Collana MenSALe
DOCUMENTA ET MONUMENTA

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Identità euromediterranea e paesaggi culturali del vino e dell'olio

Atti del Convegno Internazionale di Studio
promosso dall'IBAM - CNR
nell'ambito del progetto MenSALe
Potenza, 8-10 Novembre 2014

a cura di
Antonella Pellettieri

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Sommario

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Oil and Wine in Byzantine Alchemical Recipes*

Olive oil—as well as other types of oils—, wine and its residual products such as sediment are referred to as ingredients in several alchemical texts, which belong to what is widely known as the 'Greek alchemical Corpus'. This Corpus, the principal manuscripts of which date from the late tenth or early eleventh to the fifteenth century, contains various alchemical recipes in addition to texts demonstrating both the philosophical and technical character of alchemy[1]. In the present paper I shall study references to oil and wine, focusing mainly on the so-called "technical treatises" in the Berthelot and Ruelle edition of the Greek alchemical texts[2], with a view to highlighting the use of these two products in a specialized field such as alchemy.

The use of oil and wine was widespread in daily practice, and found for example in medicine and cookery. Thus, everyday sources of inspiration could have led, among other influences, to the adaptation of these materials for alchemical purposes. It should be stressed that these interactions were not unidirectional. Concerning alchemy and cookery, for instance, Mary the Jewess, an ancient major alchemical authority, being (or supposed to be) the inventor of a technique of uniform heating through a bath of hot water (instead of the direct exposure to fire), bequeathed the method not only to alchemy, but also to cooking, as revealed by the *bain-marie* or *bagno maria* technique (in French and Italian respectively)[3].

* I would like to thank Matteo Martelli, Ilias Anagnostakis, and Yannis Stoyas for their useful suggestions on subjects of their expertise.

[1] On the 'Greek alchemical Corpus', see R. Halleux, *Les textes alchimiques*, Turnhout, 1979, pp. 60-62; *Zosime de Panopolis, Mémoires authentiques*, ed. M. Mertens [Les alchimistes grecs IV/1], Paris, 1995, pp. XX-XLIII; M. Mertens, *Graeco-Egyptian Alchemy in Byzantium*, in P. Magdalino - M. Mavroudi (eds.), *The Occult Sciences in Byzantium*, Geneva, 2006, pp. 207-209, 220-224; *Pseudo-Democrito, Scritti alchemici, con il commentario di Sinesio*, ed. M. Martelli [Textes et travaux de Chrysopœia 12], Paris - Milan, 2011, pp. 3-54 [a version of this study was recently published in English: M. Martelli, *The Four Books of Pseudo-Democritus*, Leeds, 2013].

[2] *Collection des anciens alchimistes grecs* (hereafter: CAAG), ed. M. Berthelot - C.-É. Ruelle, 3 vols., Paris, 1887-1888, repr. Osnabrück, 1967, vol. II, pp. 321ff.

[3] R. Patai, *Maria the Jewess - Founding Mother of Alchemy*, in "Ambix", 29/3 (1982), p. 179; L. M.

Oil and wine were also used in various sectors of Byzantine industry, for example in metallurgy. Indeed, alchemy and the metalworking branches such as gold and silver working have interesting links. It is noteworthy that from the late tenth-century *Souda* lexicon we draw the classic Byzantine definition of alchemy, i.e. "the making of silver and gold"[4]. Hence, we could assert that for the non-specialist but educated Byzantine of the middle period alchemy's explicit purpose was *chrysopœia* ("gold-making") and *argyropœia* ("silver-making"), definitions which reflect the transmutational objectives of what the Byzantines used to call *chēmeia* (*χημεία*)[5] in a variety of spellings[6].
Alchemy's technical side, in accordance to the definition of the *Souda* lexicon, had its origins in Graeco-Roman Egypt, where the goldsmiths and metalworkers mastered dyeing techniques for the imitation of gold and silver, various techniques for the making of counterfeit gold, silver and other valuable materials, and also experimented on the production of alloys[7]. It is noteworthy that these techniques were passed on orally from generation to generation and usually predated their appearance in writing[8].
From the same entry concerning *chēmeia* in the *Souda* lexicon we are also informed that Diocletian (284-305) ordered in Egypt the burning of books related to the making of silver and gold so that the Egyptians would not amass wealth through this 'art', and thereby become emboldened against the Romans; that is, so that they would not rebel, as they had done in the past[9]. This episode, which may have been related to Diocletian's monetary

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Principe, *The Secrets of Alchemy*, Chicago - London, 2013, pp. 15-16. On Mary the Jewess, see also J. Letrouit, *Chronologie des alchimistes grecs*, in D. Kahn - S. Matton (eds.), *Alchimie: art, histoire et mythes*. Actes du 1er colloque international de la Société d'Étude de l'Histoire de l'Alchimie (Paris, Collège de France, 14-15-16 mars 1991), Paris - Milan, 1995, pp. 20-21.

[4] *Suidae lexicon*, ed. A. Adler, 5 vols., Leipzig, 1928-1938, repr. Stuttgart, 1967-1971, vol. IV, s.v. *Χημεία* (X 280).

[5] Cfr. W. R. Newman, *Promethean Ambitions: Alchemy and the Quest to Perfect Nature*, Chicago - London, 2004, p. XIII.

[6] On the word's etymology and spelling, see R. Halleux, *Les textes alchimiques* cit., pp. 45-47.

[7] M. Mertens, *Graeco-Egyptian Alchemy* cit., p. 206.

[8] Cfr. M. K. Papathanassiou, *Metallurgy and Metalworking Techniques*, in A. E. Laiou (ed. in chief), *The Economic History of Byzantium: From the Seventh through the Fifteenth Century*, 3 vols., Washington, D.C., 2002, vol. 1, p. 126.

[9] See above n. 4. Cfr. *Suidae lexicon* cit., vol. II, s.v. *Διοκλητιανός* (Δ 1156). See also *Acta Sanctorum Julii*, vol. II, Antwerp, 1721, col. 557C; *Ioannis Antiocheni fragmenta ex Historia chronica*, ed. U. Roberto, Berlin - New York, 2005, fr. 248, p. 428,1-7 = *Ioannis Antiocheni fragmenta quae supersunt omnia*, ed. S. Mariev [Corpus Fontium Historiae Byzantinae (hereafter: CFHB) 47], Berlin - New York, 2008, fr. 191, p. 348,2-8; *Excerpta de virtutibus et vitiis*, Pars 1, ed. Th. Büttner-Wobst - A. G. Roos, Berlin, 1906, *John of Antioch*, fr. 52 (165), p. 196,3-10.

reform[10], is revealing about the potential danger which alchemy's products posed to the Roman state and its successors[11]. If alchemical techniques were actually capable of producing real gold employed in coin production, then the state could face monetary, economic, and political instability due to the increased amount of gold and the subsequent decrease in its value. If, on the other hand, the produced gold was fake (something more likely), this could lead to monetary debasement and Gresham's Law incidents, given that once the circulation of counterfeit coins became known, people would most probably hoard their proper gold ones[12]. The result would also be instability.

For the Byzantines, as was the case with the Romans, the making of silver and gold through alchemy was possible in theory. It should be noted that the knowledge of specific metalwork and jewellery techniques was necessary not only for the production of genuine precious objects but also for imitations. The making of imitation precious metals in practice reveals a close relationship between alchemy and common techniques in the industrial production of luxury goods in Byzantium. Furthermore, these techniques reveal a particular conception of authenticity and the decisive role that color played in its pursuit. What was sought in many alchemical recipes was not for the produced material to be genuine, but similar in appearance—something mainly determined by color—so that it looked like genuine[13].

In this context, references to oil and wine are found in several alchemical texts. As mentioned above, in this study I will examine first some indicative mentions to oil and then the relevant ones to wine, found in the "technical treatises" of the Berthelot and Ruelle edition. However, it should be noted once again that the Byzantine alchemical tradition is not restricted to these technical texts but also includes more theoretical ones.

In Marc. gr. 299, the oldest manuscript of the 'Greek alchemical Corpus'

[10] For the historical background of this episode, see L. M. Principe, *Secrets of Alchemy* cit., pp. 22-23. On Diocletian's monetary reform, see C. H. V. Sutherland, *Diocletian's Reform of the Coinage: A Chronological Note*, in "Journal of Roman Studies", 45/1-2 (1955), pp. 116-118; M. F. Hendy, *Studies in the Byzantine Monetary Economy, c. 300-1450*, Cambridge, 1985, pp. 449-462; K. W. Harl, *Coinage in the Roman Economy, 300 B.C. to A.D. 700*, Baltimore, MD, 1996, pp. 148ff.

[11] On the following approach, cfr. L. M. Principe, *Secrets of Alchemy* cit., p. 61.

[12] On Gresham's Law, especially in connection with coin finds, see M. Asolati - G. Gorini (eds.), *I ritrovamenti monetali e la legge di Gresham*. Atti del III Congresso internazionale di numismatica e di storia monetaria (Padova, 28-29 ottobre 2005), Padova, 2006. This volume also contains a re-edition of the paper of R. Mundell, *Uses and Abuses of Gresham's Law in the History of Money*, which corrects the common expression that summarizes Gresham's Law 'bad money drives out good' into 'cheap money drives out dear, if they exchange for the same price' (in *ibid.*, pp. 195-222, esp. 200-203).

[13] L. James, *Light and Colour in Byzantine Art*, Oxford, 1996, pp. 43, 46.

dated in the late tenth or early eleventh century[14], one can find a very interesting text on how to make hollow molds (*φούρμας*)[15]— which are executed in negative relief (negative modeling is similar to the 'intaglio' technique)— as well as 'lumps' (*τύλους*), that is casts. Both hollow molds and 'lumps' are to be made of bronze (*ἀπὸ βροντησίου*)[16], and can be used for the imitation of any gold coin (*λαβὼν νόμισμα οἷον θέλεις*). This technique could be used for producing counterfeit coins very similar to genuine ones. The text provides instructions for the dyeing of the flans (*φάκια*, i.e. the lenticular discs, shaped like a biconvex lens). The use of oil is mentioned on two occasions. First, at the beginning of the process, when the (negative) impression (*ἐκτύπωμα*) of the coin is taken using common sulfur: the coin must be anointed with oil, probably both to facilitate the detachment and to provide a better texture for the impression of the coin. The second case of oil use occurs at the end of the process; after the flans are colored with the golden dye—and as a last step—the craftsman must put oil in his hands and rub the flans, most probably as a means of polishing and glittering the final product[17].

Codex Marc. gr. 299 also contains an invaluable text providing several details on matters of organization, techniques, materials used, and terminology concerning a workshop (probably that of a goldsmith). The text begins by distinguishing between various kinds of lead employed in metal alloys[18]. In the context of a certain technique of making alloys of copper and silver—presumably for the production of coins—it is mentioned that four pounds of oil are required for the molds[19].

Another allusion to oil occurs in the same text, when it is stated that—in order for a pound (*λίτρα*) of gold (supposedly approx. 319 grams, given the

[14] On this manuscript, see H. D. Saffrey, *Historique et description du manuscrit alchimique de Venise* Marcianus Graecus *299*, in D. Kahn - S. Matton (eds.), *Alchimie* cit., pp. 1-10.

[15] On the term *φούρμα*, see *Pseudo-Democrito* cit., pp. 133-134 and n. 59; G. Merianos - S. Sakorrafou, *Μαρτυρίες περί αλχημείας στο Βυζάντιο σε μη αλχημικά κείμενα*, in Eir. Mergoupi-Savaidou et al. (eds.), *Επιστήμη και Τεχνολογία. Ιστορικές και ιστοριογραφικές μελέτες*, Athens, 2013, p. 52 and n. 30.

[16] On the term *βροντήσιον*, see E. Trapp et al., *Lexikon zur byzantinischen Gräzität, besonders des 9.-12. Jahrhunderts*, 1 (A-K), Vienna, 2001, s.v. *βροντήσιον*; M. K. Papathanassiou, *Metallurgy* cit., p. 123 n. 14; *Pseudo-Democrito* cit., p. 134 n. 60.

[17] CAAG cit., vol. II, pp. 375,9-377,6. Cfr. M. K. Papathanassiou, *Metallurgy* cit., pp. 123-124.

[18] CAAG cit., vol. II, p. 377,8-16. Generally on the text, see M. K. Papathanassiou, *Metallurgy* cit., pp. 124-126.

[19] CAAG cit., vol. II, pp. 377,17-378,3.

manuscript's dating)[20] to produce 72 coins of the finest gold (*εὔρυζον*, cfr. *ὄβρυζον*)[21]—the whole process of flan making requires, among other materials (e.g., Cypriot copper and coals), a *xestēs* (*ξέστης*)[22] of oil[23]. Having in mind the previous text on the creation of molds, this quantity of oil was probably used for the better impression of the coin types and, at a later stage, for polishing.

References to oil are of course not restricted to the above examples. For instance, oil is used in the treatment (*οἰκονομία*) of lead[24], the production of emeralds[25], the cleansing and polishing of pearls[26], and the making of silver[27]. The use of oil in various stages of the alchemical process and in different ways—e.g., dipping various substances in oil, which is sometimes used as a dissolvent, or sprinkling oil upon them—shows that it was used mainly as an adjuvant for several alchemical techniques[28].

However, whenever 'oil' is mentioned in these "technical treatises" it does not always refer to olive oil. Usually oil without any other designation is olive oil (or when it is combined with the adjective "ordinary" [*κοινόν*])[29], while other kinds of oils are accompanied by an adjective denoting the material from which the oil derived. Indicatively, the reader can come across: "sesame oil" (*ἔλαιον … σησάμινον*)[30], "pine oil" (*ἔλαιον δᾴδινον*)[31], "natron

[20] E. Schilbach, *Byzantinische Metrologie*, Munich, 1970, pp. 166-168; C. Entwistle, *Byzantine Weights*, in A. E. Laiou (ed. in chief), *Economic History of Byzantium* cit., vol. 2, p. 611.

[21] On the term *ὄβρυζον*, see for instance M. F. Hendy, *Studies* cit., pp. 249, 350ff., 387 n. 64; R. Halleux, *Méthodes d'essai et d'affinage des alliages aurifères dans l'Antiquité et au Moyen Age*, in C. Morrisson et al., *L'or monnayé, I: Purification et altérations de Rome à Byzance*, Paris, 1985, p. 48.

[22] *Xestēs* is the Greek equivalent to *sextarius*, and is sometimes translated as "pint". In the classical world a *xestēs* was equal to approx. 540 ml. (W. F. Richardson, *Numbering and Measuring in the Classical World*, rev. ed. Bristol, 2004, par. 10.6, p. 42). On the Byzantine use of this measurement unit, see E. Schilbach, *Byzantinische Metrologie* cit., pp. 115, 119-120, and also 153-154; cfr. T. M. Hickey, *Wine, Wealth, and the State in Late Antique Egypt: The House of Apion at Oxyrhynchus*, Ann Arbor, MI, 2012, p. 194 and n. 14.

[23] *CAAG* cit., vol. II, pp. 378,18-379,2. On the "pound of gold" and the "*xestēs* of oil" it is imperative to consult the app. crit.

[24] *Ibid.*, p. 359,18-23.

[25] *Ibid.*, p. 362,20-23.

[26] *Ibid.*, p. 368,1-10.

[27] *Ibid.*, p. 389,12-17.

[28] Cfr. *L'Anonyme de Zuretti ou l'Art sacré et divin de la chrysopée par un anonyme*, ed. A. Colinet [Les alchimistes grecs X], Paris, 2000, p. 115,7-13.

[29] See for instance *CAAG* cit., vol. II, p. 346,4-5.

[30] *Ibid.*

[31] *Ibid.*, p. 360,22.

oil" (*νιτρελαίῳ*)[32], and "henna oil" (*κυπρινέλαιον*)[33]. "Spanish oil" (*ἔλαιον ἱσπανόν*) is also mentioned[34], on a rare occasion where the oil's origin is explicitly stated.

Olive oil was not in abundance in the Middle Byzantine era, and its use (particularly that of the best quality) was usually limited to the imperial palace, the upper social strata, and the Church and monasteries (especially for lighting oil lamps). The lower social strata had to make do with substitutes for olive oil or fats[35]. It is possible, however, that quantities of olive oil—if available—could have been reserved for the needs of the capital's industry[36]. This would have been crucial for metal workshops, given that some of the aforementioned techniques, which were not limited to 'alchemical' practices, employed olive oil exclusively (imagine, for example, trying to polish coins with fat)[37].

References to wine concerning the "technical treatises" in the Berthelot and

[32] *Ibid.*, p. 361,1. Cfr. also *ibid.*, pp. 38,8; 91,10; 123,5; 134,5, 12, 16, 17; 147,13; 155,10; 182,6; 450,11. Natron oil is an 'emulsion of soda and oil', according to H. G. Liddell - R. Scott - H. S. Jones, *A Greek-English Lexicon*, Oxford, 1996 (first edition 1843), s.v. *νιτρέλαιον*.

[33] CAAG cit., vol. II, p. 363,20. Cfr. H. G. Liddell - R. Scott - H. S. Jones, *Greek-English Lexicon* cit., s.vv. *κυπρινέλαιον*, *κύπρινος* (B), and *κύπρος*.

[34] CAAG cit., vol. II, p. 371,19. Cfr. H. G. Liddell - R. Scott - H. S. Jones, *Greek-English Lexicon* cit., s.v. *Ἱσπανός*.

[35] See I. Anagnostakis, *Le manger et le boire dans la Vie de saint Nil de Rossano (l'huile, le vin et la chère dans la Calabre byzantine, X^e-XI^e s.)*, as well as M. Leontsini, *Butter and Lard instead of Olive Oil? Fatty Byzantine Meals*, in the present volume. See also I. Anagnostakis, *Η ελαιοφόρος Πελοπόννησος στους μέσους βυζαντινούς χρόνους*, in *«Ο δε τόπος… ελαιοφόρος». Η παρουσία της ελιάς στην Πελοπόννησο*, Athens, 2007, pp. 63-66.

[36] For example, the guild of candlemakers (*κηρουλάριοι*) manufactured candles from olive oil, and was also responsible for the sale of inedible oil in Constantinople, which was used especially for domestic lighting purposes, as implied in the *Book of the Eparch*, ch. 11.3, 5 (*Das Eparchenbuch Leons des Weisen*, ed. J. Koder [CFHB 33], Vienna, 1991, p. 114,506-509, 513-515). See G. C. Maniatis, *The Guild-organized Candle Manufacturing Industry in Constantinople – Tenth-Twelfth Centuries*, in "Byzantinoslavica", 67 (2009), pp. 204-206, 211-212.

[37] Various references link oil to the processing of iron, and consequently to metallurgy. For example, the *Souda* lexicon mentions that iron is bathed in two ways, either in oil or in water when it is intended to become soft or hard respectively (*Suidae lexicon* cit., vol. II, s.v. *Ἐθηλύνθην* [E 323]; cfr. *ibid.*, vol. IV, s.v. *Σιδηρέαν ψυχήν* [Σ 376]). The use of oil is also attested in the manufacture of weapons such as "arrow-shooting ballistae" (*Constantine Porphyrogenitus, De administrando imperio*, 53, ed. G. Moravcsik - R. J. H. Jenkins [CFHB 1], Washington, D.C., 1967, p. 266,150-151; cfr. Ch. G. Makrypoulias, *Η πολιορκητική τέχνη των Βυζαντινών, 4ος-15ος αι.*, unpublished PhD thesis [University of Ioannina, 2011], pp. 191-194, 218-219). *Souda* also, commenting on Aristophanes, mentions the use of oil for polishing the bronze plate of a shield (*Suidae lexicon* cit., vol. III, s.v. *Κατάχει τοὔλαιον ἐν τῷ χαλκείῳ* [K 867]). For the use of olive oil as a lubricant for various mechanisms in Medieval Europe, see J. Muendel, *Friction and Lubrication in Medieval Europe: The Emergence of Olive Oil as a Superior Agent*, in "Isis", 86/3 (1995), pp. 373-393.

Ruelle edition are less frequent than those to oil. However, there are two interesting instances where we find references not to any wine, but to the celebrated Monemvasian variety[38]. The first is made in a recipe from codex Par. gr. 2327 (copied in 1478) on how to give a nice color to gilded silver:

"Take three parts of sulfur, two parts of clean Monemvasian wine lees, one part of salt, grind well, and let them boil well in water. Next, place the silver in the middle [and let it stand] for the duration of a *pater noster*. Then remove it, put it in clear cold water, and brush [it]"[39].

The lees of Monemvasian wine appear again in a variation of the aforementioned recipe[40]. The alchemical recipes in the fifteenth-century Holkh. gr. 109 edited by Colinet contain a third reference to Monemvasian wine lees concerning a silver plating method[41]. References to lees of Monemvasian wine are very interesting. Apart from the properties which the specific variety might have, we should take into account that it was one of the finest; therefore, its name was possibly a synonym for wine of the best quality, even for a by-product like lees. Furthermore, it is worth mentioning that in an alchemical context the color of an ingredient indicated its 'dyeing' ability[42]. The Monemvasian wine—especially the variety whose grapes were not sun-roasted and which was consumed within its first year—had the color of gold[43]. Finally, it is no coincidence that these references to Monemvasian

[38] On Monemvasian wine, see I. Anagnostakis (ed.), *Μονεμβάσιος οἶνος - μονοβασ(ι)ά - malvasia*, Athens, 2008. For the wine industry in Byzantium, see G. C. Maniatis, *The Byzantine Winemaking Industry*, in "Byzantion", 83 (2013), pp. 229-274.

[39] CAAG cit., vol. II, p. 329,15-19: *Περὶ τοῦ ποιῆσαι χρόαν ὡραιοτάτην εἰς ἄσημον χρυσωμένον. Ἔπαρον τιάφην μέρη γ', καὶ τρυγίαν καθαρὰν ἀπὸ Μονοβασίας μέρη β', καὶ ἅλας μέρος α', καὶ τρίψον καλῶς, ἂς βράσουν καλῶς μετὰ ὕδατος. Εἶθ' οὕτως βάλε τὸ ἄσημον μέσον ἕως ὥραν πάτερ ἡμῶν. Ἔπειτα ἔκβαλον τοῦτο, θὲς εἰς ὕδωρ ψυχρὸν καθαρόν, καὶ βούρτζισον.*

[40] *Ibid.*, p. 330,12-17. On these two references, see also I. Anagnostakis, *Ονομάτων επίσκεψη. Μονεμβάσιος οἶνος - μονοβασ(ι)ά - malvasia*, in I. Anagnostakis (ed.), *Μονεμβάσιος οἶνος* cit., pp. 107 and n. 56, 108 and n. 59.

[41] *Recettes alchimiques* (*Par. gr. 2419*; *Holkhamicus 109*) *- Cosmas le Hiéromoine*, *Chrysopée*, ed. A. Colinet [Les alchimistes grecs XI], Paris, 2010, H 34, p. 37,2.

[42] Cfr. M. Martelli, '*Divine Water*' *in the Alchemical Writings of Pseudo-Democritus*, in "Ambix", 56/1 (2009), p. 9.

[43] S. Kourakou-Dragona, *Μονοβασ(ι)ά - Malvasia. Πολύπτυχο οινικών θεμάτων*, in I. Anagnostakis (ed.), *Μονεμβάσιος οἶνος* cit., p. 440. See the relevant comment of the seventeenth-century Cretan Zuanne Papadopoli concerning the color of Monemvasian wine: *... malvasie, che il loro collore prima di ponerlo alla bocca consolava, essendo ruspido nel colore come il cechino che vien di fresco fuori dalla cecha* / '... malmsey wines, whose colour gladdened you even before you put a drop in your mouth, as they were of a soft yellow hue like a gold ducat fresh from the mint' (*Zuanne Papadopoli*, *L'occio* [*Time of Leisure*]:

wine occur in the fifteenth-century Par. gr. 2327 and not in an earlier manuscript; we should bear in mind that the first known written testimony referring to this variety is dated in 1214[44].

Nonetheless, another reference to a variety of wine shows us that, in contrast to the aforementioned recipes, a specific wine name could be copied from older works, found in manuscripts. In the anonymous so-called "Work of the Four Elements"[45], possibly dated around the twelfth century, there is a reference to "Aminean wine" (*οἶνος ἀμιναῖος*), the renowned Roman and Byzantine variety, which when aged acquired a golden hue[46]. This work, whose oldest witness is Par. gr. 2327, is actually a recipe concerning the separation of eggs into the four elements (water, air, fire, and earth) through distillation[47]. "Aminean wine" is employed as a synonym of several other terms (such as "divine oil" [*θεῖον ἔλαιον*], "cinnabar of the philosophers" [*κιννάβαρις τῶν φιλοσόφων*], "untouched sulfur" [*θεῖον ἄθικτον*], "unburnt sulfur" [*θεῖον ἄπυρον*], "realgar" [*σανδαράχην*], etc.), and denotes the 'oil' (= air) which derives from an egg once it has been macerated (*σαπῇ*) and processed with (distillatory) devices (*διοργανισθῇ*)[48]. It is noteworthy

Memories of Seventeenth-century Crete, ed. and trans. A. Vincent, Venice, 2007, pp. 132-133). Cfr. A. Vincent, *Ποικιλίες αμπέλου και είδη κρασιών στα Απομνημονεύματα του Τζουάνε Παπαδόπουλου*, in I. Anagnostakis (ed.), *Μονεμβάσιος οἶνος* cit., p. 182; S. Kourakou-Dragona, *Μονοβασ(ι)ά - Malvasia* cit., p. 437 and n. 155.

[44] I. Anagnostakis, *Ονομάτων επίσκεψη* cit., pp. 104-105, 106-107, 123.

[45] CAAG cit., vol. II, pp. 337,13-342,18.

[46] On the Aminean variety, see Virgil, *Georgicon*, 2.97ff.; Columella, *De re rustica*, 3.2.7-13; Pliny, *Naturalis historia*, 14.21-22, 41, 47, 95; *Geoponica*, 4.1.3 and 5.17, ed. H. Beckh, Leipzig, 1895. Especially on the aged Aminean wine's golden color, see Galen, *De probis pravisque alimentorum sucis = De bonis malisque sucis* (in *Claudii Galeni opera omnia*, ed. C. G. Kühn, vol. 6, Leipzig, 1823, p. 805). Cfr. I. Anagnostakis, *Βυζαντινός οινικός πολιτισμός*, Athens, 2008, pp. 38, 40.

[47] On this work, see A. Colinet, *Le Travail des quatre éléments ou lorsqu'un alchimiste byzantin s'inspire de Jabir*, in I. Draelants - A. Tihon - B. van den Abeele (eds.), *Occident et Proche-Orient: contacts scientifiques au temps des Croisades*, Actes du colloque (Louvain-la-Neuve, 24 et 25 mars 1997), Turnhout, 2000, pp. 165-190. See also CAAG cit., vol. III, pp. 322-323 n. 5, 324 n. 3. For other descriptions of egg distillation, see A. Colinet, *Le Travail* cit., p. 171. The egg is sometimes identified with the 'philosophers' stone'; see for instance, CAAG cit., vol. II, pp. 18,2-3; 20,18-21,2; 452,7-10. On egg symbolism, see M. Berthelot, *Les origines de l'alchimie*, Paris, 1885, p. 24; H. J. Sheppard, *Egg Symbolism in Alchemy*, in "Ambix", 6 (1958), pp. 140-148.

[48] CAAG cit., vol. II, p. 339,14-21, esp. lines 15-16; cfr. A. Colinet, *Le Travail* cit., p. 188. See also the reference to Aminean wine made by Synesios the alchemist (*Pseudo-Democrito* cit., p. 232,105-106 [= CAAG cit., vol. II, p. 61,3-4]: *Τοῦτο* [i.e. *ὕδωρ θεῖον*] *ὅταν σαπῇ καλεῖται ὄξος καὶ οἶνος Ἀμιναῖος καὶ τὰ ὅμοια* ["When this ('divine water') is macerated it is called vinegar, and Aminean wine, and the like"]). For the interpretation of *σαπῇ* (<*σήπω*) and *σῆψις* ("fermentation"), see *Pseudo-Democrito* cit., pp. 150-151, 420-421. On the verb *διοργανίζω*, see *ibid.*, pp. 429-430 n. 47. On Synesios and his treatise, see *ibid.*, pp. 83ff., 114ff., 148ff., and *passim*; M. Martelli, '*Divine Water*' cit., pp. 16ff.; J. Letrouit, *Chronologie* cit., p. 47.

that, given the whole list of synonyms and their strong relevance with gold color in a variety of shades, the selection of the golden Aminean wine probably coincides with this gold color imperative[49].

There are several other references to Aminean wine (in various spellings) throughout the 'Greek alchemical Corpus'. For example, in the "Alphabetical Lexicon of the *Chrysopœia*" (*Λεξικὸν κατὰ στοιχεῖον τῆς χρυσοποιίας*) we read: "Divine water[50] in the yellowing process, that is Aminean wine with celandine"[51]. Aminean wine is used here as an ingredient of the "divine water" employed for coloring gold. Zosimos of Panopolis, the renowned Graeco-Egyptian alchemical author (fl. ca. 300 A.D.)[52], states that "the water of untouched sulfur (*τὸ ὕδωρ τοῦ θείου ἀθίκτου*)[53] is composed by mixing together all fluids, and is called by the names of all fluids". In the list of various substances that he gives, Aminean wine is also recorded[54]. He seems to suggest that the "water of untouched sulfur" can be made of all fluids, including Aminean wine. In the same text Zosimos subsequently confirms the relation of this wine variety with "yellow (golden) washes" (*ξανθῶν ζωμῶν*)[55], used in the 'dyeing' process. Apart from the aforementioned as well as other references to this wine variety[56], there is one more which attests to the fact that the term 'Aminean wine' was not always used literally. In

[49] Cfr. *Pseudo-Democrito* cit., p. 421.

[50] A discussion on 'divine water' surpasses the limitations of the present paper. However, it could be generally said, with regards to practical use, that this 'water' (usually in two forms: either containing sulphur or a mixture of several substances such as lime) was mainly used in the alchemical process of 'dyeing' base metals, for the purpose of their 'transmutation' into noble ones. See F. S. Taylor, *A Survey of Greek Alchemy*, in "Journal of Hellenic Studies", 50/1 (1930), p. 131; *Zosime de Panopolis* cit., pp. 163-167; M. Martelli, '*Divine Water*' cit., pp. 5-22 (and n. 2, where further bibliography is listed); *Pseudo-Democrito* cit., pp. 318-319, 378-380, 380-381.

[51] CAAG cit., vol. II, p. 8,14: *Θεῖον ὕδωρ εἰς τὴν ξάνθωσιν ὅτι οἶνος ἀμηναῖος μετὰ ἐλνδρίου*. See also M. Martelli - S. Valente, *Per una nuova edizione commentata di un lessico alchemico bizantino*, in "Eikasmos", 24 (2013), pp. 287-288.

[52] On Zosimos, see G. Fowden, *The Egyptian Hermes: A Historical Approach to the Late Pagan Mind*, Cambridge, 1986, pp. 120-126; J. Letrouit, *Chronologie* cit., pp. 22-46; M. Mertens, *Graeco-Egyptian Alchemy* cit., pp. 209ff.; Eadem, *Zosimos of Panopolis*, in N. Koertge (ed. in chief), *New Dictionary of Scientific Biography*, vol. 7, Detroit, MI, 2008, pp. 405-408 (where further bibliography is listed).

[53] According to Martelli's reading of the relevant manuscripts ('*Divine Water*' cit., p. 9). Cfr. CAAG cit., vol. II, p. 184,2, where *ἀθίκτου* is omitted.

[54] M. Martelli, '*Divine Water*' cit., p. 9. Cfr. CAAG cit., vol. II, p. 184,2-17.

[55] CAAG cit., vol. II, pp. 184,19-185,1; cfr. *ibid.*, p. 193,19. Besides Zosimos, cfr. also CAAG cit., vol. II, p. 19,10-12: *Τὸ δὲ ξανθὸν ὕδωρ λέγουσιν ... οἶνον ἀμηναῖον* ["The yellow water is called ... Aminean wine"].

[56] *Pseudo-Democrito* cit., p. 200,186 (= CAAG cit., vol. II, p. 48,4-5). Cfr. CAAG cit., vol. II, p. 264,13-14.

an alchemical handbook under the name of Moses[57] a mix of various substances is described, which after sealed in a jar must be simmered in watery horse manure, until it becomes 'Aminean wine'[58]. Apparently, the term is employed here in a metaphorical sense, meaning that the liquid extracted would resemble Aminean wine[59], mostly in terms of color. It seems to be a *Deckname*, i.e. a "cover name"[60].

We have seen that the term 'Aminean wine' was employed by ancient alchemical authors quite often. However, after the seventh century, apart from some texts like the *Geoponika*, which reflect the reality of agronomists in antiquity, Middle Byzantine references to this wine variety do not convey contemporary reality[61]. It is thus evident that the term 'Aminean wine' in the "Work of the Four Elements" is excerpted from an older manuscript tradition[62].

Another—rather amusing and non technical—case of wine use concerns a recipe on how to stay awake by boiling the testicles of a hare in good wine and then drinking it[63]. This method is reminiscent of recipes that address daily needs, found since ancient times, for example, in Pliny the Elder and in the *Geoponika*[64]. Concerning especially the use of a hare (to be precise certain of its bodily parts), it cannot escape notice that hares were considered to sleep with their eyes open[65], something which could have contributed to the selection of this animal in a tradition of sleep-reducing recipes, perhaps simulating open-eye sleeping with light sleep or no sleep at all. As for wine, some varieties were held to possess extraordinary properties—also regard-

[57] See M. Martelli, '*Divine Water*' cit., pp. 17-18; *Pseudo-Democrito* cit., pp. 86-90 and *passim*.

[58] CAAG cit., vol. II, pp. 301,25-302,2: *Λαβὼν ὑδράργυρον παγεῖσαν, λείωσον σὺν ἅλατος ἀμμωνιακοῦ, καὶ χαλκὸν κεκαυμένον, καὶ χάλκανθον ἐξ ἴσου· βάλε εἰς ῥογήν, καὶ πωμώσας καλῶς, καῦσον ἐν ὑγρῷ κόπρου ἱππείας, ἕως οὗ γένηται οἶνος ἀμιναῖος*.

[59] Cfr. CAAG cit., vol. III, p. 289 n. 3.

[60] On *Decknamen* see for instance B. Vickers, *The Discrepancy between* res *and* verba *in Greek Alchemy*, in Z. R. W. M. von Martels (ed.), *Alchemy Revisited*, Proceedings of the International Conference on the History of Alchemy at the University of Groningen (17-19 April 1989), Leiden, 1990, pp. 21-33; L. M. Principe, *Secrets of Alchemy* cit., pp. 17-18.

[61] J. Lefort, *The Rural Economy, Seventh-Twelfth Centuries*, in A. E. Laiou (ed. in chief), *Economic History of Byzantium* cit., vol. 1, p. 249; I. Anagnostakis, *Noms de vignes et de raisins et techniques de vinification à Byzance. Continuité et rupture avec la viticulture de l'antiquité tardive*, in "Food & History", 11/2 (2013), pp. 35-59.

[62] Cfr. A. Colinet, *Le Travail* cit., p. 167.

[63] CAAG cit., vol. II, p. 389,9-10: *ἕψησον τοῦ λαγωοῦ τὰ ὀρχίδια μετὰ οἴνου καλλίστου καὶ αὐτὸ ποίει, καὶ οὐ μὴ κοιμᾶται*.

[64] Concerning sleep induction or reduction, see indicatively Pliny cit., 18.118, 19.126, 20.56, and particularly 30.140; *Geoponica* cit., 12.13.2, 6, 7, 15; 12.17.15.

[65] E.g., Pliny cit., 11.147.

ing sleep—since antiquity. Pliny, once again, informs us that the people of Thasos were said to produce two different kinds of wine, one that brought sleep and another that prevented it[66].

All references to wine given above are merely indicative, and their importance lies mainly in the fact that they mention certain wine varieties. However, questions arise concerning the vague references to the use of wine in these "technical treatises". If, for example, we would compare the references to wine in the *Anonymous of Zuretti*, we would notice more detailed descriptions such as references to red and to white wine (or their by-products), or to "old sour wine" (*οἴνου παλαιοῦ ὀξίνου*)[67]. Although this work can hardly be described as Byzantine, it was written in southern Italy in Greek (ca. 1300), and addressed to a Greek-speaking audience. Its sources were in the main part Latin, including translations from Arabic, however, the author also used, though to a much lesser degree, Greek works[68]. Even though the comparison between a Greek collection of recipes and a mostly Latin-influenced work can seem arbitrary, it does allow us to pose questions concerning the terminology used by Greek and Latin alchemical authors as well as their knowledge of specific wine properties.

In conclusion, the use of oil and wine, as found in certain Byzantine alchemical texts, varies and is not necessarily specifically designated. On one hand, the role of oil in certain stages of the alchemical process is diverse but nevertheless essential. In fact, oil is irreplaceable in some processes. On the other hand, wine varieties, when mentioned, are of the finest quality. This seems to imply knowledge of specific properties lacking in less fine varieties. The golden color of fine quality wines also seems to play a decisive role in employing them. It is also interesting that references of later authors to the use of Monemvasian wine in recipes bring to mind references made by ancient authors to the use of Aminean wine. This suggests that perhaps the best wine varieties of different eras were employed in alchemical practices. Finally, references to oil and wine in a technical context illustrate the interaction between alchemy, various industrial sectors and everyday practices, showing that alchemical techniques could hardly be characterized as marginal.

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[66] Pliny cit., 14.117.

[67] *L'Anonyme de Zuretti* cit., red wine: pp. 146,9-10; 187,9; white wine: pp. 46,19; 143,16-17; 146,15; 148,26 (cfr. also white wine vinegar: pp. 31,16; 41,20-21); old sour wine: p. 151,10-11. This work also contains a chapter dedicated to oils, apart from references *passim* (*ibid.*, ch. 81, pp. 142,21-143,24).

[68] *Ibid.*, *Introduction*, esp. pp. XXXVII-LXVII, LXXXIV-LXXXVI, XCI-XCIII; A. Colinet, *L'Anonyme de Zuretti. Un traité alchimique italo-grec de 1300*, in C. Viano (ed.), *L'alchimie et ses racines philosophiques. La tradition grecque et la tradition arabe*, Paris, 2005, pp. 135-140.

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