the alchemical entries, some variations in the transcriptions of the Greek lemmas notwithstanding:

Lexical entries in MSS Oriental 1593 (fol. 2v) and Egerton 709 (fol. 3v)	Sergius’ translation (<i>pinakes</i>) MS Add. 14,661 (fol. 3v–4r)
ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ Βαλαύστιον, <i>rūmān Mšrīn</i> (Egyptian pomegranate)	ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ ܠܗܘܢ Βαλαύστιον, that is, <i>rūmān Mšrīn</i>
ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ Βδέλλιον, <i>mūqlā</i> (Bdellium)	ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ ܠܗܘܢ Βδέλλιον, that is, <i>mūqlā</i>
ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ Δρῦς, <i>balūṭā</i> (oak)	ܠܗܘܢ ܠܗܘܢ ܫܘܒܘܢܘܢ ܠܗܘܢ Δρῦς, that is, <i>balūṭā</i>

Lexical entries on minerals often coincide with the Galenic entries preserved in Mm. 6.29 as well, which seem to provide an epitomized version of Sergius’ translation of Galen’s *On Simple Drugs*, book 9.⁹² Two entries can exemplify these similarities:

⁹¹ Martelli 2010. The “Galen Syriac Palimpsest” represents another crucial witness to book 9 of Galen’s *On Simple Drugs*. See above, note 89.

⁹² See Bhayro et al. 2013: 144–145; Martelli 2014: 208–211.

Many of the 31 code names listed above also occur in the *Lexicon on the Making of Gold* handed down by Byzantine manuscripts (see above). This lexicon includes many entries devoted to mercury, which is given similar names. In one entry, for instance, mercury is called water of copper (ὕδωρ Ἀφροδίτης = no. 16 in the Syriac list), water of silver (ὕδωρ ἀργύρου = no. 4) and river water (ὕδωρ ποτάμιον = no. 22);¹⁰⁵ in other entries, water of lead (ὕδωρ μολίβδου = no. 26),¹⁰⁶ and juice of all trees and plants (ὄπος πάντων δένδρων καὶ βοτάνων = no. 31).¹⁰⁷ Moreover, many of these *Decknamen* also appear in the Arabic alchemical lexicon preserved in MS Sprenger 1908 as well as in its *garšūnī* version included in the second part of the two Syriac MSS Oriental 1593 and Egerton 709.¹⁰⁸

None of these code names, however, have been recorded among the terms explained in the introductory sections that open the two London manuscripts. The compilers of these sections seem to have been less interested in explaining this kind of secret names, which encapsulate and emphasize specific features of the chemical substances they secretly refer to, such as colour, odour, texture, and mechanical and ‘chemical’ properties.¹⁰⁹ Conversely, they decided to record the names of gods and planets that referred to natural substances, especially to metals, as in the list of alchemical signs discussed above. Indeed, among the lexical entries included in the first section, one finds the following terms (according to their order of appearance in MS Egerton 709, fol. 2v):¹¹⁰

- (1) ܟܪܘܢܘܨ ܘܠܘܒܝܘܨ, “Κρόνος, lead (*’abārā*)”.
- (2) ܙܝܘܨ ܘܬܝܢܘܨ ܘܬܝܢܘܨ ܟܘܨܘܨ ܘܬܝܢܘܨ ܘܬܝܢܘܨ, “Ζεύς, tin (*’ānkā*) and κασσίτερος (i.e. ‘tin’), ἤλεκτρον”.
- (3) ܟܘܪܘܨ ܘܬܝܢܘܨ, “The sun (*šemsā*) gold (*dahbā*)”.
- (4) ܟܘܪܘܨ ܘܬܝܢܘܨ, “*Srōš* (*SRWŠ*) copper (*nḥāšā*)”.
- (5) ܟܘܪܘܨ ܘܬܝܢܘܨ, “The moon (*sahrā*) silver (*si’ mā*)”.
- (6) ܙܝܘܨ ܘܬܝܢܘܨ, “Ερμής, quicksilver (*zīwag*)”.
- (7) ܟܘܪܘܨ ܘܬܝܢܘܨ, “Ἀφροδίτη, copper (*nḥāšā*)”.
- (8) ܟܘܪܘܨ ܘܬܝܢܘܨ, “Ἄρης, iron (*parzlā*)”.

The names of five Greek gods (nos. 1–2 and 6–8) – along with the sun (no. 3) and the moon (no. 5) – clearly convey an astrological meaning and must be read as referring to specific planets. Furthermore, the name of an Iranian deity, *Sraoša* (lit.

¹⁰⁵ See Berthelot/Ruelle 1887–1888: vol. 2, 14, l. 18–19.

¹⁰⁶ See Berthelot/Ruelle 1887–1888: vol. 2, 14, l. 18–19.

¹⁰⁷ See Berthelot/Ruelle 1887–1888: vol. 2, 12, l. 6.

¹⁰⁸ Ruska/Wiedemann 1924: 28–31; Ferrario 2009: 44–45. On this lexicon, see above.

¹⁰⁹ See Siggel 1951: 13–14 for this kind of *Decknamen* in Arabic. See also Halleux 1979: 116–119 (on *Decknamen* in Latin alchemical literature).

¹¹⁰ See Berthelot/Duval 1893: 3–4. The same entries are recorded in MS Oriental 1593, fol. 1r.

“obedience, discipline”), is also recorded.¹¹¹ Already mentioned in the *Avesta*, the role of this Zoroastrian deity as protector of the material world against demonic influences is emphasised in Pahlavi literature.¹¹² His middle Persian name is *Srōš*, from which the form *SRWŠ* of our alchemical list derives.¹¹³ Less clear, however, is another entry that reads:

(9) ܩܠܝܡܐ ܩܝܠܐ, “*SHYM*, iron (*parzlā*)”.¹¹⁴

The tenth-century Syriac lexicographer Bar Bahlūl confirms that a term spelled *SHWM* was used by the alchemists (*aṣḥāb al-kīmiyā*) for the iron (Syr. *parzlā*), but he does not specify the origin of the name.¹¹⁵ One might be tempted to read the Arabic root *sahama*, “to become grave” behind this form. Various terms stem from the root, such as *suhūm*, “graveness, sadness”, or *sahm*, that refers to an arrow with an iron head (and sometimes to iron itself) as well as to the zodiac sign of Sagittarius.¹¹⁶ Be that as it may, lists of Arabic *Decknamen* do include *sahīm* as a code name for iron. This form, for instance, occurs in the alchemical lexicon preserved in MS Sprenger 1908: on fol. 3v, l. 10–13, in fact, among the 18 names given to iron (*al-ḥadīd*), we also read *al-sahīm*. As already seen, this lexicon largely overlaps with a *garšūnī* alchemical dictionary included in the second part of the two London manuscripts: this dictionary lists 18 names for iron and also includes *SHYM* among them.¹¹⁷

Besides this difficult term, Greek names of planets are widely used in Arabic lexica of *Decknamen*. As mentioned above, MS Gotha A 1261 preserves six tables of code names. The first one is fully devoted to planets (fol. 16v):¹¹⁸

- (1) زحل¹¹⁹ القمرنس, “Κρόνος (*al-qrunus*) is Saturn (*zuḥal*)”.
- (2) زوس¹²⁰ مشتري, “Ζεύς (*zūs*) is Jupiter (*muštari*)”.
- (3) ارس مريخ, “Ἄρης (*aris*) is Mars (*mirriḥ*)”.
- (4) ايلیوس شمس, “Ἥλιος (*ayliyūs*) is the sun (*šams*)”.
- (5) افروديطا زهرة, “Ἀφροδίτη (*afrūdīṭā*) is Venus (*zuhara*)”.
- (6) هرمس عطارد, “Ἑρμῆς (*hirmis*) is Mercury (*uṭārid*)”.

¹¹¹ See already Duval 1893: 295–296.

¹¹² See Malandra 2014.

¹¹³ Ciancaglini 2008: 226–227.

¹¹⁴ Egerton 709, fol. 2v, l. 5; Oriental 1593, fol. 1r, l. 10; edited in Berthelot/Duval 1893: 3.8.

¹¹⁵ Duval 1888–1901: vol. 2, 1303. See also Duval 1893: 296.

¹¹⁶ See Lane 1863: 1454.

¹¹⁷ Berthelot/Duval 1893: 72 (Syriac text); 157 (translation). See also Ruska/Wiedemann 1924: 23.

¹¹⁸ Siggel 1951: 15.

¹¹⁹ The manuscript reads القمرنس, which Siggel (1951: 16) proposed to correct into القمرنس.

¹²⁰ The manuscript reads زوش, which Siggel (1951: 16) proposed to correct into زوس.

The table only includes Greek names and Arabic translations, without indicating the associated metals, which are instead recorded in a rich lexicon handed down in the same manuscript (Gotha A 1261, fol. 17v–19r).¹²¹ This section, in fact, reports long lists of *Decknamen* for eight alchemical substances, namely iron, copper, sulphur, arsenic ore (*zarnīḥ*), tin, lead, quicksilver and sal ammoniac. For every metal, both the Arabic (usually mentioned at the beginning of the entry) and the Greek names (usually at the end of the entry) are registered as code names: Mars (*mirrīḥ*) and Ares for iron, Venus (*zuhara*) and Aphrodite for copper, Jupiter (*muštari*) and Zeus (*zāwsh*, sic!)¹²² for tin, Saturn (*zuḥal*) and Kronos (*ifrūnus*, sic!)¹²³ for lead, and Mercury (*uṭārid*) and Hermes for quicksilver.¹²⁴

4 Concluding remarks

The three introductory texts that open the Syriac alchemical manuscripts Oriental 1593 and Egerton 709 challenge fixed disciplinary boundaries and stand at the crossroads of different linguistic traditions. Greek, Syriac, Persian, and Arabic terms are combined in these texts, often copied next to each other as tangible evidence of the various attempts that scholars and alchemists who worked in different, yet contiguous cultural milieus made to interpret a difficult, technical terminology. The focus seems to be on foreign names, which are listed and interpreted along with a rich set of signs drawing on the earlier alchemical and astrological traditions. Interestingly, the compilers of these sections dealt with both foreign terms and alchemical signs by applying similar patterns. In many cases, alchemical signs are followed by a two-fold interpretation, which combines a Greek term in transliteration along with its Syriac translation. Likewise, the same pattern is used to explain the lexical entries that are included in these sections: foreign terms (mainly Greek names) in transliteration are translated into Syriac or,

¹²¹ Siggel 1951: 17–18. Various versions of this lexicon (that sometimes encompass a wider set of substances) are handed down in other Arabic manuscripts, such as Dresden MS 210 (Ruska/Weidemann 1924) or British Library MS Add. 25,724 (Holmyard 1926).

¹²² Siggel 1951: 18 (l. 6); another spelling can be زاوس (*zāws*), see Siggel 1951: 11, 41.

¹²³ Siggel 1951: 18 (l. 10); another spelling can be افرونس (*ifrūnus*), see Siggel 1951: 11, 35 (l. 12).

¹²⁴ The same terms are also recorded in the lexicon of MS Sprenger 1908 and in the *garšūnī* version of the two London manuscripts. A similar pattern is adopted in Hermetic lapidaries that combine Greek and Arabic names of the seven stones associated to the seven planets; see MSS Istanbul, Aya Sofya 3610 (fol. 144v–164v) and Paris, BNF, Ar. 2775 (fol. 116v–121v) described in Raggetti 2019: 224–226 and 229.

in some cases, explained with a few sentences dealing with their identification and basic treatment.

Foreign terms as well as alchemical and astrological signs are written in red ink: the lemmas of the lexical entries seem to be equated to the signs listed in the same pages, as they were no longer words conveying an understandable meaning, but pure combinations of signs that were to be decoded. The recorded interpretations, on the other hand, largely overlap with the information kept by the medical tradition. It is not coincidental that, in MS Egerton 709, the first section is introduced by the title: “Signs, marks, shapes of the symbols that refer to medicines”. Even though only symbols are mentioned, the reference to medicines, ‘*eqārā* in Syriac (lit. “medicinal herbs”), is significant. In fact, the names of the substances used in alchemical procedures coincide to a large extent with the *materia medica* that Syriac learned physicians were called upon to interpret when they studied and translated the texts inherited from the Greek medical tradition. In a way, this attitude to look at medicine in order to better understand the alchemical terminology goes back to the earliest alchemical recipe books that came to us from the dry sand of the Graeco-Roman Egypt: the Leiden Papyrus, in fact, is closed by a set of entries taken from Dioscorides’ *De materia medica*, which was a critical source of information on hundreds of names of natural substances. Galen’s *On the Properties of Simple Drugs* played a similar role in Syriac alchemical literature: the translations that Sergius of Rēš ‘Aynā provided for the Greek names of minerals, plants, and animal products he found in the Galenic books had a strong impact on the later medical and lexicographical tradition and left their mark on our alchemical sections as well. Moreover, in these sections, the medical fragments are complemented by information concerning Greek and Persian names of planets and metals as well as zodiac signs and related substances. This variety points to the different fields of expertise that alchemists were expected to deal with in order to make sense of the texts they inherited from earlier traditions and, eventually, to put those words into deeds.

Research Funding: This publication is part of the research project *Alchemy in the Making: From Ancient Babylonia via Graeco-Roman Egypt into the Byzantine, Syriac, and Arabic Traditions*, acronym *AlchemEast*. The *AlchemEast* project has received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (G.A. 724914).

References

Manuscripts

- Berlin, Staatsbibliothek Preußischer Kulturbesitz, Orientabt., Sprenger 1908.
Cambridge, University Library, Mm. 6.29.
Gotha, Forschungsbibliothek, MS A 1261.
Istanbul, Aya Sofya, MS 3610.
London, British Library, Add. 14,661.
London, British Library, Egerton 709.
London, British Library, Oriental 1593.
Paris, Bibliothèque Nationale de France, Ar. 2275.
Rome, Biblioteca Vaticana, Vaticanus syr. 217.
Venice, Biblioteca Marciana, Marcianus gr. 299.

Printed Sources

Editions and Translations

- Andorlini, Isabella (2003): “Un anonimo del genere degli *latromathematikà*”. In: *Trasmissione e ecdotica dei testi medici greci. Atti del IV Convegno Internazionale (Parigi, 17–19 maggio 2001)*. Edited by Antonio Garzya and Jacques Jouanna. Napoli: D’Auria, 7–23.
- Beck, Lily Y. (2011): *Pedanius Dioscorides of Anazarbus, De Materia Medica*. Hildesheim/Zürich/ New York: Olms/Weidmann.
- Bailey, Kenneth C. (1929): *The Elder Pliny’s Chapters on Chemical Subjects, part. I*. London: Edward Arnold & Co.
- Bakoš, Jan (1933): *Grégoire Aboulfaradj dit Barhébraeus, Le candélabre des sanctuaires II*. Paris: Firmin-Didot.
- Berthelot, Marcellin/Duval, Rubens (1893). *La chimie au Moyen Âge, II. L’Alchimie syriaque*. Paris: Imprimerie Nationale.
- Berthelot, Marcellin/Ruelle, Charles-Émile (1887–1888): *Collection des anciens alchimistes grecs*, 3 vols. Paris: G. Steinheil.
- Caley, Earle Radcliffe (1927): “The Stockholm Papyrus: An English Translation with Brief Notes”. *Journal of Chemical Education* 4.8: 979–1002.
- Colinet, Andrée (2002): *Les alchimistes grecs. X. L’Anonyme de Zuretti ou l’Art sacrée et divin de la chrysopée par un anonyme*. Paris: Les Belles Lettres.
- Duval, Rubens (1888–1901): *Lexicon Syriacum auctore Hassano bar Bahlule*. 3 vols. Paris: Imprimerie Nationale.
- Friedrich, Hans-Veit (1968): *Thessalos von Tralles: griechisch und lateinisch*. Mesenheim am Glan: Hain.
- Halleux, Robert (1981): *Les alchimistes grecs, I. Papyrus de Leyde, Papyrus de Stockholm, Recettes*. Paris: Les Belles Lettres.

- Halleux, Robert/Schamp, Jacques (2003). *Les lapidaires grecs. Lapidaire orphique, Kérygmes lapidaires d'Orphée, Socrate et Denys, Damigéron – Évax*. Paris: Les Belles Lettres.
- Kühn, C. G. (1821–1833): *Claudii Galeni opera omnia*. 20 vols. in 22. Leipzig: Knobloch.
- Leemans, Conrad (1885): *Papyri Graeci Musei Antiquarii Publici Lugduni Batavi*. 2 vols. Leiden: Brill.
- Martelli, Matteo (2013): *The Four Books of Pseudo-Democritus*. (Ambix; vol. 60, suppl. 1). Leeds: Maney Publishing.
- Mertens, Michèle (1995): *Les alchimistes grecs, IV.1 Zosime de Panopolis, Mémoires authentiques*. Paris: Les Belles Lettres.
- Papathanassiou, Maria K. (2017): *Stephanos von Alexandria und sein alchemistisches Werk. Die kritische Edition des griechischen Textes eingeschlossen*. Athens: Cosmosware.
- PGM = *Papyri Graecae Magicae*, edited in Preisendanz 1929-1931.
- PSI = *Papiri della Società Italiana; PSI inv. 1702* edited in Andorlini 2003.
- Preisendanz, Karl (1928–1931): *Papyri Graecae Magicae. Die griechischen Zauberpapyri*. 2 vols. Leipzig und Berlin: Teubner.
- Sa'īd, al-Ḥakīm Muḥammad (1973): *Kitāb al-Ṣaidana fī l-ṭibb. Al-Bīrūnī's Book on Pharmacy and Materia Medica. Edited with English Translation*. 2 vols. Karachi: Hamdard Academy.
- Wellmann, Max (1906–1914): *Pedanii Dioscuridis Anazarbei De materia medica libri quinque*. 3 vols. Berlin: Weidmann.
- Zuretti, Carlo Oreste (1932): *Catalogue des manuscrits alchimiques grecs. VIII. Alchemistica Signa*. Bruxelles: Union Académique Internationale.

Secondary literature

- Afif, Naima et al. (2016): “Continuing Research on the Syriac Galen Palimpsest: Collaborative implementation within the framework of two European projects”. *Semitica et Classica* 9: 261–268.
- Ahlwardt, Wilhelm (1887–1899): *Die Handschriftenverzeichnisse der Königlichen Bibliothek zu Berlin. Verzeichnis der arabischen Handschriften*. 10 vols. Berlin: Asher.
- Bhayro, Siam (2017): “On the Problem of Syriac ‘Influence’ in the Transmission of Greek Science to the Arabs: The Cases of Astronomy, Philosophy, and Medicine”. *Intellectual History of the Islamicate World* 5: 211–227.
- Bhayro, Siam/Hawley, Robert (2014): “La littérature botanique et pharmaceutique en langue syriaque”. In: *Les sciences en Syriaque*. Edited by Émilie Villey. Paris: Geuthner, 285–318.
- Bhayro, Siam et al. (2013): “The Syriac Galen Palimpsest: Progress, Prospects and Problems”. *Journal of Semitic Studies* 58.1: 131–148.
- Carlson, Thomas A. (2015): “Formulaic Prose? Rhetoric and Meaning in Late Medieval Syriac Manuscript Colophons”. *Hugoye: Journal of Syriac Studies*, 18.2: 379–398.
- Ciancaglini, Claudia A. (2008): *Iranian Loanwords in Syriac*. Wiesbaden: Dr. Ludwig Reichert Verlag.
- Duval, Rubens (1893): “Notes de lexicographie syriaque et arabe”. *Journal Asiatique* n.s. 2: 290–361.
- Ferrario, Gabriele (2009): “An Arabic Dictionary of Technical Alchemical Terms: MS Sprenger 1908 of the Staatsbibliothek zu Berlin”. *Ambix* 56.1: 36–48.
- Festugière, André-Jean (1950): *La révélation d'Hermès Trismégiste. I. L'astrologie et les sciences occultes*. Paris: J. Gabalda.

- Fiori, Emiliano (2017): “A Hitherto Unknown Medical Fragment in Syriac. Evidence of Recipes and Prescriptions from the Qubbet el-Ḥazne of the Umayyad Mosque in Damascus”. *Aramaic Studies* 15.2: 200–229.
- Geller, Markham J. (2014): *Melothesia in Babylonia. Medicine, Magic and Astrology in the Ancient Near East*. Berlin/Boston: De Gruyter.
- Gignoux, Philippe (2011): *Lexique des termes de la pharmacopée syriaque*. Paris: Association pour l'avancement des études iraniennes.
- Halleux, Robert (1974): *Le problème des métaux dans la science antique*. Paris: Les Belles Lettres.
- Halleux, Robert (1979): *Les textes alchimiques*. Turnhout: Brepols.
- Hatch, William Henry Paine (1946): *An Album of Dated Syriac Manuscripts*. Boston: American Association of Arts and Sciences.
- Hawley, Robert (2014): “More Identifications in the Galen Syriac Palimpsest”. *Semitica et Classica* 7: 237–272.
- Heeßel, Nils (2008): “Astrological Medicine in Babylonia”. In: *Astro-Medicine, Astrology and Medicine, East and West*. Edited by Anna Akasoy, Charles Burnett, and Ronit Yoeli-Tlalim. Florence: Sismel Edizioni del Galluzzo, 1–22.
- Holmyard, Eric John (1926): “Abu’ l-Qāsim al-‘Irāqī”, *Isis* 8,3: 403–426.
- Käs, Fabian (2010): *Die Mineralien in der arabischen Pharmakognosie. Eine Konkordanz zur mineralischen Materia medica der klassischen arabischen Heilmittelkunde nebst überlieferungsgeschichtlichen Studien*. 2 Teile. Wiesbaden: Harrassowitz Verlag.
- Kazimirski, Albert (1860): *Dictionnaire arabe-français*. 2 vols. Paris: Maisonneuve et Cie Éditeur.
- Kessel, Grigory (2017): “A Syriac Medical *Kunnāšā* of ʾĪšōʾ bar ʾAlī (9th c.): First Soundings”. *Intellectual History of the Islamicate World* 5: 228–251.
- Kraus, Paul (1942): *Jābir Ibn Ḥayyān. Contribution à l'histoire des idées scientifiques dans l'Islam. II. Jābir et la science grecque. (Mémoires présentés à l'Institut d'Égypte; 45)*. Le Caire: Imprimerie de l'Institut français d'archéologie orientale.
- Lane, Edward William (1863): *Arabic-English Lexicon*. London: Williams & Norgate.
- Lippmann, Edmund O. von (1919): *Entstehung und Ausbreitung der Alchemie*. Vol. 1. Berlin: Springer.
- Malandra, William W. (2014): “SRAOŠA”. In *Encyclopædia Iranica*, online edition, available at <http://www.iranicaonline.org/articles/sraosa> (accessed on 21 February 2020).
- Margoliouth, George (1899): *Descriptive List of Syriac and Karshuni Manuscripts in the British Museum Acquired since 1873*. London: British Museum.
- Martelli, Matteo (2010): “Medicina e alchimia. ‘Estratti galenici’ nel Corpus degli scritti alchemici siriaci di Zosimo”. *Galenos* 4: 207–228.
- Martelli, Matteo (2014): “L’alchimie en syriaque et l’œuvre de Zosime”. In: *Les sciences en Syriaque*. Edited by Émilie Villey. Paris: Geuthner, 191–214.
- Martelli, Matteo/Valente, Stefano (2013): “Per una nuova edizione commentata di un lessico alchemico bizantino”. *Eikasmos* 24: 275–296.
- Mavroudi, Maria (2002): *A Byzantine Book on Dream Interpretation. The Oneirocriticon of Achmet and its Arabic Sources*. Leiden: Brill.
- Neugebauer, Otto/Van Hoesen, Henry Bartlett (1987): *Greek Horoscopes*. Philadelphia: The American Philosophical Society.
- Nutton, Vivian (2008): “Greek Medical Astrology and the Boundaries of Medicine”. In: *Astro-Medicine, Astrology and Medicine, East and West*. Edited by Anna Akasoy, Charles Burnett, and Ronit Yoeli-Tlalim. Florence: Sismel Edizioni del Galluzzo, 17–31.

- Пигулевская, Нина Викторовна (Pigulevskaya, Nina Viktorovna) (1979): *Культура сирийцев в средние века*. Москва: Наука (Kul'tura Syijcev v srednie veka. Moskva: Hayka).
- Raggetti, Lucia (2019): "Rolling Stones Do Gather: MS Istanbul Aya Sofya 3610 and Its Collection of Mineralogical Texts". In: *The Emergence of Multiple-Text Manuscripts*. Edited by Alessandro Bausi, Michael Friedrich, and Marilena Maniaci. Berlin: De Gruyter, 215–245.
- Reitzenstein, Richard (1919): "Zur Geschichte der Alchimie und des Mystizismus". *Nachrichten von der Königlichen Gesellschaft der Wissenschaften zu Göttingen* s.n.: 1–37.
- Rudolf, Stefanie (2018): *Syrische Astrologie und das Syrische Medizinbuch*. (*Science, Technology, and Medicine in Ancient Cultures*; 7). Berlin/Boston: De Gruyter.
- Ruska, Alfred/Wiedemann, Eilhard (1924): "Beiträge zur Geschichte der Naturwissenschaften. LXVII. Alchemistische Decknamen". *Sitzungsberichte der Physikalisch-medizinischen Sozietät zu Erlangen* 56: 17–36.
- Siggel, Alfred (1951): *Decknamen in der arabischen alchemistischen Literatur*. (Veröffentlichung, Deutsche Akademie der Wissenschaften zu Berlin, Institut für Orientforschung; 5). Berlin: Akademie Verlag.
- Sokoloff, Michael (2009): *A Syriac Lexicon. A Translation from the Latin, Correction, Expansion, and Update of C. Brockelmann's Lexicon Syriacum*. Winona Lake, Indiana/Piscataway, New Jersey: Eisenbrauns/Gorgias Press.
- Stapleton, Henry Ernest/Ḥusain, Muḥammad Hidājat/Azo, R.F. (1905): "Chemistry in 'Irāq and Persia in the Tenth Century A.D.". *Memoirs of the Royal Society of Bengal* 8.6: 317–417.
- Wright, William (1870–1872): *Catalogue of the Syriac Manuscripts in the British Museum Acquired Since the Year 1838*. 3 vols. London: British Museum.