# The Christianity of the Philosopher Christianos. Ethics and Mathematics in Alchemical Methodology*

## El Cristianismo del filósofo Christianos. Ética y matemáticas en la metodología alquímica

**Gerasimos Merianos**
National Hellenic Research Foundation, Athens
gmerianos@eie.gr

### Abstract

The alchemical philosopher "Christianos" (late 6th [?] – 8th cent. CE) demonstrates that alchemical knowledge is a gift of God and describes the virtues that a philosopher-alchemist must possess to receive it. These and other Christian elements should not be considered as a Christian gloss on alchemical ideas. As a result of his exposure to the Neoplatonic mathematization of philosophical ideas, Christianos develops a precise method for defining and classifying alchemical productions on a mathematical basis. This math-

### Resumen

El filósofo alquímico "Christianos" (finales del siglo VI [?] – VIII d.C.) demuestra que el conocimiento alquímico es un don de Dios y describe las virtudes que un filósofo-alquimista debe poseer para recibirlo. Estos y otros elementos cristianos no deberían considerarse como una glosa cristiana sobre las ideas alquímicas. Como resultado de su exposición a la matematización neoplatónica de las ideas filosóficas, Christianos desarrolla un método preciso para definir y clasificar los elementos alquímicos sobre una base

* I am thankful to Jean Christianidis, Doru Costache, Eudoxia Delli, Marina Koumanoudi, Nikolaos Livanos, and Zisis Melissakis for their helpful comments and our fruitful discussions during the writing of this article, as well as the two anonymous reviewers for their valuable remarks and suggestions.

ematization intends to legitimize alchemy as a licit philosophical field, by presenting it as sharing similar traits with the sciences of the quadrivium. Christianos appears to have regarded this mathematical approach as a path illuminated by God through which a worthy philosopher-alchemist could partake in divine knowledge. The virtuous conduct and the mathematical method serve as two intertwined prerequisites in the pursuit of alchemical knowledge, facilitating at the same time the demarcation between true and false pursuers of knowledge.

matemática. Esta matematización pretende legitimar la alquimia como un campo filosófico lícito, presentándola con rasgos similares a las ciencias del quadrivium. Christianos parece haber considerado este enfoque matemático como un camino iluminado por Dios a través del cual un digno filósofo-alquimista podría participar en el conocimiento divino. La conducta virtuosa y el método matemático sirven como dos prerrequisitos entrelazados en la búsqueda del conocimiento alquímico, facilitando al mismo tiempo la demarcación entre verdaderos y falsos perseguidores del conocimiento.

KEYWORDS

Alchemical Methodology; Alchemical Oath; Alchemy; Byzantium; Christianity; Christianos the Philosopher; *Donum dei*; Egg in Alchemy; Ethics; Mathematics; Maximos the Confessor; Neoplatonism; Pappos the Alchemist; Participation in Divine Knowledge; Philosopher; Philosophy; Proclus; Quadrivium; Religion

PALABRAS CLAVE

Alquimia; Bizancio; Cristiandad; Christianos el filósofo; Cuadrivio; *Donum dei*; Ética; Filosofía; Filósofo; Huevo en alquimia; Juramento alquímico; Matemáticas; Máximo el Confesor; Metodología alquímica; Neoplatonismo; Pappos el alquimista; Participación en el conocimiento divino; Proclo; Religión

Fecha de recepción: 18/02/2022 Fecha de aceptación: 22/06/2022

## 1. The Name "Christianos"

One of the most significant but less-studied authors for understanding the evolution of Byzantine alchemical thinking is the obscure philosopher and commentator called Christianos (Χριστιανός), that is, "Christian", in the Greek alchemical corpus.[1] Our knowledge concerning this author remains particularly limited and even his very name raises questions. At first glance, it would be plausible to assume that "Christianos" is a proper name after the homonymous saint.[2] Nevertheless, the evident scarcity of references to persons of this name supports its oddity and rarity in the Middle Byzantine period.[3] Furthermore, in the table of contents of **M** (second half of the 10th cent.),[4] the oldest known codex of the Greek alchemical corpus, as well as inside the manuscript itself, his name is accompanied by the article τοῦ (τοῦ Χριστιανοῦ), which is typically rendered as "the".[5] This means that the form τοῦ Χριστιανοῦ is used as an epithet. These remarks, along with the fact that no other author's name in the table of contents is preceded by an article when it is mentioned for the first time, in all likelihood, confirm that he was an anonymous philosopher, designated as "the Christian", rather than named "Christian". Accordingly, in modern English literature,

1. For the three manuscripts that appear often in this paper, the following established sigla are used: Marc. gr. 299 = **M**; Par. gr. 2325 = **B**; Par. gr. 2327 = **A**.

2. *AASS Maii* V, May 24, pp. 446-449.

3. See, for example, the sole entry in the *Prosopographie der mittelbyzantinischen Zeit* on a person ambiguously named Christianos: Lilie *et al.*, 2013. It is also notable that in the brief vita of saint Christianos in the 10th-cent. *Synaxarium ecclesiae Constantinopolitanae*, May 24 (ed. Delehaye, 1902, col. 706), the unknown author finds the saint's name unusual: […] καὶ Χριστιανὸς οὕτω καλούμενος […].

4. For the dating of **M**, see Roberts, 2020, pp. 11-25, 35; cf. Pérez Martín, 2017, p. 45, n. 36. See also Saffrey, 1981, p. xiv; Mavroudi, 2002, p. 107 and n. 50.

5. **M**, ff. 2v, 110r, 121r; cf. 101r.

the name is often rendered with a multiplicity of forms, such as "the Christian" or "the Christian Philosopher",[6] which closely correspond to the form of his name as it appears in manuscripts. However, there is seldom an explicit explanation, like the one given above, as to why such forms are preferred to render this author's name in certain modern languages. Having exposed, and being aware of, the issues arising from the author's name, I will refer to him conventionally as Christianos, due to the conciseness of this form and its close resemblance to the original Greek word.

The vague naming of an author as "Christianos" is not unprecedented in Byzantine literature. For example, the authorship of the mid-6th-cent. *Christian Topography* is traditionally attributed to Kosmas Indikopleustes, that is, "Kosmas, who sailed to India". However, the name of the author is not mentioned in the treatise; he is only designated as "a Christian" (Χριστιανός).[7] It is noteworthy that patriarch Photios (858-867, 877-886) still considered him anonymous in the 9th cent., describing *Christian Topography* in his *Bibliotheke* (or *Myriobiblos*) as "a book of a Christian, a commentary on the Octateuch".[8] It was not until the 11th cent. that the name "Kosmas" began to appear: in codex Laur. Plut. IX 28, f. 20v, as well as in commentaries on the Gospels and the Psalms that quote the treatise.[9] Nevertheless, the author's designation as "a Christian" is consistent with the title of the work, characterized as *Christian* too. As the treatise is deemed a true Christian topography that opposes pagan or "pseudo-Christian" treatises, so too its author is presented primarily as a (true) Christian, opposing those (false) Christians that adhere to classical theories on the universe and accept a spherical cosmology.[10]

The case of the anonymous author of the *Christian Topography* raises interesting parallels with the designation of the alchemical writer Christianos. Regardless

6. *E.g.* "the Christian" in Mertens, 2006 and Roberts, 2019; "the Christian Philosopher" in Viano, 2018.

7. Kosmas Indikopleustes, *Christian Topography*, Pinax 3, ed. Wolska-Conus, 1968-1973, I, p. 261; V 257, vol. II, p. 373; VII 1, vol. III, p. 57; VII 96-97, vol. III, pp. 165-167; VIII 31, vol. III, p. 201. For the identification of "Kosmas" with Constantine of Antioch, see the discussion in Kominko, 2013, pp. 11-12.

8. Photios, *Bibliotheke*, cod. 36, ed. Henry, 1959, p. 21, 7-8: Ἀνεγνώσθη βιβλίον, οὗ ἡ ἐπιγραφὴ Χριστιανοῦ βίβλος ἑρμηνεία εἰς τὴν ὀκτάτευχον. See also Schamp, 1987, pp. 229-230.

9. Wolska-Conus, 1968-1973, I, pp. 15-16, 59-61, 109-115; Kominko, 2013, p. 10.

10. Wolska-Conus, 1968-1973, I, pp. 16, 37; Kominko, 2013, p. 23. The *Christian Topography*, having adopted a literal interpretation of the Bible, proposes that the world has the form of Moses' Tabernacle (a vaulted chest). This was not the standard Christian understanding of the world in this period. John Philoponos (*ca.* 495-568) disputed such views and provided a Christian model of an Aristotelian conception of the universe, supporting a spherical cosmology. For a concise exposition of this conflict, see Tihon, 2017, pp. 184-185.

of whether Christianos chose or not to be anonymous, whoever (probably a copyist or a compiler) first gave him the epithet "Christianos" was most likely prompted by the distinct and extensive Christian traits in this author's treatises. Does this suffice to interpret his naming? As mentioned above, the *Christian Topography* aimed to present a "truly" Christian worldview, as opposed to pagan or "false" Christian ones. Similarly, perhaps the anonymous alchemical philosopher was named Christianos since his work was considered to present a truly Christian view of alchemy compared to other treatises in the alchemical corpus, which were pagan or dubiously Christian.[11] Additionally, we may take into account the possibility that this author could have been labeled "Christian" in contrast to alchemical authors that were Muslims,[12] a hypothesis based on the evidence of Byzantine engagement with early Arabic alchemy.[13] Yet, the crucial factor for assessing such an assumption is the dating of the author, which will be discussed below.

## 2. Dating Christianos

Christianos is broadly dated from the 6th to the 8th cent.[14] So far, the allusions that one can draw from his work are inconclusive and do not allow us to situate him within a specific chronological period. For example, Christianos addresses a certain Sergios in his work,[15] whom Marcellin Berthelot identified as Sergios of Rešʿaynā (d. 536),[16] the renowned translator of Greek medical, philosophical, and theological texts into

11. To convincingly claim that some texts could have given the impression of being "dubiously Christian", one would have to study the Christian ideas expressed in several works of the Greek alchemical corpus that predate or are nearly contemporary to the ones by Christianos. However, it would still be hard to discern with certainty which texts might have appeared as "dubiously Christian" to someone who would have compared them with Christianos' "true" Christian ones. In effect, one should be able in theory not only to examine the type of "Christianity" of such texts but also that of whoever labeled our author as "Christianos". Nevertheless, though it seems difficult to prove the above through particular texts, it is not implausible; yet, this would be the subject of a different study.

12. I acknowledge Olivier Dufault for this suggestion.

13. On Arabic influence on Byzantine alchemy, see Colinet, 2000; Mavroudi, 2002, pp. 400-403; Roberts, 2022.

14. *E.g.* von Lippmann (1919, p. 102) dates him to the 6th cent. or later; Festugière (1944, p. 240) to the 7th; Halleux (1979, p. 62) to the 6th (provided that Christianos indeed refers to Sergios of Rešʿaynā; see below, nn. 15-16); Letrouit (1995, p. 62) and Mertens (2006, p. 209) to the 7th-8th cent.; while Viano (2018, p. 945) between the 6th-8th cent.

15. *CAAG* II, p. 399, 16: Ὁ περὶ τοῦ θείου ὕδατος λόγος, βέλτιστε Σέργιε […].

16. Berthelot, 1885, p. 205.

Syriac. On the other hand, Henri Dominique Saffrey deemed that the said Sergios could probably be identified as Sergios I, patriarch of Constantinople (610-638).[17]

Additionally, Jean Letrouit's attention was drawn by a reference made by Christianos to the dyestuff called λαχὰ(ς) ("lac dye"),[18] extracted from the secretions produced by the scale insect *Kerria lacca* Kerr, which is native to India and Southeast Asia. Letrouit built on this reference to date Christianos' work to the 7th-8th cent., since, according to Rodolphe Pfister,[19] this dye had not been attested in Egypt before the Arab conquest; therefore, Christianos' knowledge concerning the treatment of the insect's secretions could not have been from an earlier time. Letrouit further employed this argument to refute the identification of the aforementioned Sergios with either Sergios of Rešʿaynā or the patriarch Sergios I.[20] Yet, things are not so straightforward: pseudo-Demokritos already mentions the ingredient λακχὰς in the 1st cent. CE.[21] Furthermore, a recent paper describes the investigation of a purple pigment on a 3rd-cent. BCE *oinochoē* from Canosa di Puglia (now in the British Museum), during which, an example of a mixture of red colorants from plants and insects was discovered. The examined samples also contained markers for insect-derived colorants from lac (*Kerria lacca* Kerr), making this the first recognized evidence for the use of lac dye on an object from Classical Antiquity.[22]

Moreover, Berthelot reluctantly mentioned that Christianos, in a text attributed to him, has referred to Stephanos of Alexandria (7th cent.), information repeated by Saffrey,[23] which could have been a piece of crucial evidence for dating Christianos. However, Letrouit observed that the text containing the reference to Stephanos was not written by Christianos.[24] Indeed, this text comprises one of the *Chapters to Eusebeia*, attributed to Zosimos of Panopolis (late 3rd or 4th cent.), which Michèle Mertens

17. Saffrey, 1995, p. 6.

18. *CAAG* II, p. 418, 21-22: ὥσπερ δὲ χοοποιηθεὶς ὅ ἐστιν λάχιον ὃ καλοῦσιν λαχὰν οἱ λαχωταί, τουτέστιν οἱ ἰνδικοβάφοι.

19. Pfister, 1936.

20. Letrouit, 1995, p. 62.

21. Pseudo-Demokritos, *On the Making of Purple and Gold: Natural and Secret Questions* 1, 16 – 2, 29, ed. Martelli, 2013, pp. 78-80; see the commentary on the term λακχὰ(ς) that also includes reference to Christianos at pp. 205-206, n. 3. Cf. Dyer, Tamburini & Sotiropoulou, 2018, p. 130.

22. Dyer, Tamburini & Sotiropoulou, 2018. According to Gulmini *et al.* (2017, p. 495), Indian lac dye was also detected in certain textiles from the Coptic textile collection of the Museo Egizio (Turin), which are attributed to the "Roman-Byzantine or Byzantine periods". This suggests that Indian lac was possibly already in use in Egypt during the late Roman and the Byzantine periods.

23. *CAAG* III, p. 379; Saffrey, 1981, p. xiv.

24. Letrouit, 1995, p. 62.

has described as a collection of excerpts on various subjects from Zosimean works. That this was the work of a compiler is also attested by the fact that these chapters contain scattered quotations and references to authors post Zosimos, such as Stephanos of Alexandria.[25]

Berthelot observed that the compilation method of Christianos' work follows the general system adopted by the Byzantines "from the 8th to the 10th centuries", consisting in drawing extracts and summaries from ancient authors. Berthelot mentioned indicatively the works of patriarch Photios and emperor Constantine VII Porphyrogennetos (945-959).[26] Obviously, Berthelot alluded to the phenomenon still widely known as "encyclopedism", a term first applied in the Byzantine literary culture of the 10th cent. by Paul Lemerle in 1971.[27] However, Berthelot's argument suggests that the period from the 8th to the 10th cent. shares the same features. His remarks are consistent with the late-19th-cent. state of knowledge about a phenomenon that was not understood then as much as it is today. Even Lemerle's notion of Byzantine "encyclopedism" has been challenged by Paolo Odorico, who proposed instead the term "cultura della συλλογή",[28] which could be rendered as the "florilegic habit"[29] or "florilegic culture".[30] Nonetheless, Berthelot's comment helps us realize that, although the concentration of collecting and compiling projects reached an unparalleled pinnacle in the 9th and 10th cent.,[31] the "Byzantine culture was permanently encyclopaedic in the sense that it was continually collecting, summarising, excerpting and synthesising earlier texts".[32]

Overall, the fact remains: Christianos cannot be assigned to a certain century. Yet, in Section 5, I illustrate how some of the Christian phrases in his work could be used to refine the dating of this author.

25. Mertens, 1995, p. lx and n. 168; cf. Roberts, 2019, p. 90, n. 139. The argument that Christianos could not have been the author of this text is also confirmed by Saffrey's (1995) reconstruction of the original order of **M**'s quires. For a visualization of **M**'s present status and Saffrey's reconstruction, see Mertens, 1995, pp. xxiii-xxviii. See also Roberts, 2019, pp. 88-90.

26. *CAAG* III, p. 381; cited also by Viano, 2008, p. 88; 2018, p. 953.

27. Lemerle, 1971, ch. X.

28. Odorico, 1990; also 2011; 2017. From the vast bibliography on Byzantine compilation literature, see also Van Deun & Macé, 2011; Magdalino, 2013; 2017b; Németh, 2018.

29. Magdalino, 2011, p. 143.

30. Roberts, 2019, p. 86 and n. 114.

31. Magdalino, 2013, p. 225.

32. Magdalino, 2013, p. 219; cf. Odorico, 2011, p. 92.

## 3. The Christian Framework of Christianos' Writings

Two works are handed down under the name of Christianos, titled Περὶ εὐσταθείας τοῦ χρυσοῦ (*On the Consistency of Gold*)[33] and Περὶ χρυσοποιΐας κεφάλαια λ′ (*On Making Gold, Thirty Chapters*).[34] The latter has been characterized as "a collection of 'chapters' or excerpts", which helps better understand the present structure and content of Christianos' work.[35] His texts, along with that attributed to Stephanos of Alexandria, the alchemical author whose identity remains a topic of debate,[36] are among those containing the most extensive Christian traits in the Greek alchemical corpus. Apart from the notable allusions discussed in this section, it should be stressed that there are also scattered religious references in his work, such as the typical expressions starting with the valediction "farewell" (ἔρρωσο/ἔρρωσθε) – "Farewell in Lord" or "Farewell, friends and servants of Christ our God" – often used to designate the end of a text (or a collection of texts).[37]

Interestingly, Christianos does not refer to alchemy as the "sacred and divine art", a description used by other alchemical authors.[38] However, he once uses the term θεία ἐπιστήμη,[39] being the only case, to the best of my knowledge, that appears in the Greek alchemical corpus. Θεία ἐπιστήμη is also employed by Plato[40] and later Platonic philosophers, such as Iamblichus (*ca.* 242 – *ca.* 325)[41] and Proclus (412-485),[42] but also by Christian Neoplatonizing authors, such as pseudo-Dionysios the Are-

33. *CAAG* II, pp. 395, 1 – 399, 11.

34. The texts comprising this work have been dispersed throughout the edition of Berthelot and Ruelle (*CAAG* II). According to Letrouit (1995, p. 62), the correct order is: *CAAG* II, pp. 272, 1 – 285, 4 + 399, 12 – 421, 5 + 373, 21 – 375, 8 + 35, 8-16 + 27, 4-17. Cf. Saffrey, 1995, pp. 6-7; Roberts, 2019, pp. 89 (n. 132), 93-94, 99.

35. Roberts, 2019, p. 94.

36. On the religious elements of Stephanos of Alexandria's work, see Carlotta, this issue. For the *status quaestionis* on Stephanos, see Koutalis, Martelli & Merianos, 2018, pp. 23-31.

37. *CAAG* II, p. 278, 22: Ἔρρωσο ἐν Κυρίῳ; p. 285, 3-4: Ἔρρωσθε, φίλοι καὶ δοῦλοι Χριστοῦ τοῦ Θεοῦ ἡμῶν (cf. Mertens, 1995, p. 189, n. 10). See also *CAAG* II, p. 403, 16-19: Οὕτω γὰρ καὶ ὁ θεῖος ἔφησε χρησμός· "Ποιήσωμεν ἄνθρωπον κατ' εἰκόνα ἡμετέραν καὶ ὁμοίωσιν". Προσεπάγει ὁ συγγραφεύς· "Ἄρσεν καὶ θῆλυ ἐποίησεν αὐτούς" (cf. Gen. 1:26-27).

38. See *e.g.* Merianos, 2017, p. 238 and n. 40.

39. *CAAG* II, p. 409, 4.

40. Plato, *Sophist* 265c.

41. *E.g.* Iamblichus, *Protrepticus* XXI, ed. Pistelli, 1888, pp. 108, 20 and 109, 4.

42. *E.g.* Proclus, *Commentary on Plato's Parmenides* IV 923, 28-29, ed. Steel, 2007-2009, II, pp. 114-115: […] ἡ μὲν παρ' ἡμῖν ἐστιν ἐπιστήμη τῶν παρ' ἡμῖν ἐπιστητῶν, ἡ δὲ θεία τῶν θείων· […].

opagite (late 5th or early 6th cent.)[43] and Maximos the Confessor (580-662),[44] bearing the meaning of "divine knowledge". Indeed, it will be demonstrated that, for Christianos, true engagement with alchemy denotes participation in divine knowledge.

### 3.1. The Gift of God and the Concept of Participation

*On the Consistency of Gold* is set by Christianos within the pseudo-Demokritean alchemical tradition. The author comments on pseudo-Demokritos' phrase "Take mercury and make it solid with the body of *magnēsia*"[45] and its interpretation by Zosimos of Panopolis. Within this analysis, a lengthy passage is introduced that is associated not only with his religious beliefs but also with the Christianized framework of alchemy as he conceives it.[46]

> Τί δή ποτε οὖν τοσαῦται βίβλοι καὶ δημονοκλησίαι (δαιμονοκλησίαι **M**, f. 111r), καὶ καμίνων καὶ ὀργάνων κατασκευαὶ τοῖς παλαιοῖς ἀνεγράφησαν, πάντων τῶν, ὡς σὺ φῆς, ὄντων ῥᾳδίων τε καὶ συντόμων; Πολλάκις, εἶπεν, ὦ φοιτητὰ τῶν Δημοκριτείων λόγων, τάχα ἵνα ὑμῶν γυμνάσῃ τὰς φρένας.[47] Ὁ νοῦς γὰρ ἐὰν εὕρῃ ὁδόν,[48] ἑαυτὸν φάναι,[49] πάντα γινώσκει κατὰ μετοχήν, οὐκ ἐκ φύσεως. Οὐ γάρ ἐστιν ἄνθρωπος φύσει θεός, ἀλλὰ εἰκὼν τοῦ εἰπόντος θεοῦ πρὸς τὸν υἱὸν καὶ τὸ πνεῦμα τὸ ἅγιον· "Ποιήσωμεν

43. Pseudo-Dionysios, *On the Ecclesiastical Hierarchy* 1, 1, ed. Heil & Ritter, 2012, p. 63, 1-2: […] τῆς ἐνθέου καὶ θείας ἐστὶ καὶ θεουργικῆς ἐπιστήμης […]; 6, Theoria, 1, p. 117, 21: […] τὴν θείαν τῶν κατ' αὐτὴν ἱερῶν ἐπιστήμην […]; 7, 2, p. 121, 13: […] οὐδὲ ἱκανῶς ἐν ἐπιστήμῃ θείᾳ μυηθέντες […].

44. *E.g.* Maximos the Confessor, *Mystagogy* 5, 442, ed. Boudignon, 2011, p. 28.

45. *CAAG* II, p. 397, 2-3, 13. Cf. Pseudo-Demokritos, *On the Making of Purple and Gold: Natural and Secret Questions* 5, 67, ed. and transl. Martelli, 2013, pp. 86-87: Λαβὼν ὑδράργυρον, πῆξον τῷ τῆς μαγνησίας σώματι, […] (see commentary at pp. 215-216, n. 23).

46. *CAAG* II, pp. 397, 15 – 398, 18.

47. Cf. Synesios the alchemist, who notes that, according to pseudo-Demokritos, the obscurity of the alchemical language aims at training the minds of the adepts (*To Dioskoros: Notes on Demokritos' Book* 8, 119-121, ed. Martelli, 2013, p. 132: […] διὰ τὸ γυμνάσαι ἡμῶν τὸν νοῦν καὶ τὰς φρένας, οὕτω συνετάγησαν. Ἄκουσον αὐτοῦ λέγοντος· ὡς νοήμοσιν ὑμῖν ὁμιλῶ, γυμνάζων ὑμῶν τὸν νοῦν; also *ibidem*, 5, 54-56, p. 126; 17, 285-290, p. 146). Cf. also the similar sayings attributed to pseudo-Demokritos by Olympiodoros the alchemist (*CAAG* II, pp. 97, 5-7; 103, 9-10). Cf. further, *e.g.* Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 5, 18-20, ed. Papathanassiou, 2017, p. 181; 7, 118-122, p. 203; pseudo-Hierotheos, *On the Divine and Sacred Art, in <Iambic>Verse*, vv. 7-11, ed. Goldschmidt, 1923, p. 43; pseudo-Archelaos, *On the Same Divine Art, in Iambic Verse*, vv. 21-23, ed. Goldschmidt, 1923, p. 50; vv. 301-303, pp. 58-59 (for an English translation of this poem, see Browne, 1946; for a commentary, see Browne, 1948).

48. Cf. Olympiodoros, *CAAG* II, p. 86, 1-2: καὶ ἡ ὁδὸς οὐχ εὑρίσκεται· […]. See below, n. 53.

49. Cf. Zosimos of Panopolis, *Authentic Memoirs* I 12, 118, ed. Mertens, 1995, p. 6: Φησὶ γὰρ ὁ νοῦς ἡμῶν· […].

ἄνθρωπον κατ' εἰκόνα ἡμετέραν καὶ καθ' ὁμοίωσιν". – "Τί γὰρ ἔχεις ὃ οὐκ ἔλαβες; φησὶν ὁ τῆς εὐσεβείας κήρυξ, ὁ ἀπόστολος Παῦλος. Εἰ δὲ καὶ ἔλαβες, τί καυχᾶσαι, ὡς μὴ λαβών;" Οἱόν τινι συνόδῳ φράζων, καὶ ὁ Ἰάκωβος ὁ θεόπνευστος ἔλεγεν· "Πᾶσα δόσις ἀγαθή, καὶ πᾶν δώρημα τέλειον ἄνωθέν ἐστιν, καταβαῖνον ἀπὸ τοῦ πατρὸς τῶν φώτων", καθὰ καὶ αὐτὸς ὁ τῶν ὅλων θεὸς καὶ κύριος ἡμῶν καὶ διδάσκαλος Ἰησοῦς ὁ Χριστὸς διδάσκων ἡμᾶς λέγει· "Οὐδὲν δύνασθε ἀφ' ἑαυτῶν λαβεῖν ἐὰν μὴ ᾖ δεδομένον ὑμῖν ἐκ τοῦ πατρὸς τοῦ ἐν οὐρανοῖς. Δεῖ τοίνυν ἡμᾶς αἰτεῖν παρὰ θεοῦ καὶ ζητεῖν καὶ κρούειν, ἵνα λάβωμεν". "Αἰτεῖτε γάρ, φησὶν ὁ θεῖος χρησμός, καὶ λαμβάνετε, ζητεῖτε καὶ εὑρήσετε, κρούετε καὶ ἀνοιγήσεται ὑμῖν. Πᾶς γὰρ ὁ αἰτῶν λαμβάνει, καὶ ὁ ζητῶν εὑρήσει, καὶ τῷ κρούοντι ἀνοιγήσεται". Ὁρᾶν δὲ χρὴ τῆς ἑαυτοῦ πολιτείας ἅμα καὶ προθέσεως ἕκαστος τὸ ἀκηρότατόν τε καὶ τῆς αἰτήσεως ἄξιον πρόδρομον, ἵνα πεπαρρησιασμένως αἰτῶν μὴ ἀστοχήσῃ, ὅπως μὴ μάτην παρακαλῇ. Ἐρεῖ γὰρ τὸ θεῖον λόγιον· "Ἐὰν μὴ ἡ καρδία ἡμῶν καταγινώσκῃ ἡμῶν, παρρησίαν ἔχομεν πρὸς τὸν θεόν". Καὶ πάλιν· "Αἰτεῖτε, καὶ οὐ λαμβάνετε, διότι κακῶς αἰτεῖσθε, ἵνα ἐν ταῖς ἡδοναῖς δαπανήσητε αὐτά, μοιχαλίδες". Δεῖ οὖν ἡμᾶς ἐν καθαρᾷ συνειδήσει καὶ πράξει καὶ τρόπῳ τὸν θεὸν ἱκετεύειν.

"Why then were so many books and invocations of daemons and constructions of furnaces and instruments recorded by the ancients, since everything, as you say, is easy and concise? Many times, he [pseudo-Demokritos] said, O disciple of the Demokritean words, [that this aims] to train your mind. The intellect, if it finds a way [*i.e.* a method], says to itself that it knows everything by participation, not by nature. Because man is not God by nature but rather an image of God, Who said to the Son and the Holy Spirit: 'Let Us make man in Our image, according to Our likeness' (Gen. 1:26).[50] 'What do you have that you did not receive?' – says the herald of piety, Paul the Apostle – 'Now if you did indeed receive it, why do you boast as if you had not received it?' (1 Cor. 4:7). Showing a certain concurrence, James the divinely inspired said: 'Every good gift (δόσις) and every perfect gift (δώρημα) is from above, and comes down from the Father of lights' (James 1:17). Likewise, the God of the universe Himself and our Lord and Teacher Jesus Christ says instructing us: 'You cannot receive anything from yourselves, unless it has been given to you by the Father in heaven (cf. John 3:27)'. Therefore, we must ask from God and seek and knock so that we receive. Indeed, 'ask', the divine oracle says, 'and it will be given to you; seek, and you will find; knock, and it will be opened to you. For everyone who asks receives, and he who seeks finds, and to him who knocks it will be opened' (cf. Matt. 7:7-8; Luke 11:9-10). Each must pay attention to the purity of both his way of life and purpose, as well as the worthiness of his request in advance, in order that he will not fail if he asks boldly, so that he will not plead in vain. And shall thus say the divine saying: 'If our heart does not condemn us, we have confidence toward God' (1

50. The New King James Version (hereafter: NKJV) has been used for the English translations of biblical quotations unless otherwise cited.

> John 3:21). And again: 'You ask and do not receive, because you ask amiss, that you may spend it on your pleasures. Adulteresses!' (James 4:3-4).[51] Therefore, we must supplicate God with pure conscience and practice and manner".

Christianos, before turning again to the topic of mercury and the body of *magnēsia*, concludes by stating that it is Zosimos who said these things and rightly gave such advice.[52] Evidently, the above passage is not a collection of Zosimean phrases but is mainly formed by putting together recognizable scriptural quotations. Yet, these most likely serve to frame and religiously reinforce a specific phrase or concept in the passage that evokes Zosimos' thought. It is particularly hard to identify if there is an exact Zosimean saying that Christianos had in mind. However, Berthelot has pointed to this passage's similarities with Zosimos' *First Book of the Final Abstinence* (also known as the *Final Count*),[53] specifically the part where Theosebeia is urged by Zosimos to subdue her passions, avert the daemons, concentrate on acquiring divine knowledge on the "genuine and natural" tinctures, and achieve the perfection of her soul.[54] These counsels must have sounded familiar to later Christian audiences, and indeed, as will be shown below, ideas such as the necessity for an alchemist to master his passions were accommodated quite well in similar views of Byzantine alchemical

51. The text of James 4:4 both in the Greek New Testament (NA28) and here reads μοιχαλίδες. The NKJV translates this word as "adulterers and adulteresses", but I prefer to stay close to the original term and meaning. Lockett (2008b, p. 131) provides an explanation as to why the feminine plural form "adulteresses" is used in James: "The label 'adulteresses' (μοιχαλίδες) symbolically refers to the covenant relationship between God (as a groom) and Israel (as his bride) found in the Torah. This relationship is likened to a marriage […] where God is spurned by unfaithful Israel, where the unfaithfulness of Israel is often metaphorically spoken of as adultery […]". Cf. *LSJ*, *s.v.* "μοιχαλίς", which notes (citing James 4:4) that this word, when used in a religious sense, means "unfaithful to God".

52. *CAAG* II, p. 398, 19-21: Ταῦτα τοῦ φιλοσόφου Ζωσίμου λέγοντος, καὶ καλῶς ἡμᾶς νουθετήσαντος, τῆς ζητήσεως ἀνθεξόμεθα, τί ἐστιν ὑδράργυρος καὶ τί τὸ σῶμα τῆς μαγνησίας· […].

53. *CAAG* III, p. 385, n. 7. Berthelot also points to a similar reference to Zosimos made by the alchemical commentator Olympiodoros. According to Olympiodoros, Zosimos says that one should pray to learn from God on how to prepare everything precisely. Olympiodoros then enumerates the insurmountable difficulties faced by an adept in the study of alchemy. He mentions, among other things, that men do not instruct, and that the way (*i.e.* the method) cannot be found (*CAAG* II, pp. 85, 22 – 86, 2: Ὅπως δὲ ἡ ἀκρίβεια τοῦ παντὸς σκευάζηται, εὔξασθε παρὰ Θεοῦ μαθεῖν, φησὶν ὁ Ζώσιμος· οἱ ἄνθρωποι γὰρ οὐ παραδιδόασι, […]· καὶ ἡ ὁδὸς οὐχ εὑρίσκεται· […]; cf. Festugière, 1944, p. 280, n. 3). The difficulty of finding the "way" recalls Christianos' phrase "if it [the intellect] finds a way" (*CAAG* II, p. 397, 19), mentioned above. On Olympiodoros, see Viano, 2021 (where previous bibliography on this author is cited).

54. Zosimos of Panopolis, *Final Abstinence* 8, ed. Festugière, 1944, pp. 367-368. See *ibidem*, pp. 280-281; Fowden, 1993, pp. 122-123; Fraser, 2004, pp. 142-145; Dufault, 2019, pp. 105-106, 129-130.

authors. What is of paramount importance in Zosimos' treatise is that true (alchemical) knowledge is considered to be attained through God, which is the meaning of Christianos' text too.

Christianos builds on the Scriptures to make explicit that alchemical knowledge is bestowed by God upon a worthy pursuer of wisdom, devoted to a righteous purpose. Judging from the citation of James 4:3-4 ("You ask and do not receive, because you ask amiss, that you may spend it on your pleasures. Adulteresses!"), Christianos seems to underscore that those who seek riches to live lavishly will fail in this quest.

The quotation of James 1:17 ("Every good gift and every perfect gift is from above, and comes down from the Father of lights!")[55] showcases the idea of alchemy as a gift (δώρημα) of God. This concept is also expressed by Stephanos of Alexandria, who, as Christianos, cites James 1:17 verbatim.[56] Further references to the Father of lights can also be found in Stephanos' work ("I confess the grace of the illumination from above, which is given to us by the Father of lights"; and "O rich gifts by the Father of lights!"), while in one instance the alchemical opus is characterized as "God-given".[57] Moreover, the four alchemical poems attributed to Heliodoros, Theophrastos, Hierotheos, and Archelaos,[58] respectively, include references to the concept of God-given alchemical knowledge. For example, in the poem under the name of Theophrastos, the "gift" that is "divinely given" is mentioned.[59] On the other hand, the notion of alchemy as a divine gift (*donum dei*) also appears in texts from different

55. On this biblical quotation, see also below, n. 101. James' description of God as the "Father of lights" most likely refers to Gen. 1:14-19, which narrates the creation of the luminaries by God. This characterization portrays God as the creator of all; see Lockett, 2008a, pp. 152-153. See also the expression "gift of God" in John 4:10; cf. Eph. 3:7.

56. Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 4, 1-2, ed. Papathanassiou, 2017, p. 173: Πᾶσα δόσις ἀγαθὴ καὶ πᾶν δώρημα τέλειον, ἄνωθέν ἐστι καταβαῖνον ἀπὸ τοῦ πατρὸς τῶν φώτων. Cf. Papathanassiou, 2018, pp. 75, 81.

57. See, respectively, Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 1, 47-48, ed. Papathanassiou, 2017, p. 158: Ὁμολογῶ τῆς ἄνωθεν φωτοδοσίας τὴν χάριν, ἣ παρὰ τοῦ πατρὸς τῶν φώτων ἡμῖν δεδώρηται; 7, 188-189, p. 205: Ὦ πλούσιαι δωρεαὶ παρὰ τοῦ πατρὸς τῶν φώτων; and 2, 66, p. 163: […] ἡ θεοδώρητος ἐργασία, […]. Cf. Papathanassiou, 2005, p. 117; 2018, pp. 74, 79, 84. With regard to the word θεοδώρητος, in a text attributed to Zosimos, the agent of transmutation is characterized as "ungiven and God-given" (ἀδώρητον καὶ θεοδώρητον) (*Authentic Memoirs* XIII 1, 15-22, ed. Mertens, 1995, p. 49; commentary on p. 234, nn. 8-10).

58. These poems are considered to be the work of a single author and are dated to the 7th-8th cent.; see Letrouit, 1995, pp. 82-83, 88. However, Marc Lauxtermann (2019, pp. 205-207) recently redated them to the 5th or early 6th cent., based on their metrical analysis.

59. Pseudo-Theophrastos, *On the Same Divine Art, in Iambic Verse*, vv. 210-211, ed. Goldschmidt, 1923, p. 41: […] εὐφραντικῶς τὸ δῶρον ἀξιουμένων / τὸ θειοδώρητόν τε τοῦτο πάντιμον […]. For an English translation of the poem, see Browne, 1920.

cultural contexts and is particularly persistent in medieval and early modern alchemical writings.[60] The current consensus is that the idea of alchemy as a *donum dei* in medieval Latin authors derives from the Arabic alchemical tradition, which in turn had inherited the concept from the Hellenistic world.[61] Therefore, it is noteworthy that the same notion of *donum dei* is expressed by Christianos and other Byzantine authors, but significantly earlier than medieval Latin writers.[62]

Yet, the core concept that explains why alchemical knowledge is understood as a divine gift appears at the beginning of Christianos' passage. Commenting on the vagueness and obscurity of the alchemical writings of the ancient philosophers, he refers to the way one must find in order to interpret them. He centers this pursuit around the idea that the human intellect has access to knowledge not by nature but by participation (κατὰ μετοχήν). The concept of "participation" (μέθεξις, μετοχή, μετέχειν, μετουσία) is of paramount importance in the Greek patristic tradition, overlapping with concepts such as "deification" (θέωσις) and "likeness" (ὁμοίωσις).[63] 2 Peter 1:4 is often cited to provide the theological views on this idea with support from the New Testament.[64] The notion of participation, but also the definition of likeness to God as the goal of the spiritual and moral life, bears an undisputed Platonic origin.[65] Nevertheless, Christianity pioneered the development of the idea of deification and its terminology so much that, "by the time Porphyry first wrote of the philosopher deifying himself, Christians had already been speaking of deification for more than a century".[66]

60. For an overview of the enduring idea of alchemy as a *donum dei*, see Karpenko, 1998. See also Newman, 1994, pp. 3, 8-10, 12, 66, 181; 2019, pp. 20, 44, 107, 496; Nummedal, 2007, pp. 27-30; Principe, 2013, pp. 192-195, 199-200.

61. Newman, 1994, pp. 98, 114; 2004, p. 84; Karpenko, 1998, pp. 67-68. For a significant reference to *donum dei*, see the 13th-cent. *Summa perfectionis* by pseudo-Geber (ch. 93, ed. Newman, 1991, p. 632, 40-41, transl. p. 785): "Therefore let the artificer of good intellect exercise himself through those things which we have passed down, and he will be happy to have arrived at the highest gift of God (*donum dei altissimum*)"; cf. Newman, 1985, p. 290.

62. It should be stressed that Karpenko (1998, pp. 65-66, 68) refers to the presence of this idea in Byzantine alchemy. Yet, he mentions only Stephanos of Alexandria and refers vaguely to this concept in his work.

63. Russell, 2004, p. 2.

64. 2 Peter 1:4 (transl. NKJV): "[…] by which have been given to us exceedingly great and precious promises, that through these you may be partakers of the divine nature, having escaped the corruption that is in the world through lust".

65. See *e.g.* Niarchos, 1985; Siorvanes, 1996, pp. 71-86.

66. Russell, 2004, p. 52.

The fundamental difference between Creator and creature is considered to be the possession of existence by nature or by participation. The created-from-nothing creatures do not possess life in themselves but must acquire it by participating in the source of life, that is, God. Since existence is inherent to God's nature, and the Son is consubstantial (ὁμοούσιος) with the Father, existence, as well as *wisdom*, goodness, and power, are befitting to His nature. Humanity becomes divine and achieves eternal life by participating in the divine nature through the Holy Spirit.[67] Gregory of Nyssa seems to employ the language of participation to a much larger extent than that of deification.[68] For him – and in this, he coincides with the Platonic tradition (cf. Plato, *Theaetetus* 176a-b) – human life should aim at the imitation of God; and, given that God is infinite, Christian perfection can meet no limit in spiritual life (*epektasis*).[69]

Since the alchemical study is set within the broad context of philosophy, it is not surprising that Stephanos of Alexandria, who has projected the Christianization of alchemy on such a scale, repeats a traditional definition of philosophy: "[…] likeness to God as far as humanly possible".[70] What is striking is that Stephanos' definition of philosophy appears in his sixth Lecture, within the context of the geometrization of physical bodies and the discussion of the numerical qualities of substances. Comparably, Christianos also partakes in this tradition of mathematized philosophical inquiry, as will be shown below.

For Christianos, approaching divine knowledge of nature presupposes a moral conduct that promotes the figure of the virtuous alchemist, or *philosopher*,[71] and, ultimately, the beneficial character of alchemy itself. The need for setting a kind of "moral code" must not be irrelevant to the effort made in alchemical texts for distinguishing the true philosopher from the false one.

67. Smith, 2011, p. 119.

68. Russell, 2004, p. 233.

69. Gregory of Nyssa, *On the Life of Moses* I, ed. Musurillo, 1964, p. 4, 5-15. Cf. Meredith, 1999, p. 22. On the concept of *epektasis*, or perpetual spiritual progress, in Gregory of Nyssa and Maximos the Confessor, see Blowers, 1992.

70. Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 6, 34-35, ed. Papathanassiou, 2017, p. 188: Τί γάρ ἐστι φιλοσοφία, ἀλλ' ἢ ὁμοίωσις Θεῷ κατὰ τὸ δυνατὸν ἀνθρώπῳ; See Merianos, 2017, p. 243 and n. 76.

71. For the characterization of alchemical authors as "philosophers", see Koutalis, Martelli & Merianos, 2018, pp. 31-37; Dufault, 2019, pp. 95-100.

### 3.2. The Moral Code and the Christian Oath

Christianos' other work, *On Making Gold, Thirty Chapters*, closes with two small texts: (i) a description of the virtues that a true pursuer of knowledge should hold, followed by (ii) an oath.

(i) The first text can also be interpreted as a warning to those who do not strive to live up to these ideals, and, consequently, an explanation of why an aspiring alchemist might fail in his endeavors.

> Ποῖον εἶναι χρὴ τοῖς ἤθεσι τὸν μετιόντα τὴν ἐπιστήμην[72]
> Χρεὼν εἶναι τὸν μετιόντα τὴν ἐπιστήμην πρῶτον μὲν φιλόθεον καὶ φιλάνθρωπον, σώφρονα, ἀφιλάργυρον, ψεῦδος ἀποστρεφόμενον, καὶ πάντα δόλον, καὶ κακουργίαν, καὶ φθόνον, εἶναι δὲ ἀληθῆ καὶ πιστὸν παῖδα τῆς ἁγίας καὶ ὁμοουσίου καὶ συναϊδίου Τριάδος.[73] Ὁ μὴ τοιαῦτα κάλλιστα καὶ θεάρεστα ἤθη κτησάμενος ἢ κτήσασθαι σπουδάσας, ἑαυτὸν ἀπατήσει, τοῖς ἀνεφίκτοις ἐπιπηδῶν, καὶ βλαβήσεται μᾶλλον.

72. *CAAG* II, p. 35, 8-16. For Berthelot, "*[c]e morceau est attribué à Démocrite par Cedrenus. Il se retrouve avec développement dans Geber et les alchimistes arabes*" (see *CAAG* III, p. 36, n. 7, citing Berthelot, 1885, pp. 119, 160, 206). George Kedrenos notes: Τότε καὶ Δημόκριτος ἐγνωρίζετο φιλόσοφος, ὃς ἐδίδασκε πρὸς τοῖς ἄλλοις, ὅτι δεῖ τὸν φιλοσοφεῖν ἐθέλοντα πάντων ἀπέχεσθαι κακῶν, σωφροσύνην ἀσκεῖν καὶ πάντα ὀρθῶς νοεῖν καὶ πράττειν, καὶ οὕτως ἔστι τὸ ἐννεαγράμματον μαθεῖν· καὶ οὕτως, φησίν, ὄψει τὸν υἱὸν τοῦ θεοῦ λόγον, τὸν ἀπαθῆ, παθητὸν νεοφανῆ (*Summary Historical Compilation* 138, 1, ed. Tartaglia, 2016, I, p. 252; cf. John Malalas, *Chronicle* 4, 15, ed. Thurn, 2000, p. 61, 32-37). From the term ἐννεαγράμματον ("word of nine letters": *LSJ*), one can infer that the text most likely refers to alchemical writings attributed to (pseudo) Demokritos. Indeed, the ἐννεαγράμματον alludes to the "riddle of the philosophers", concerning the secret name of the philosophers' stone that consists of nine letters and four syllables. The riddle is found as an independent text under the names of Hermes and Agathodaimon (*CAAG* II, pp. 267, 16 – 268, 2), it is also mentioned by Olympiodoros (*CAAG* II, p. 71, 10-11: τὸ τετρασύλλαβον καὶ τὸ ἐννεάγραμμον), and commented by Stephanos of Alexandria (*On the Great and Sacred Art of Making Gold* 6, 47-183, ed. Papathanassiou, 2017, pp. 188-194; see Papathanassiou, 2005, pp. 130-132). Cf. *Sibylline Oracles* I 141-146, ed. Geffcken, 1902, pp. 12-13. However, while Kedrenos refers to the morals that philosophers should possess according to Demokritos, he does not attribute Christianos' text to him, as Berthelot claims.

73. Cf. Eustratios the Presbyter's late-6th-cent. *Life of the Patriarch Eutychios*, ed. Laga, 1992, l. 2822: […] τῆς ἁγίας καὶ ὁμοουσίου καὶ συναϊδίου Τριάδος, […]. According to Laga's *app. fontium* (*ibidem*, p. 90), lines 2816-2823 paraphrase Gregory of Nazianzos' *Funeral Oration for Basil the Great* (*Or.* 43) 82, 6-15, ed. Bernardi, 1992, pp. 304-306, which mentions τὴν ἁγίαν καὶ μακαρίαν Τριάδα. For the dating of the *Life*, see Cameron, 1988, pp. 244-245 (= Cameron, 1996, no. I); Cameron, 1990, p. 208 (= Cameron, 1996, no. II).

> What Moral Qualities One Who Pursues Science Should Have
> "One who pursues science must first love God and man, be prudent, not love money, despise lies and everything deceitful and wicked and envious; he must be a true and faithful disciple of the Holy and Consubstantial and Coeternal Trinity. Whoever has not acquired such excellent and God-pleasing morals or was not eager to acquire them will deceive himself, rushing into unattainable goals, and will be rather harmed".

At first sight, this text seems to present a vague and rather banal Christian moral view. Yet, this assessment cannot be accurate for two reasons. First, and according to the approach of the Cappadocian Fathers, man is deified through baptism and the Eucharist, but also by the practice of virtue.[74] Maximos the Confessor shares the latter idea, presenting the moral life as a pathway to God, as a compass toward deification.[75] Consequently, likeness to God cannot be construed separately from the pursuit of the moral life. Maximos also accentuates the role of grace; deification is granted to those who are worthy, it is beyond nature, and makes, by grace, gods out of human beings those who participate in His attributes.[76] Second, a closer look at certain established Christian virtues, such as aversion to avarice or deception, brings also to mind the ever-timely debate since Zosimos of Panopolis' times on the proper alchemical conduct, methodology, and goals. False alchemists care only for gold and the lucrative aspect of alchemy.[77] They avoid the painstaking pursuit of a rigid methodology and technique that is, on the one hand, grounded on the conceptual understanding of the natural principles of substances via the study of the Greek alchemical and philosophical tradition and, on the other hand, on the empirical understanding of matter, which is achieved in the laboratory.[78]

Christianos shares the view, which pervades his whole work, that the study of the masters of the past is essential for meaningful engagement with alchemy. But this

74. The two understandings are not at all irreconcilable. Accordingly, pseudo-Dionysios (*On the Ecclesiastical Hierarchy* 1, 3, ed. Heil & Ritter, 2012, p. 66, 12-19) defines deification as […] ἡ πρὸς θεὸν ὡς ἐφικτὸν ἀφομοίωσίς τε καὶ ἕνωσις ("assimilation to and union with God as far as possible") and bridges the concepts of likeness/virtue with participation/union. On the passage, see Golitzin, 2013, pp. 250-252; Costache, 2017, pp. 69-70. On pseudo-Dionysios' concept of deification, see also Russell, 2004, pp. 248-262.

75. Russell, 2004, pp. 233, 270.

76. Maximos the Confessor, *Questions and Doubts* 61, ed. Declerck, 1982, p. 48; cf. Russell, 2004, pp. 265-266. On Maximos' doctrine of participation, see also Portaru, 2015, pp. 136-138.

77. See *e.g.* Zosimos of Panopolis, *On the Treatment of the Body of Magnēsia*, *CAAG* II, p. 190, 19-21: Καὶ διδασκόμενοι βαθμοὺς ἀληθείας, τὴν τέχνην οὐκ ἀνέχονται, οὐδὲ πέπτουσιν, χρυσοῦ μᾶλλον ἢ λόγων ἐπιθυμοῦντες· […]. On this work of Zosimos, see Dufault, 2019, pp. 122-127, 137.

78. Merianos, 2021, pp. 76-79.

is not the only requirement. The codification of certain moral qualities, identifiable (though not exclusively) with traditional Christian virtues, emphatically shows that the conduct of the true philosopher coincides with that of the true Christian. And, since alchemical knowledge is dependent on divine illumination, those who do not possess these virtues simply fail in their pursuits.

(ii) The *Thirty Chapters* closes with a text bearing a manifest Christian character: an oath before the Holy Trinity. Before turning to the text itself, it will be helpful to cite Moshe Blidstein's description of the function of the oath in Antiquity, which generally applies to our case study as well:

> "An oath is composed of two parts: a statement clause, and a verifying or empowering clause. The empowering clause may consist only of an invocation of a god as witness to the statement or include also a self-curse in case the statement is false. An oath is therefore a way of empowering a statement, empowerment that can be useful for various personal and social endeavors. The invocation of the deity as guarantor is the main instrument of empowerment in the oath […]".[79]

An oath verifies the truth of a statement, or at least the sincerity of an intention,[80] and as soon as it is given, one may break it but cannot ignore it.[81] A Christianized continuation of the Roman practice, oaths were customary in the Byzantine state, attested from the mid-5th cent. Imperial officials not only swore an oath of loyalty upon taking office but also with the advent of a new emperor. It is noteworthy that Constantine V (741-775), a fervent iconoclast, innovated in a two-fold way by utilizing the oath as a valuable tool: he is said to have imposed a universal oath not to venerate icons, but also to have made the representatives of the constituted bodies swear not to harm his children after his death.[82] Oaths were also established in law courts and the conclusion of diplomatic treaties; and they had a ubiquitous presence in social relations, economic transactions, and everyday life. Even the New Testament prohibition against oaths (Matt. 5:33-37; also, James 5:12), being the topic of theolog-

79. Blidstein, 2017, p. 55.
80. Rapp, 2016, p. 27.
81. Blidstein, 2017, p. 55.
82. Nichanian, 2008. On Byzantine Iconoclasm, see Humphreys, 2021.

ical discussions, did not manage to curb the practice; and the Church developed from being once the enemy of oaths to their ultimate guarantor.[83]

To return to Christianos, in his *Oath*, which is guaranteed by the Trinity, he addresses the student of alchemy who reads his work:

> Ὅρκος[84]
> Ὄμνυμί σοι, καλὲ παῖ, τὴν μακαρίαν καὶ σεβασμίαν Τριάδα ὡς οὐδὲν ἀπέκρυψα τῶν ἐμοὶ παρ' αὐτῆς δεδομένων ἐν ταμείοις ψυχῆς[85] μυστηρίων τῆς ἐπιστήμης· ἀλλὰ πάντα τὰ γνωσθέντα μοι θεόθεν περὶ τῆς τέχνης ἀφθόνως[86] ἐνέθηκα ταῖς ἡμετέραις γραφαῖς, ἀναπτύξας καὶ τῶν ἀρχαίων τὸν νοῦν, ὡς λογίζομαι. Σὺ οὖν εὐσεβῶς αὐταῖς ἐντυγχάνων ἁπάσαις καὶ νουνεχῶς, εἴ τι μὴ καλῶς ἡμῖν εἴρηται ἀγνοήσασιν οὐ πανουργευσαμένοις, διόρθου τὰ ἡμέτερα πταίσματα, σεαυτὸν ὠφελῶν, καὶ τοὺς ἐντυγχάνοντας πιστοὺς ὄντας Θεῷ καὶ ἀκακοήθεις καὶ ἀγαθούς, ὅπερ ἐστὶ χαλεπὸν εὑρίσκειν ὡς ἀληθῶς. Ἔρρωσο ὁ ἐν ἁγίᾳ καὶ ὁμοουσίῳ Τριάδι, πατρί, φημί, καὶ υἱῷ καὶ ἁγίῳ πνεύματι. Τριὰς ἡ μονὰς[87] ὁ υἱὸς ἀτρέπτως ἐνανθρωπήσας καυχήσει τῆς δυάδος οἰκοιωθὲν (οἰκειωθὲν **M**, f. 128ᵛ) ὀνόματι τὴν ἄμωμον ἔπλασεν ἀνθρώπου φύσιν ὀλισθήεσσαν (ὀλισθεῖσαν **M**, f. 128ᵛ) ἰδὼν διωρθώσατο.
>
> Oath
> "I swear to you, good disciple, by the blessed and venerable Trinity, that I have concealed nothing of the mysteries of the science that were granted to me by It [the Trinity] in the inner chambers of the soul. But everything concerning the art that was made known to me by God I put ungrudgingly in our writings, having also developed the thought of the ancients according to my reflections. You have to read them all with piety and wisdom, and if we have said something wrong due to ignorance, not wickedness, correct our faults to benefit yourself and those readers who are faithful to God and guileless and good, qualities which are, indeed, difficult to find. Farewell, you who live by the Holy and Consubstantial Trinity, I say the Father and the Son and the Holy Spirit. The Monad is a Trinity; the Son, who without change became man for the glorying of the duality [of

83. Delouis, 2008, p. 232. On oaths and oath-taking in Byzantium, see also Koukoules, 1949, pp. 346-375; Svoronos, 1951; Auzépy & Saint-Guillain, 2008.

84. *CAAG* II, p. 27, 4-17. The Greek alchemical corpus contains a second oath that bears a (presumably) Christian character and is attributed to Pappos the philosopher; see Appendix.

85. Cf. *e.g.* Plutarch, *Table Talks* 672e: […] ἴδιόν τι τοῦτο τῇ ψυχῇ ταμιεῖον εὐπαθειῶν ἀποκεῖσθαι […]; Clement of Alexandria, *Stromateis* VII 7, 49, 7, ed. Le Boulluec, 1997, p. 168: κἂν ἐν αὐτῷ τῷ ταμιείῳ τῆς ψυχῆς ἐννοηθῇ μόνον […]. Concerning the term ταμιεῖον/ταμεῖον, see the reference in Matt. 6:6; cf. Isaiah 26:20. See also below, nn. 100-101.

86. See below, nn. 102 and 104.

87. Cf. Maximos the Confessor, *Ambigua to Thomas* 1, 3, ed. and transl. Constas, 2014, I, pp. 10-11: […] Τριὰς ἀληθῶς ἡ μονάς, […] ("the Monad is truly a Trinity").

natures], which is kindred with His name, has formed the unblemished nature of man; seeing it to fail, He corrected it".

Before commenting on the content of the *Oath*, it must be taken into consideration that the text in **M** (second half of the 10th cent.) incorporates a part that is not included in **B** (13th cent.) and **A** (1478),[88] which are the oldest manuscripts after **M**. Berthelot has explicitly stated that he deems the extra text in **M** an addition.[89] It should be noted that the entire *Oath* in **M**, which includes the extra part, is written by the same hand. We cannot rule out the possibility that the extra text is indeed an addition to the manuscript tradition, perhaps by a compiler, who could have inserted it at the end of an earlier collection. On the other hand, the missing part in **B** and **A** could have been considered as a standardized ending (Ἔρρωσο ὁ ἐν ἁγίᾳ καὶ ὁμοουσίῳ Τριάδι…), such as those found in many Byzantine works, and therefore could have easily been omitted by other scribes.

Be that as it may, the *Oath*, and in particular the extra text in **M**, is imbued with notable elements of Christian theology. After certain references to the Holy Trinity, the Son is described as ἀτρέπτως ἐνανθρωπήσας ("who without change became man"), a phrase which, in this exact form, can already be found in the *troparion* " Ὁ Μονογενὴς Υἱὸς" ("The Only-begotten Son").[90] According to Theophanes the Confessor, the emperor Justinian I (527-565) introduced the hymn into the Divine Liturgy of Constantinople in 535/536.[91] While the Byzantine tradition attributes the *troparion* to Justinian himself, the non-Chalcedonian Churches, which also adopted it, ascribe it to Severos of Antioch (d. 538). Venance Grumel leaned toward attributing the composition of, or at least the inspiration for, it to Justinian; yet, he stressed that this is not certain.[92] In any case, the paternity of the text is beyond the scope of this paper. What matters more for our analysis is that (a) the term Μονογενὴς ("Only-begotten") excludes the possibility of a Nestorian origin, and (b) the adverb ἀτρέπτως ("without change"), in particular, is accepted both by Chalcedonians and non-Chalcedonians.[93] It has been shown that the author of the *troparion* elaborately

88. The *Oath* appears fully in **M**, f. 128$^{v}$. Codex **B**, f. 116$^{v}$, in its present state at least, lacks the text from ὡς ἀληθῶς to διωρθώσατο, while **A**, ff. 109$^{v}$-110$^{r}$, from Ἔρρωσο to διωρθώσατο. Furthermore, **A**, f. 298$^{r}$ (written by a later hand) lacks the text from Τριὰς to διωρθώσατο.

89. *CAAG* III, p. 29, n. 2.

90. Brightman, 1896, p. 366, 5.

91. Theophanes the Confessor, *Chronographia*, ed. de Boor, 1883, p. 216, 23-24.

92. Grumel, 1923.

93. Janeras, 2013, p. 220.

combined words and phrases, mainly from the Nicene-Constantinopolitan Creed (381) and the Chalcedonian Definition of Faith (451), to produce it.[94] Concerning the phrase under discussion, the word ἐνανθρωπήσας originates in the Nicene-Constantinopolitan Creed.[95] As for the term ἀτρέπτως, it is one of the four so-called "Chalcedonian adverbs" included in the Definition of Faith of the Council of Chalcedon – the other three are ἀσυγχύτως, ἀδιαιρέτως, and ἀχωρίστως ("without confusion, division, separation").[96] These adverbs in their original Greek form underline the union of Christ's two complete and distinct natures, the divine and the human, in one person (*hypostasis*). It is notable that the same adverbs already appear in the influential work of Cyril of Alexandria (412-444).[97] From the above, it is clear that the phrase ἀτρέπτως ἐνανθρωπήσας alone cannot indicate the type of the author's Christianity.

It is with the next phrase (καυχήσει τῆς δυάδος οἰκειωθὲν ὀνόματι) that the author most probably accentuates his Chalcedonian faith by referring to the significance of Christ's duality of natures, which is kindred with his very name.[98] This wording evokes the crucial Chalcedonian formula ἐν δύο φύσεσιν, meaning that Christ is to be acknowledged in two natures – without confusion, change, division, or separation.[99] From this reference, it can be deduced that Christianos (or whoever the author of the *Oath*'s last sentence was) most likely was an adherent of Chalcedonian Christianity.

The aim of Christianos' *Oath* is clearly expressed; by swearing by the Holy Trinity, he most solemnly and emphatically certifies that he divulged all (alchemical) knowledge that was granted to him divinely "in the inner chambers of the soul". Interestingly, this last phrase has a prior parallel in the *Thirty Chapters*: "the innermost sanctuaries or holy inner chambers of the souls" (ἀδύτοις ἢ ταμείοις ἱεροῖς τῶν ψυχῶν).[100] This intratextual connection also corroborates that the *Oath* was an integral part of the *Thirty Chapters*. Intriguingly, the idea that knowledge is revealed by God in the human souls

94. Barkhuizen, 1984. On the hymn, see also Galadza, 2018, pp. 165-166; Giannouli, 2019, p. 491.

95. Symbolum Nicaeno-Constantinopolitanum, ed. Dossetti, 1967, p. 246, 8.

96. Concilium Oecumenicum Chalcedonense, Definitio fidei, ACO II.1.2, p. 129, 31.

97. See, for instance, McGuckin, 1994, p. 239; Riches, 2016, pp. 60-61 and n. 19.

98. Cf. Patriarch Nikephoros, *First Antirrhetic* 45, *PG* 100, col. 313; transl. Mondzain, 2005, p. 239: "[…] the name of Christ designates the duality of [his] natures […]".

99. Concilium Oecumenicum Chalcedonense, Definitio fidei, ACO II.1.2, p. 129, 30-31: […] ἐν δύο φύσεσιν ἀσυγχύτως ἀτρέπτως ἀδιαιρέτως ἀχωρίστως γνωριζόμενον, […].

100. *CAAG* II, p. 418, 11-13: […] τὸ ἀκριβὲς ὑμῖν καὶ τοῖς νοήμοσιν ἑκατέρωθεν παραστήσομεν, τὴν ἐν ἀδύτοις ἢ ταμείοις ἱεροῖς τῶν ψυχῶν ἐμφανίζοντες ποίησιν. Cf. Origen, *Commentary on the Song of Songs* (fragmenta), ed. Baehrens, 1925, p. 108, 28-30: "Εἰσήγαγέ με ὁ βασιλεὺς εἰς τὸ ταμιεῖον αὐτοῦ". Ἤγουν "ἄδυτον" τὴν ἀξιέραστον λέγει ψυχὴν ἢ ἐκκλησίαν ἢ τὸ ἡγεμονικὸν τοῦ Χριστοῦ, […].

can already be traced to the Neoplatonic schools of Late Antiquity.[101] Furthermore, Christianos makes explicit that he has also developed the thought of the ancient masters according to his reflections. In this manner, he implies that both divine grace and the exegetical analysis of the ancient texts are necessary conditions for one to partake in the study of matter. Of course, his wish to share this kind of knowledge does not concern any reader, but only those who uphold the virtues he already presented in the moral code and summarizes in the *Oath*, that is, the true philosophers.

Two different traditions, the biblical and the alchemical, appear to converge in the affirmation that he concealed nothing, putting everything down ungrudgingly (ἀφθόνως). A similar stance can be traced in the Book of Wisdom (7:13): "I learned without guile and I impart without grudging; I do not hide her [wisdom's] wealth".[102] Likewise, the general notion of the evangelical precept, "Freely you have received, freely give" (Matt. 10:8),[103] could well be applied in this case.

Christianos' statement also echoes pseudo-Demokritos, the great master of the past, who, at the closing of the book *On the Making of Silver*, asserts: "You have received everything useful for gold and silver. Nothing has been left out; nothing is missing, except how to sublime volatile substances and to distil waters". These parts were excluded, according to pseudo-Demokritos, because they were extensively (ἀφθόνως) covered in his other writings.[104] Furthermore, the alchemical commentator Olympiodoros (6th cent.) notes that the masters of the past were philosophers in the proper sense, speaking among philosophers. They concealed nothing, openly writing about everything, being true to their oath.[105] Although Olympiodoros

101. O' Meara encapsulates this Neoplatonic concept as follows: "Knowledge in the strong sense, 'science', is the infallible grasp of these [transcendent eternal immaterial] realities. This knowledge cannot be derived from sense-experience; the possibility of access to it was explained by its being already present, innate in soul, requiring articulation according to rigorous logical method". He further notes that some Christian thinkers could also accept that God revealed knowledge to humans, not only through the Bible, but also in the human souls and in the world, albeit to a lesser and imperfect level. This explains why pagan philosophers were thought that they could have discovered some truths, although in an imperfect way. James 1:17 was an appropriate quotation in this context. See O' Meara, 2017, p. 171; also 2012.

102. Wisdom 7:13: ἀδόλως τε ἔμαθον ἀφθόνως τε μεταδίδωμι, τὸν πλοῦτον αὐτῆς οὐκ ἀποκρύπτομαι· […] (transl. New Revised Standard Version).

103. Matt. 10:8: δωρεὰν ἐλάβετε, δωρεὰν δότε (transl. NKJV).

104. Pseudo-Demokritos, *On the Making of Silver* 10, 85-88, ed. and transl. Martelli, 2013, pp. 114-115. Cf. Zosimos of Panopolis, *Authentic Memoirs* IV (**M**′) 1, 1-30 = (**M**) 1, 1-9 and 21-30, ed. Mertens, 1995, pp. 16-17; see commentary at pp. 140-141, nn. 5-6.

105. *CAAG* II, p. 79, 16-20: Θέλω γάρ σοι παραστῆσαι τὸν νοῦν τῶν ἀρχαίων, ὅτι κυρίως φιλόσοφοι ὄντες ἐν φιλοσόφοις λελαλήκασι καὶ παρεισήνεγκαν τῇ τέχνῃ διὰ τῆς σοφίας τὴν φιλοσοφίαν, μηδὲν

stresses that nothing had been hidden by the ancient masters, his reference to philosophers implies that only a philosophically trained mind was deemed capable of approaching ancient alchemical literature. We can assume that Christianos' openness toward his readers implies this prerequisite. It is worth noting that, in a similar manner, pseudo-Archelaos declares in his poem that he had not concealed knowledge from anyone who sought it.[106]

These elucidations are essential for understanding Christianos' text, given that alchemical oaths are traditionally regarded as promoting and securing secrecy. This is the case with the renowned oath of secrecy included in the Greek alchemical corpus by which the angel Amnaël grants Isis access to alchemical knowledge. The oath is found within the late-2nd- or early-3rd-cent. text known as *The Letter of Isis to Horus*.[107] Moreover, Synesios the alchemist (first half of the 4th cent.), responding to Dioskoros' (his interlocutor) remark that Ostanes (?) made pseudo-Demokritos swear not to make any clear disclosures to anybody, states: "[…] 'to nobody' is not asserted with a general meaning. He was speaking about those who have <not> been initiated and who do <not> have a well-trained mind".[108] From what has been examined, it can be inferred that alchemical oaths, dating from different periods, do not serve a sole purpose: they are either employed to exclude the uninitiated and the untrained from alchemical knowledge or to affirm the disclosure of it to "philosophers". However, these two distinct objectives constitute, in essence, two sides of the same coin: the exclusion of the first group implies the inclusion of the second and vice versa. The shift of focus from the apophatic (exclusion) to the cataphatic (inclusion) could also be associated with the cultural milieu in which each text was written. Thus, a further explanation as to why Christianos does not safeguard the knowledge he transmits could be that, within the Christian context of alchemy, knowledge in the wrong hands is meaningless since an unworthy alchemist will not be illuminated by God's grace to understand it.

---

ἀποκρύψαντες, ἀλλὰ πάντα φανερῶς γράψαντες· καὶ ἐν τούτοις εὐορκοῦσιν; cf. pp. 70, 4-20; 85, 19-20. See also Viano, 2018, p. 955.

106. Pseudo-Archelaos, *On the Same Divine Art, in Iambic Verse*, vv. 296-297, ed. Goldschmidt, 1923, p. 58.

107. *CAAG* II, pp. 28, 20 – 33, 3 at 29, 24 – 30, 9. See Mertens, 1988 (cf. a revised edition of the oath at pp. 6-7); Lopes da Silveira, 2022; Blanco Cesteros, this issue (where additional bibliography on *The Letter of Isis* is cited). Gruner (1807) has studied the three alchemical oaths of Isis, Christianos, and Pappos.

108. Synesios, *To Dioskoros: Notes on Demokritos' Book* 4, 38-42, ed. and transl. Martelli, 2013, pp. 124-125 (see commentary on p. 241, n. 7).

The necessity for a true alchemist to be virtuous and pious is exemplified in both Christianos' moral code and *Oath*. Yet, parallel views are also traceable in other alchemical texts, such as Stephanos of Alexandria's work and the four alchemical poems.[109] This fact constitutes evidence that in the process of the Christianization of alchemy in Byzantium, moral excellence, as a prerequisite for true engagement with alchemy, was further emphasized – in the sense that it shaped the philosopher-alchemist's intellect and soul into a proper receptacle of divine grace, through which he could be enlightened. In this context, for Stephanos, the visitation of grace requires the renunciation of the world, the mortification of the body, and the praise of God, among other things.[110] Pseudo-Archelaos describes a similar preparation of the alchemist's body and soul to receive the knowledge granted by grace in a manner that strongly resembles a way of life befitting to an ascetic.[111] Such views, besides being reminiscent of the aforementioned counsels to Theosebeia by Zosimos, seem also to converge with the Christian understanding of the terms "philosopher" and "philosophy", according to which, the Christian way of life, aiming at moral perfection, was considered "true philosophy" and was paradigmatically identified with the monastic ideal.[112]

As shown in the above passages, Christianos upholds that all knowledge, including the "alchemical", is participation in divine knowledge. Access to it is granted, as a gift, by God's grace but only to a philosopher-alchemist who holds certain virtues and serves a God-pleasing purpose. The pursuit of knowledge is linked to the pursuit of moral life, a traditional philosophical quest. Christianos' moral code serves to identify an alchemist as "worthy" or "unworthy" by virtue of his conduct and consequently delineates the moral boundaries of the field. True knowledge cannot be achieved outside of them. In this way, Christianos contributes to the construction of the identity of the philosopher-alchemist in Byzantium.

But could a path to participate in divine knowledge be paved with mathematics?

109. See *e.g.* Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 1, 42-43, ed. Papathanassiou, 2017, p. 158; 4, 29-34, p. 174; 6, 240-244, p. 197; pseudo-Theophrastos, *On the Same Divine Art, in Iambic Verse*, vv. 247-265, ed. Goldschmidt, 1923, p. 42; pseudo-Hierotheos, *On the Divine and Sacred Art, in <Iambic> Verse*, vv. 196-199, ed. Goldschmidt, 1923, p. 48.

110. Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 8, 125-145, ed. Papathanassiou, 2017, pp. 211-212 (see commentary on p. 142). See also Papathanassiou, 2020, p. 492.

111. Pseudo-Archelaos, *On the Same Divine Art, in Iambic Verse*, vv. 37-48, ed. Goldschmidt, 1923, p. 51; vv. 288-295, p. 58; vv. 314-326, p. 59.

112. On this understanding of philosophy, see Malingrey, 1961. For a synopsis, see O'Meara, 1991; also 2017, p. 171.

## 4. Divine Mathematics

In the texts handed down under his name, Christianos attempts to provide a description of the alchemical art and to interpret ancient authorities on key topics (*e.g.* the notion of "divine water").[113] At the same time, he seeks to harmonize seemingly diverse views, interpreting the vagueness of the language of the ancient masters in a two-fold way: first, as a precaution, aiming to deceive those who, out of grudge, would destroy alchemical books;[114] second, as a means of exercising the minds of those interested in alchemy,[115] a method associated with pseudo-Demokritos and often cited by Synesios and Olympiodoros.[116] Christianos strives to demonstrate, as he says, a well-known fact to all who engage in the study of these subjects: that the material of science is one and only in terms of species (μία καὶ μόνη τῷ εἴδει).[117]

Christianos is preoccupied with the development of a rigorous alchemical method which could further serve as a means to demarcate true alchemical pursuits. His work *On Making Gold, Thirty Chapters* contains a chapter titled Πόσαι εἰσὶν αἱ κατ' εἶδος καὶ γένος διαφοραὶ τῶν ποιήσεων ("How Many Are the Differences [Differentiae] of Productions by Species and Genus").[118] Within this chapter, he exposes in detail the combinations of certain substances and the various methods of their treatment that yield compounds of different states, by applying, as he states in another chapter, the Platonic dialectical method of division by genera and species.[119] The general idea of Christianos' text is explained below in *simple* terms.

The main concept is that the matter is quadripartite and corresponds to the four parts of an egg (shell, membrane, white, yolk).[120] In fact, Christianos' text is one

113. He mentions mainly pseudo-Demokritos, Zosimos of Panopolis, and Hermes, but he also refers to Apollo (*CAAG* II, p. 276, 3, 15; Letrouit, 1995, p. 81), Agathodaimon (*CAAG* II, p. 280, 5), Isis (*CAAG* II, p. 375, 2; Letrouit, 1995, p. 82), Ostanes (*CAAG* II, p. 396, 2), Mary the Jewess (*CAAG* II, pp. 273, 3; 277, 19; 282, 5); Synesios (*CAAG* II, p. 416, 15), and Petasios (*CAAG* II, pp. 278, 17; 282, 9; 416, 15; Letrouit, 1995, p. 48).

114. *CAAG* II, pp. 400, 10-12; 416, 3-5. One cannot but think here of the burning of the alchemical books in Egypt by Diocletian. For a recent discussion of this story and its possible monetary aspects, see Merianos, 2017, pp. 238, 248.

115. *CAAG* II, pp. 397, 15-18; 414, 2-4; 416, 5-10.

116. See above, n. 47.

117. *CAAG* II, p. 414, 1-2.

118. *CAAG* II, pp. 410, 16 – 414, 10; see also his remarks at pp. 409, 1 – 410, 15.

119. *CAAG* II, p. 418, 3-7. See Viano, 2005b, p. 94; 2018, p. 953.

120. It should be noted that Paul Kraus (1942, p. 37) argued that Christianos' consideration of the matter as quadripartite (symbolized with the egg), his classification of different processes after "certains principes arithmologiques", as well as his comparison of treatments with geometrical figures, evoke the semi-legendary Muslim alchemist Jābir ibn Ḥayyān. However, as already said, Christianos himself refers

of several in the Greek alchemical corpus referring to the processing of eggs for the preparation of a substance intended for the "dyeing" of base metals into silver or gold. Since ancient times, the egg was considered an image of the world; its four parts correspond to the four elements.[121] Christianos identifies four classes (τάξεις), arranged according to the number of egg parts included in each one (combinations or single components). There are three ways of preparing compounds (συνθέματα) – which Christianos alternately calls "drugs" (φάρμακα)[122] – made of either the whole egg or combinations of its parts or components: with fire; without fire; or with a mixed method. The compounds are in one of the following three states: dry, liquid, or a middle state.[123] Thus, the generic classes of productions are formed as follows:

> I. Four parts of the egg: 1 combination (shell-membrane-white-yolk) × 3 methods of processing × 3 states of the compounds = 9 generic classes.

---

to the Platonic dialectical method of division by genera and species concerning his method of classification, while, as will be shown below, the matching of treatments to geometrical shapes is rather reminiscent of Proclus' comments on certain figures.

121. For other Greek alchemical texts on egg distillation, see Colinet, 2000, p. 171; Dufault, 2017. Olivier Dufault (2017) argues that the majority of the Greek alchemical texts including an egg-distillation recipe must have been written after the 6th cent. and appeared at the end or after the composition of the Greek alchemical corpus. Andrée Colinet (2000) proved that the so-called "Work of the Four Elements" (*CAAG* II, pp. 337, 13 – 342, 18), in particular, is closely related to a text attributed to Jābir ibn Ḥayyān. Colinet showed that the Greek text is an adaptation of the Jabirian work with insertions, omissions, and other changes. She deemed that the Greek adaptation probably depended on the Latin translation of the Jabirian treatise, without excluding the possibility that the Greek text derived directly from the Arabic original. However, the most significant difference is that the "stone", which is mentioned both in the Arabic original and the Latin translation, has been replaced by eggs in the Greek text, a choice following the Graeco-Roman tradition of egg symbolism (Colinet, 2000, pp. 174, 179, 188).

122. On the term *pharmakon* in pseudo-Demokritos, see Martelli, 2009, p. 13. On the same term in Stephanos of Alexandria, see Papathanassiou, 1990, pp. 121-122, 124; 2017, pp. 110-111, 132, 134-135.

123. Christianos seems to echo Galen with regard to the three states of the compounds. See *e.g.* Galen, *Mixtures* I 9, ed. Helmreich, 1904, pp. 32, 24 – 33, 16; transl. Singer, van der Eijk & Tassinari, 2018, p. 88: "Now, since the middle in any genus, and most obviously within the totality of existent objects, arises from a combining together of the extremes, our conception and distinguishing of it must also be composed on the basis of those. […] Furthermore, if you add dry earth, ash, or some other such thing that is completely dried-out, to an equal volume of water, you will produce a body that is in the middle (τὸ μέσον) with regard to the opposition of dry and wet (κατὰ τὸ ξηρόν τε καὶ ὑγρόν)". Christianos uses mainly the adjective μέσος, -η, -ον to denote the middle state, and alternatively the adjective οὐδέτερος, -α, -ον (neutral). It should be noted that Viano (2008, p. 88; 2018, p. 953) argues that Christianos was affected by the descriptions of states of physical bodies (liquids, solids, composite nature) and the processes (cooking, melting, decomposition by fire or liquid) in Book 4 of Aristotle's *Meteorology*.

II. Three parts of the egg: 4 combinations (shell-membrane-white; shell-membrane-yolk; shell-white-yolk; membrane-white-yolk) × 3 methods of processing × 3 states of the compounds = 36 generic classes.
III. Two parts of the egg: 6 combinations (shell-membrane; white-yolk; shell-white; membrane-yolk; shell-yolk; membrane-white) × 3 methods of processing × 3 states of the compounds = 54 generic classes.
IV. One part of the egg: 4 components (shell; or membrane; or white; or yolk) × 3 methods of processing × 3 states of the compounds = 36 generic classes.

Additionally, a combination or a component treated with a specific method and yielding a compound in one of the three states constitutes a specific class under a generic class of productions (*e.g.* egg whites and yolks processed with fire and yielding a liquid compound constitute a specific class, under the 54 generic classes of treatments that use two parts of the egg). The sum of every single production results in the entirety of the classes of alchemical productions (τάξεις τῶν ποιήσεων), which amount to 135 (9+36+54+36).[124] This represents the sum of all feasible productions.[125] Next, Christianos describes how to use the produced "drug", but we will not touch upon this here. It is worth mentioning that the Anonymous (Ἀνεπίγραφος) Philosopher (8th-9th cent.), in his treatise on alchemy and music,[126] takes for granted that there exist only 135 kinds of alchemical productions.[127] Thus, he seems to rely on Christianos' exposition and deems this knowledge fundamental.[128]

As already noted, Christianos attributes his method to Plato, but by the time he adopted it, it had already been developed by later philosophical schools. Lucas Sior-

124. For the method of calculation, cf. *CAAG* III, p. 396, n. 1; Stephanides, 1927, pp. 43-44.

125. *CAAG* II, p. 413, 10-13: Μόναι τοίνυν αἱ εἰρημέναι τάξεις τῶν ποιήσεων ρλε′ ἀναδειχθεῖσαι εἰς ἑαυτῶν μεθόδους γεννώσας προεστήσαντο, τήν τε διὰ μόνου πυρός, καὶ τὴν ἄνευ τελείως πυρός, καὶ τὴν ἐξ ἀμφοτέρων ξηρῶν, ἢ ὑγρῶν, ἢ μέσων ἀποκυΐσκουσαι φάρμακον. The text further mentions that if the productions in which the whole egg is used are excluded, then 129 specific classes are left, and it is impossible to find more (p. 413, 14-15). Actually, the number should read 126 (36+54+36), as is corrected in the French translation in *CAAG* III, p. 396. See also the *app. crit.* in *CAAG* II, p. 413.

126. As Letrouit (1995, p. 63) noticed, the correct order of the text in *CAAG* II should be: pp. 433, 11 – 436, 18 + 219, 13 – 220, 10 + 436, 20 – 441, 25. For this work, see Stephanides, 1927; Wellesz, 1951, pp. 154-158.

127. *CAAG* II, p. 433, 13-14.

128. This is not the only instance that the Anonymous Philosopher echoes Christianos. Letrouit (1995, p. 63) shows two other cases where the Anonymous Philosopher (*CAAG* II, pp. 437, 13-14; 439, 1-3) draws on Christianos (cf. *CAAG* II, p. 409, 8-10). It should be noted that, according to Letrouit (1995, pp. 63-65), the name "Anonymous Philosopher" applies to two different authors, dating to the 8th-9th cent.

vanes, commenting on the concept of "participation" in Proclus, helps us understand the reason why Christianos took over the task of precisely defining the kinds (and the number) of alchemical productions:

> "Definition shows the essence of a thing's substance. In a manner well liked by Neo-Platonists from Porphyry onwards, Aristotle accepted that 'participation' relates genus and species asymmetrically. The species partakes of the genus and is essentially defined by it, but the genus does not partake of the species. But, for Aristotle, there are no general properties transcending their particulars, so the genus is not more than the collection of its disjointed species. According to Aristotle, 'definition' consists of distinguishing attributes, the 'differentia', applied to a 'genus'. The 'differences' distinguish specific forms out of the genus: so Aristotle spoke rather rashly of the genus as matter (*Metaph.* 1038a7-8)".[129]

From what has been discussed above, it could be suggested that Christianos seems to also regard the genus as the assembly of its severed species.

His chapter examining the 135 kinds of alchemical productions is immediately followed by another, titled Πῶς δεῖ νοεῖν αὐτὰς καὶ σχήμασι γεωμετρικοῖς ("How One Should Apprehend Them with Geometrical Figures Too").[130] The word αὐτὰς ("Them") corresponds to the διαφοραὶ τῶν ποιήσεων ("Differences [Differentiae] of Productions") in the title of the previous chapter. Christianos refers once again to the four parts of the egg. He associates four geometrical figures to the number of components of the egg used in treatments: the processes with all four parts of the egg are represented by the square; with three parts by the triangle; with two parts by the semicircle; and with one part (presumably) by the circle.[131] Christianos then links the

129. Siorvanes, 1996, p. 74.

130. *CAAG* II, pp. 414, 11 – 415, 9. Cf. *CAAG* III, p. 398, n. 3; Berthelot, 1885, pp. 264-265.

131. Concerning the circle, it should be stressed that the text in *CAAG* II, p. 415, 4-5 (transcribed from **M**, f. 124$^{r-v}$) does not explicitly refer to such a figure: ἐπὶ δὲ τῶν ἀπὸ μέρους ἑνὸς γινομένων τάξεων, κυρίως ἐστὶν ὁ διαγραφόμενος μόνος, ᾗ γραμμοειδὲς (γαμμοειδὲς **M**, f. 124$^{v}$). However, the French translation of the text (*CAAG* III, p. 398) mentions it: "*Quant aux classes formées avec une seule partie, c'est à proprement parler le (cercle) seul, décrit en tant que résultant d'une ligne unique*". The justification of the reference to the circle in the translation is provided by the *app. crit.* of the edition (*CAAG* II, p. 415), which refers to two 17$^{th}$-cent. manuscripts that present a differentiated text. In particular, Par. gr. 2251, p. 99, reads: τῶν δὲ ἀπὸ μέρους ἑνός, γινομένων τάξεων, κυρίως ἐστὶν ὁ διαγραφόμενος μόνος κύκλος, τῇ γραμμοειδεῖ καταθέσει. The text of Par. gr. 2329, f. 29$^{v}$, is similar; however, it seems that the scribe has erased and rewritten many of its parts. It should be further noted that **B** and Par. gr. 2275 – a copy of **B**, dated from 1465 (for this manuscript, see Martelli, 2011, pp. 13-14 and n. 44) – also present a different version of the text. In **B**, f. 111$^{v}$, the word μόνος is followed by a lacuna (a blank space in the

ways of processing the parts of the egg with geometrical solids. Processing with fire is traditionally associated with the pyramid. Treatment without fire is linked to the octahedron, the solid denoting the element of air, which is considered to have a middle nature and position between water and air. Christianos' exposition is pervaded by Neoplatonic ideas echoing, *inter alia*: long-standing Pythagorean beliefs;[132] the Platonic solids from *Timaeus* (particularly the tetrahedron and the octahedron);[133] and the comments of Proclus on the First Book of Euclid's *Elements* concerning the circle, the semicircle, the triangle, and the square.

---

manuscript) and then by the word μοειδὲς (*sic*), which in Par. gr. 2275, f. 79ʳ, becomes μονοειδές, with the addition of the letters νο in the interlinear space, probably by a later hand. Presumably, the unintelligible word μοειδὲς in **B** corresponds to part of the word γ<ρ>αμμοειδές, mentioned previously. The scribe of Par. gr. 2275 faithfully copied the text from **B**, but it seems that a later reader turned μοειδὲς into μονοειδές, in an attempt to make the word intelligible. Be that as it may, it is noteworthy that Proclus in the *Commentary on the First Book of Euclid's Elements* describes the circle in a way that coincides with the term γραμμοειδὲς (linear): "[…] every circle is only a line" (Def. I, ed. Friedlein, 1873, p. 92, 7-8; transl. Morrow, 1970, p. 75).

132. The Pythagoreans construed reality as being numerical in nature, according to Aristotle (*Metaphysics* 986a1-3; 1083b11-13, 17; 1090a20-25; see Riedweg, 2005, p. 80). A key position in Pythagorean arithmology is reserved for the τετρακτὺς (*tetraktys*), a term that can be translated as "Fourness" and denotes the decad, which is considered as the sum of the first four numbers (the addition of 1+2+3+4 amounts to 10, the "perfect" number). The *tetraktys*, visualized with the aid of pebbles that are arrayed in four rows, forms an equilateral triangle (cf. Riedweg, 2013, pp. 53-54).

133. In *Timaeus*, Plato deems the cosmos to be the creation of a Demiurge, a divine craftsman, a description which would greatly affect alchemical authors. This craftsman is benevolent, rational, but not omnipotent, and works with pre-existing materials available to him. He is also a mathematician because he fashioned the cosmos following geometrical principles. An important aspect of Plato's theory concerns the five regular geometrical solids: the tetrahedron (or pyramid), the hexahedron (or cube), the octahedron, the dodecahedron, and the icosahedron. He associated each of the four traditional elements with one of the solids: fire-tetrahedron; air-octahedron; water-icosahedron; and earth-cube. As for the dodecahedron (the regular solid closest to the sphere), it was assigned to the entire cosmos. The variety in the material world is produced by the mixing of the elements in various proportions. The rectilinear plane surfaces of the so-called "Platonic solids" are dividable into triangles and these are in turn dividable into right-angled triangles (that is, with a 90-degree angle), either isosceles or scalene. Scalene triangles are what Plato considers to be truly elemental units, the *stoicheia*. In particular, three of the four solids, the tetrahedron, the octahedron, and the icosahedron (fire, air, and water, respectively), are made of equilateral triangles (reminding of the Pythagorean *tetraktys*). These equilateral triangles in turn are formed by assembling six right-angled scalene triangles with angles of 30, 60, and 90 degrees. The fourth solid, the cube, associated with the element of earth, can be assembled only by right-angled isosceles triangles forming squares. Thus, only the elements of fire, air, and water can be transmuted into one another, being composed of the same *stoicheia*, the right-angled scalene triangles. The element of earth cannot participate in the process of elemental transformation, as its *stoicheia* are isosceles, not scalene triangles; this means that when the faces of the cube are broken, they can reassemble only into another cube. See Mueller, 2005, pp. 107-111; Lindberg, 2007, pp. 38-41; Lloyd, 2007, pp. 99-101.

To better understand the association between treatments with a specific number of egg parts and specific geometrical shapes, it will be useful to present nuggets of Proclus' commentary on these four figures, which are employed in his geometrical thinking as a way to express metaphysical principles.[134] According to Christianos, treatments with all four parts of the egg correspond to the square; Proclus states that "[t]he Pythagoreans thought that this more than any other four-sided figure carries the image of the divine nature".[135] Processes with three parts of the egg correspond to the triangle; for Proclus, "[…] the triangle is the premier of all rectilinear figures, […] because it is determined by the number three and formed by it".[136] Treatments with two parts of the egg correspond to the semicircle; Proclus observes that "[…] all figures of this sort are dyadic, […] and are composed of unlike elements".[137] Finally, processes with one part of the egg correspond to the circle; Proclus comments that "[t]he first and simplest and most perfect of the figures is the circle. […] It corresponds to the Limit, the number one, […]".[138] Thus, numbers (four, three, two, and one) are the agents that create the relationship between alchemical treatments and geometrical figures.

Geometry, for Proclus, is more suitable than arithmetic to represent the mediational role of the mathematical sciences, because it is mediational itself, able to extend metaphysical truths into imaginative space.[139] To offer an example, the progression from unity to multiplicity (and from multiplicity to unity) is fundamental for Christianos, who applies it, for instance, in his argument on the unity of the "divine water", the agent of transmutation.[140] Proclus helps us conceive the role geometry can play in understanding this progression when he says: "[…] if he (the student) wonders how the many could be in the One, and all in the indivisible, let him think of the monad and how it is shown that all forms of odd and even are (pre-contained) in it, the circle [κύβος Steel] and sphere, and the other forms of numbers".[141] Christianos' use of

134. O' Meara, 2005, pp. 139-141. It is interesting to note that Proclus himself is critical of those who claim to produce gold (*Commentary on Plato's Republic*, ed. Kroll, 1899-1901, II, p. 234, 14-25); see Viano, 1996, pp. 202-203; also Dufault, 2019, pp. 101-102.

135. Proclus, *Commentary on the First Book of Euclid's Elements*, Def. XXX-XXXIV, ed. Friedlein, 1873, p. 173, 2-4; transl. Morrow, 1970, p. 136.

136. Def. V, ed. Friedlein, 1873, p. 115, 5-8; transl. Morrow, 1970, p. 93.

137. Def. XVIII, XIX, ed. Friedlein, 1873, p. 159, 12-13; transl. Morrow, 1970, p. 126.

138. Def. XV, XVI, ed. Friedlein, 1873, pp. 146, 24 – 147, 4; transl. Morrow, 1970, p. 117.

139. O' Meara, 2005, pp. 138-139.

140. See *e.g. CAAG* II, pp. 404, 18 – 405, 5. On the "divine water", see Martelli, 2009.

141. Proclus, *Commentary on Plato's Parmenides* IV 926, 20-23, ed. Steel, 2007-2009, II, p. 118; transl. O' Meara, 1989, p. 200.

geometrical figures and solids no longer seems bizarre but is (without a doubt) well embedded in the Neoplatonic tradition.

Christianos' short chapter concludes with the statement that the diagrams of the relevant figures are depicted.[142] It is notable that from the three main witnesses of the Greek alchemical corpus, the text is accompanied by four freehand sketches of geometrical shapes only in codices **B** and **A**, in the margin of their respective pages.[143] The text in **M** does not include any corresponding figures.

It is obvious from the two aforementioned chapters that Christianos expresses his method concerning the classification of alchemical productions with an arithmetical and geometrical language. The "mathematization" of the classes of substances and the feasible productions suggests that, in all likelihood, he considered alchemy as sharing similar traits with the sciences of the quadrivium. The Anonymous Philosopher will later attempt to prove the same, stressing the similarities between alchemy and music through analogical reasoning.[144] The affinity of alchemy to the sciences of the quadrivium accentuates the idea that alchemical practice should be conceived in, and grounded on, concrete (mathematical) principles and rigorous, logical procedures that constitute a precise methodology.

In a Neoplatonic manner, the number 135 does not denote only the feasible productions but symbolizes the totality of the "art" itself. I think that this kind of mathematical exactness probably accommodates an essential request: the formation of a strict methodology serving true alchemical pursuits. As Christianos reveals in another chapter – and this rationale permeates all of his work – he is urged by the need to show that the "art" is not unlimited and incomprehensible in every way.

142. *CAAG* II, p. 415, 9: ἔστωσαν δὲ τὰ διαγράμματα οὕτως.

143. **B**, f. 111$^{r}$; **A**, f. 106$^{r}$. In both manuscripts the following geometrical figures and solids are depicted (from top to bottom): a square, a triangle, a semicircle, and (possibly) a pyramid. The last figure was presumably meant to depict an open pyramid consisting of four triangular lateral surfaces and a four-sided surface at its base. It is striking, though, that a square-based pyramid is depicted, rather than a triangular-based one, or else, a regular tetrahedron, the solid associated with the element of fire in the Platonic *Timaeus* (56a-b; see above, n. 133; cf. Plutarch, *On the Obsolescence of Oracles* 428d). If this figure portrays a pyramid indeed, this could mean that whoever originally sketched these figures, as well as the copyists that reproduced them, probably did not understand the type of pyramid Christianos was referring to. Another interesting fact is that in **A** the figures are placed in the right margin of f. 106$^{r}$, in correspondence with the closing sentence of the chapter (ἔστωσαν δὲ τὰ διαγράμματα οὕτως), whereas in **B** they are depicted in the left corner of the lower margin of f. 111$^{r}$, even though the chapter finishes on the next page (where the phrase ἔστωσαν δὲ τὰ διαγράμματα οὕτως appears). These shapes are also included in Par. gr. 2275, f. 78$^{v}$, as well as in Par. gr. 2251, p. 99, and Par. gr. 2329, f. 29$^{v}$. Note that the four figures in question have been erroneously reproduced upside down in *CAAG* I, p. 160, fig. 36.

144. On analogy and analogical reasoning, see Bartha, 2022.

He aims, on the one hand, to remove the obscurity of the various descriptions and writings, revealing that the method is only one; on the other hand, he tries to avoid attracting the usual criticism of presenting an unlimited number of productions.[145] The Anonymous Philosopher becomes more clear about the pitfalls of not following this methodology: "[…] one must beware of disorder (ἀταξίαν) in all that has been said. […] the work of willfulness (αὐθαδείας) will be harmful and worthy of laughter".[146] This is reminiscent of Zosimos of Panopolis' similar aphorism in *On the Treatment of the Body of Magnēsia*, where he reproaches the ridiculous deeds of those alchemists who do not have patience for lessons and always lack a solid foundation (κενεμβατοῦσιν).[147] An aspiring practitioner should follow principles and procedures that safeguard the result of the attempt. Overlooking the teachings of the masters of the past, along with ignorance, improvisation, and lack of patience would inevitably result in a mocking failure.

Christianos was not the only Byzantine alchemical author pointing out alchemy's relation with the mathematical sciences. As already seen, Stephanos of Alexandria and the Anonymous Philosopher expressed similar ideas. The former, exposing his model of matter,[148] explicitly states that the physical bodies, that is, the four elements, need to be in congruence (ὁμολογίας) with mathematical theory.[149] Thus, he echoes the thesis that acquaintance with mathematics is indispensable for the conception of the structure of matter (cf. Plato, *Timaeus* 53b-c). It has been noticed that, for Stephanos, "[g]eometry offers its immaterial figures as a static model for the description of the structure of atoms or indivisible bodies in the material world".[150] It seems that he was most likely influenced by the systematic mathematization of the later Greek philosophy, an effect of Iamblichus' program to Pythagoreanize Neoplatonic philosophy.[151]

145. *CAAG* II, pp. 417, 14 – 418, 4.

146. *CAAG* II, p. 436, 8-18.

147. *CAAG* II, p. 191, 6-7.

148. On Stephanos' conception of matter and its philosophical background, see Papathanassiou, 1990, p. 126; 2005, pp. 117-120; 2017, p. 93; Viano, 2005b, p. 102; 2018, p. 952.

149. Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 6, 77-78, ed. Papathanassiou, 2017, p. 189: Τὰ δὲ φυσικὰ σώματα, οἷον τὰ τέσσαρα στοιχεῖα, ἔχει τὴν ἀνάγκην τῆς ὁμολογίας διὰ τῆς μαθηματικῆς θεωρίας. See Papathanassiou, 1990, p. 126; 2005, p. 119. On alchemy and the mathematical sciences in the work of Stephanos, see Papathanassiou, 1990, pp. 126-127; for astronomy, in particular, see Papathanassiou, 1996, pp. 260-264; for music, see Wellesz, 1951, pp. 153-154.

150. Papathanassiou, 1990, p. 126.

151. O' Meara, 1989, pp. 104-105, 212.

As previously pointed out, Stephanos' definition of philosophy as "likeness to God as far as humanly possible" appears within this context of mathematization. Therefore, the philosophy which shows the path of assimilation to God is Neoplatonic in nature and highly mathematized. This is consistent with the Neoplatonic belief that one's progress to metaphysics passes through mathematical sciences,[152] but it also suggests that the effort to approach the universe, which proclaims the glory of God, requires a firm grasp of the universal mathematical language. For Proclus, who particularly exalts the role of geometry as a mediational science,

> "[m]athematics […] promotes perfection in the life of discursive reasoning, but it also prepares the soul for a higher level of reasoning, that of theology or metaphysics, the practice of which prepares the soul in turn for access to yet a higher level of divine life, that of non-discursive, perfect, complete knowledge, *i.e.* the life of divine Intellect".[153]

In the context of Neoplatonism, and within the period spanning roughly from around the 7th to the 9th cent., it seems that certain alchemical authors, such as Christianos, attempted, in different degrees, to establish an alchemical theory and/or methodology on a concrete foundation with mathematical characteristics. In doing so, they tried to draw legitimacy for the field of alchemy by projecting its relation or analogy with arithmetic, astronomy, geometry, and music. This suggested affinity implies that they considered alchemy to be mathematical in nature and eligible for a rigorous methodology. Thus, if the "art" could be lifted to a level close to the sciences of the quadrivium, its consideration as a legitimate subject of philosophical inquiry could be enhanced. It is plausible to assume that these attempts could have also furnished alchemical philosophers with a valuable means for the demarcation of the field. Amateurs and charlatans, motivated mainly by the desire to acquire wealth or easy profit, degraded the "art", reducing it to either a nonsensical or a defrauding practice. A precise methodology could guarantee the alchemical outcome and, at the same time, exclude those who were devoid of profound knowledge.[154] Combined with the proper moral conduct, discussed in the previous section, this methodology constituted a safe way of identifying a true philosopher.

152. O' Meara, 2005, p. 137.
153. O' Meara, 2005, p. 138.
154. See Merianos, 2021, pp. 70-72.

## 5. The Context. A Christian Culture Open to the Lessons of the Universe

Any attempt to contextualize Christianos' views faces the problem of his dating. Nonetheless, his religious vocabulary could provide some hints in our attempt to chronologically situate him. Based on what has been previously examined in Section 2, it would seem the only conclusion is that Letrouit's evidence on the dating of Christianos (deriving from the assumption that the dyestuff λαχὰ[ς] was attested in Egypt after the Arab conquest) is most probably not valid anymore. Could Christianos, thus, be dated earlier? There are certain Christian phrases in his work that could suggest this. For example, the earliest datable mention of the exact phrase τῆς ἁγίας καὶ ὁμοουσίου καὶ συναϊδίου Τριάδος ("of the Holy and Consubstantial and Coeternal Trinity"), appearing in the moral code, is found in Eustratios the Presbyter's late-6th-cent. *Life of the Patriarch Eutychios*.[155] Furthermore, the phrase ἀτρέπτως ἐνανθρωπήσας ("who without change became man") in Christianos' *Oath* evokes, as shown above, the *troparion* "Ὁ Μονογενὴς Υἱὸς" ("The Only-begotten Son"), which is nearly contemporary with the *Life of Eutychios*. However, one should be cautious, as it could have been part of a later addition. These phrases could serve as *termini post quos* for the composition of Christianos' work, and along with other potential evidence – such as the fact that he does not refer to Stephanos of Alexandria – perhaps point more to the late 6th or 7th cent. rather than the 8th. Although this meager evidence cannot decisively tilt the scales in favor of the earlier dating, Christianos' religious vocabulary is nonetheless worth studying further.

Christianos' correlation between Christianity and mathematics is not surprising for the presumed period of his dating. Perhaps one of the most graphic ways to demonstrate this link around the mid-6th cent. is to refer to the church of Hagia Sophia in Constantinople. It was built between 532 and 537 by the emperor Justinian, and its architects were Anthemios of Tralles and Isidore of Miletus. The core of the building exemplifies, according to Dominic O' Meara, "the geometry of the divine as interpreted by Proclus in his commentary on Euclid":

> "From the centre of the church, the lofty point from which radiates a dome, the church expands to the circular base of the dome, itself resting on four semi-circular arches. The circular base and semi-circular arches create four triangular spaces, the pendentives. Arches and triangles lead down in turn to the square composed by four massive

155. See above, n. 73. This conclusion was reached after a search was conducted in the *Thesaurus Linguae Graecae* (stephanus.tlg.uci.edu), accessed on November 25, 2021.

> piers. Expressed in solids, the sequence centre, circle, semi-circle, triangle and square manifests a perfectly controlled progression from unity to developing levels of perfectly unified multiplicity, ideal limitations of multiplicity which bring it back in stages to ever greater unity, back to the centre, transcendent source of all. The church thus corresponds, in visual space, to the metaphysical dynamics of unity and multiplicity, the progression of reality from, and reversion to, the Ultimate, as formulated by Proclus".[156]

O' Meara traces the links between the architects of Hagia Sophia, the School of Proclus in Athens, and the Neoplatonic School in Alexandria, suggesting that Anthemios and Isidore, mathematicians themselves, were acquainted with Proclus' ideas on the higher significance of geometry. As a result, any visitor to Hagia Sophia, provided they were well-versed in philosophy and mathematics, would have recognized the geometry of the divine, expressed in three-dimensional space.[157]

Evidence for the appeal of certain mathematical sciences during the 7th and 8th cent. is paradigmatically exposed by Paul Magdalino in his study of astrology in Byzantium.[158] Nevertheless, it must be stressed that interest, particularly, in astronomy and astrology does not seem to be continuous during this period (at least with our current knowledge); there is a gap between Herakleios' reign (610-641) and the late 8th cent.[159]

Magdalino shows that the political and cultural developments during Herakleios' reign led to a vivid interest in studying the "secular" sciences. The study of astronomy served the official need to establish, with perfect accuracy, the calendar of the Paschal cycle and the chronology of world history. With regard to the calendar, the official project aimed at introducing an improved system; it would come to replace the diverse practices in different congregations, thus making it part of the policy of religious conciliation which promoted Monoenergetic and Monotheletic doctrines. But the adepts of astronomy were also prepared for the study of a Christianized astrology, which would examine the design of Providence in the celestial movements.[160] So, it is not peculiar that official interest in astrology manifested during the most unpromising period of Herakleios' reign, when the Persians were dominant on the battlefield (until the Byzantine counter-offensive that began in 622) and fear for the future of the empire was widespread.

156. O' Meara, 2005, pp. 143-144.
157. O' Meara, 2005, pp. 144-145.
158. Magdalino, 2006, ch. II.
159. Magdalino, 2017a, pp. 202-203, 214; cf. Caudano, 2020, p. 210.
160. Magdalino, 2006, p. 37.

A parallel need must have urged the Byzantines to further study an already known "art". From what can be inferred, strong engagement with alchemy, probably with imperial encouragement, must have been related to the state economy and monetary affairs, since the "divine art" could have appeared as a way to replenish the depleted treasury. Suffice it to give two known examples to depict the dire economic situation. In 615, according to the *Chronicon Paschale*, Herakleios introduced the new silver *hexagram* coin, "[…] and imperial payments were made with it, and at half their old rate". In 622, according to Theophanes the Confessor, Herakleios "[b]eing short of funds he took on loan the moneys of religious establishments and he also took the candelabra and other vessels of the holy ministry from the Great Church, which he minted into a great quantity of gold and silver coin".[161] The Byzantine state was in desperate need of money, and a remedy to the crisis could utilize alchemical knowledge. In this context, the figure of Stephanos of Alexandria became the model of the polymath savant of the period, exemplifying the Christian philosopher who puts his diverse knowledge, stemming from the intellectual tradition of Alexandria, in the service of the state and closely collaborates with an emperor (Herakleios) for the common good.[162] Therefore, it is hardly a coincidence that an association between Herakleios and alchemy is discernible in the Greek alchemical corpus: (a) the last Lecture of Stephanos' work is addressed to Herakleios, and (b) in the table of contents of **M**, three, now lost, alchemical texts are attributed to the same emperor.[163]

At the same time, theological thought was characterized by the evocation of the entirety and unity of the divine work, a trend which, although based on the authority of the New Testament, also admitted the existence of other means of accessing knowledge of the providential design.[164] The most striking example is that of the prominent theologian Maximos the Confessor, who went so far as to state that:

> "[…] whoever wishes blamelessly to walk the straight road to God, stands in need of both the inherent spiritual knowledge of Scripture, and the natural contemplation of beings according to the spirit. In this way, anyone who desires to become a perfect lover

161. *Chronicon Paschale*, ed. Dindorf, 1832, p. 706, 9-11; transl. Whitby & Whitby, 1989, p. 158. Theophanes the Confessor, *Chronographia*, ed. de Boor, 1883, pp. 302, 34 – 303, 3; transl. Mango & Scott, 1997, p. 435. Cf. Hendy, 1985, pp. 494-495.

162. Cf. Magdalino, 2006, p. 51; 2017a, pp. 206-207, 214.

163. (a) Stephanos of Alexandria, *On the Great and Sacred Art of Making Gold* 9 (Title), ed. Papathanassiou, 2017, p. 213; (b) **M**, f. 2$^{r}$. See Letrouit, 1995, p. 58; Saffrey, 1995, pp. 4-5; Mertens, 2006, pp. 218, 221-222; Merianos, 2017, pp. 236-237; Roberts, 2019, pp. 80, 88, 96, 98.

164. Magdalino, 2006, p. 40.

> of perfect wisdom will be able to show what is only reasonable, namely, that the two laws – the natural and the written – are of equal value and equal dignity, that both of them reciprocally teach the same things, and that neither is superior or inferior to the other".[165]

It is notable that earlier in the same text, Maximos characterizes God as "the creator (κτίστης), fashioner (ποιητής), and artisan (τεχνίτης)" of creation.[166] The representation of God as a craftsman originates in the Platonic *Timaeus* (41d), in a description that has profoundly affected alchemical ideas and imagery.[167] In another instance, Maximos reproduces the idea that the four Gospels correspond to the four elements of which the world consists.[168]

Nicholas Constas notes, with regard to Maximos' speculation on the meaning of several numbers,[169] that, for him, they are "a positive expression of the created order, an affirmation of the ontological value of difference, particularity, and multiplicity".[170] Maximos demonstrates elsewhere that "[…] it is not possible for anything whose existence is determined by numerical quantity to be infinite or, consequently, without beginning".[171] This concurs with Christianos' concern to prove that the alchemical productions could not be infinite in number.

The Neoplatonism of Maximos, who was influenced in his Christian cosmology by pseudo-Dionysios the Areopagite, leads to the conception of the universe in a hierarchical and harmonized way, in which all of its parts are linked.[172] The description of this chain of interdependent beings evokes the image of Homer's golden chain (*Iliad* VIII 18-27), a long-standing and influential allegory and sym-

165. Maximos the Confessor, *Ambigua to John* 10, 17, 30, ed. and transl. Constas, 2014, I, pp. 192-195. Doru Costache, commenting on Maximos' *Ambigua to John* 41, points out that his "[…] representation of reality bridges scriptural wisdom, Platonic philosophy, and the Aristotelian science". Furthermore, Maximos seems to advocate that "[…] science, technology, theology, and spirituality can peacefully and creatively coexist and interact […]". See Costache, 2020, pp. 18 and 19, respectively; also 2015, pp. 380-381.

166. Maximos the Confessor, *Ambigua to John* 10, 17, 30, ed. and transl. Constas, 2014, I, pp. 192-193.

167. Viano, 2005b, pp. 103-104.

168. Maximos the Confessor, *Ambigua to John* 21, 5, ed. Constas, 2014, I, p. 424. Cf. Origen, *Commentary on the Gospel of John* I 21, ed. Blanc, 1966, p. 68.

169. Maximos the Confessor, *Ambigua to John* 65-67, ed. Constas, 2014, II, pp. 274-302.

170. Constas, 2014, II, p. 369 (*Ambigua to John* 65, n. 1).

171. Maximos the Confessor, *Ambigua to John* 10, 39 (Title), ed. and transl. Constas, 2014, I, pp. 294-295.

172. Maximos the Confessor, *Ambigua to John* 10, 37, 89, ed. Constas, 2014, I, p. 288; see Magdalino, 2006, p. 42.

bol, which in Neoplatonic texts was conceived as the chain of spiritual powers that bind the universe together with an indissoluble friendship and extend from the highest god to the material universe.[173]

In Byzantine theological thought, the relation between nature and divine causes was shaped by the Christian concept of Divine Providence.[174] Yet, the way Maximos conceives it is remarkable. He ascribes to it the meaning of the "[…] power which holds the universe together, keeping it aligned with the inner principles according to which it was originally created".[175] Such a concept of Providence could even strengthen the notion of universal sympathy uniting all created beings, from the highest to the lowest.[176] This example suggests that certain traditional alchemical ideas could be accommodated quite well in the advanced theological thought of the era, facilitating the ongoing Christianization of alchemy.

To return to the political level, Herakleios' successors, such as Constantine V, also faced a state in crisis, especially after the revival of the Caliphate under the Abbasids. Consequently, it is not surprising that there are clues for a renewed interest in astronomy, astrology, and alchemy.[177] Indications are not limited to Byzantine sources, as the following (well-known) example shows. 'Umāra ibn Ḥamza, ambassador of the caliph al-Manṣūr (754-775), is said to have reported after a stay in Constantinople how the emperor Constantine V demonstrated in his presence a transmutation of lead into silver and copper into gold with the aid of a white and a red powder, respectively. This instigated, according to 'Umāra, al-Manṣūr's interest in alchemy.[178] Albeit in a different and non-alchemical context, relating to the monetization of the state economy, the fact that Constantine has been characterized as φιλόχρυσος ("lover of gold") and νέος Μίδας ("new Midas"), because of his effort to build up a massive reserve of gold,[179] could be further suggestive of the creation of an image of his as an emperor associated with precious metals.

173. Lévêque, 1959, pp. 45-46, 56; Lamberton, 1986, pp. 271-272.

174. Nicolaidis *et al.*, 2016, p. 550.

175. Maximos the Confessor, *Ambigua to John* 10, 19, 37, ed. and transl. Constas, 2014, I, pp. 206-207.

176. Magdalino, 2006, p. 43.

177. Magdalino, 2006, p. 50.

178. See Strohmaier, 1991; Rochow, 1994, pp. 85-87; Gutas 1998, pp. 115-116.

179. According to the iconophile sources that attribute these labels to Constantine V, he pressed the taxpayers in the collection of taxes to achieve this goal. In order to pay their taxes, payable in gold coinage, the farmers were forced to sell off their products cheaply. This resulted in a significant decrease in the price of goods; see Patriarch Nikephoros, *Short History* 85, 12-21, ed. Mango, 1990, p. 160; Theophanes the Confessor, *Chronographia*, ed. de Boor, 1883, p. 443, 19-22. Cf. Hendy, 1985, pp. 226, 298-299; Oikonomides, 2002, p. 981.

As emerges from the above sketchy discussion, during the period that Christianos' work could be dated (late 6th [?] – 8th cent.), the study of alchemy appears to coincide with an interest in the mathematical sciences, prompted also by the openness to learn what lessons the universe can teach about the divine design. Within the aforementioned period, Christianos' Christianized alchemy fitted in the broader Byzantine intellectual culture.

## 6. Conclusion

The circulation of Graeco-Egyptian alchemical texts in the once pagan, now largely Christianized Eastern Roman Empire, led inevitably to a gradual Christianization of alchemical concepts. Certain Byzantine works in the Greek alchemical corpus, such as those of the anonymous author designated as "Christianos", portray a close connection of alchemy with Christianity. These religious elements, which could also provide us with some chronological hints, should not be regarded as a Christian gloss on alchemical ideas. Christianos shows that true alchemical knowledge is participation in divine knowledge and defines the virtues that a philosopher-alchemist must possess to be granted access to it.

Christianos was influenced by the Neoplatonic mathematization of philosophical ideas and introduced a precise method, consisting of sequential and interdependent steps, to define and classify alchemical treatments on a basis with mathematical attributes. It seems that he considered this very method as a path enlightened by God, a gift to participate in divine knowledge. This gift could only be bestowed upon a pious and worthy alchemist in the inner chambers of his soul. The worthiness of the true alchemical philosopher was shaped by a set of (Christian) virtues and the painstaking study of the ancient alchemical literature. Thus, Christian ethics and mathematics, the conduct and the method, coincided in Christianos' thought as a way to elevate and at the same time demarcate true alchemy. It is plausible to conclude that the religious aspects of Christianos' work form an indispensable part of his alchemical methodology.

## Appendix. Pappos' Oath

Apart from Christianos' oath, another one encompassing (presumably) Christian traits appears in the Greek alchemical corpus. It is found at the beginning of a text attributed to Pappos the philosopher, who is dated to the 7th or 8th cent., that is, around the time of Christianos. In the technical part of the text following the oath, Pappos refers to Stephanos of Alexandria (as well as pseudo-Moses), which permits us to set a *terminus post quem* for the dating of Pappos.[180]

In **M**, Pappos' work is simply titled Πάππου φιλοσόφου (*By Pappos the Philosopher*).[181] However, in the manuscript's table of contents, a more complete title corresponding to this treatise can be read: Πάππου φιλοσόφου περὶ τῆς θείας τέχνης (On the Divine Art by Pappos the Philosopher).[182] As previously stated, the text begins with the following oath:

> Πάππου φιλοσόφου[183]
> Ὅρκῳ οὖν ὄμνυμί σοι τὸν μέγαν ὅρκον, ὅστις ἄν συ ᾖ, θεόν φημι τὸν ἕνα, τὸν εἴδει καὶ οὐ τῷ ἀριθμῷ, τὸν ποιήσαντα τὸν οὐρανὸν καὶ τὴν γῆν,[184] τῶν τε στοιχείων τὴν τετρακτὺν[185] καὶ τὰ ἐξ αὐτῶν, ἔτι δὲ καὶ τὰς ἡμετέρας ψυχὰς λογικάς τε καὶ νοεράς,[186]

180. *CAAG* II, p. 28, 12-14. See *CAAG* III, p. 30, n. 4; von Lippmann, 1919, p. 107; Letrouit, 1995, pp. 61, 86-87.

181. **M**, f. 184v.

182. **M**, f. 2v. See Letrouit, 1995, p. 61; Roberts, 2019, p. 89.

183. *CAAG* II, pp. 27, 18 – 28, 4.

184. Cf. Psalms (LXX) 113:23, 120:2, 123:8, 133:3, 145:6; also Acts 4:24; Revelation 14:7.

185. Cf. *e.g.* Eusebios of Caesarea, *In Praise of Constantine* 6, 5, ed. Heikel, 1902, p. 207, 12-13: […] τὴν τῶν στοιχείων τετρακτὺν ἐπινοήσας, […]; Proclus, *Commentary on Plato's Timaeus* III, ed. Diehl, 1903-1906, II, p. 50, 1-2: […] τὴν τῶν στοιχείων εἰσάγει τετρακτὺν […]; IV, vol. III, p. 67, 29: […] κάτωθεν μὲν σελήνην καὶ τὴν τῶν στοιχείων τετρακτύν, […]. Stephanos of Alexandria, whom Pappos mentions, also refers to God as the maker of the four elements (*On the Great and Sacred Art of Making Gold* 5, 23-25, ed. Papathanassiou, 2017, p. 181).

186. Cf. *e.g.* Olympiodoros, *Commentary on Plato's Gorgias* 4, 3, ed. Westerink, 1970, p. 32, 13-14: […] θέλων ψυχὴν λογικὴν καὶ νοερὰν χαρίζεσθαι, […]; John Philoponos, *On the Creation of the World* VI 11, ed. Reichardt, 1897, p. 252, 16-17: […] μόνος τῶν ἐγκοσμίων ὁ ἄνθρωπος τῆς λογικῆς καὶ νοερᾶς ἠξίωται ψυχῆς· […] (also VI 2, p. 233.10-12); Maximos the Confessor, *Ambigua to John* 42, 24, ed. Constas, 2014, II, p. 168: […] μὴ ἔχειν τὸ τικτόμενον τὴν λογικήν τε καὶ νοερὰν ψυχὴν […].

ἁρμόσαντα σώματι,[187] τὸν ἐπὶ ἁρμάτων χερουβικῶν ἐποχούμενον,[188] καὶ ὑπὸ ταγμάτων ἀγγελικῶν ἀνυμνούμενον.[189]

By Pappos the Philosopher[190]
"I swear to you by the great oath, whoever you are; I say of God who is One, in form and not in number, the Maker of heaven and earth, the fourness (τετρακτὺν) of the elements and everything that originates from them, and also our rational and intellectual souls, having joined them with the body; He who is carried by the chariots of the cherubim and praised by the orders of angels".

Compared to Christianos' oath, this one presents two main differences. First, it appears at the beginning of the text and not at the end. Second, it does not state the reason behind its composition (*e.g.* to affirm full disclosure of knowledge, as Christianos does), at least in its extant form. The phrase θεόν φημι τὸν ἕνα, τὸν εἴδει καὶ οὐ τῷ ἀριθμῷ could be read as a periphrastic invocation of the Trinitarian God,[191] intended to guarantee the oath, legitimize the content of the text that follows, and portray the author as a true Christian. The rest of the oath gives the impression of a compilation of stock terms and phrases found in texts of various genres (theological, hymnographic, philosophical, etc.), indicative examples of which are noted in their respective footnotes. Particularly, the phrases θεόν φημι τὸν ἕνα, […], τὸν ποιήσαντα τὸν οὐρανὸν καὶ τὴν γῆν could be seen as paraphrasing the corresponding ones from the Nicene-Constantinopolitan Creed: Πιστεύομεν εἰς ἕνα θεὸν […], ποιητὴν οὐρανοῦ καὶ γῆς, […] ("We believe in One God […], Maker of heaven and earth, […]").[192]

On the other hand, the terminology in what could be construed as a periphrastic reference to the Trinity (but also other phrases) might denote Neoplatonic

187. Cf. *e.g.* Clement of Alexandria, *Protrepticus* I 5, 3, ed. Marcovich, 1995, p. 8, 16-17: […] τὸν σμικρὸν κόσμον, τὸν ἄνθρωπον (ψυχήν τε καὶ σῶμα αὐτοῦ), ἁγίῳ πνεύματι ἁρμοσάμενος, […]; Nemesios of Emesa, *On the Nature of Man* 2, 120, ed. Morani, 1987, p. 36, 6-7: μένει γὰρ ἔτι τὸ αὐτὸ ἄτοπον, ὡς τοῦ θεοῦ μὴ πρόσφορον ψυχὴν ἐναρμόσαντος τῷ σώματι, […].

188. Cf. *e.g.* John of Damascus, *Homily on the Withered Fig-Tree and the Parable of the Vineyard* 1, 4-5, ed. Kotter, 1988, p. 102: […] ὁ ἐπὶ χερουβικῶν ἁρμάτων ἐποχούμενος […]. Cf. Sirach 49:8.

189. Cf. Romanos the Melode, *Hymns* 50, 16, 2-3, ed. Grosdidier de Matons, 1981, p. 256: […] ἀγγέλων πάντα τὰ τάγματα / καὶ τῶν ἀρχαγγέλων ἀνυμνοῦντα προτρέχουσι […].

190. For other English translations, see Bulmer-Thomas, 1974, p. 301; Jones, 1986, p. 14.

191. See also Tannery, 1896, p. 32; Ver Eecke, 1933, p. xii; Bulmer-Thomas, 1974, p. 301; Letrouit, 1995, p. 61; Cuomo, 2000, p. 6, n. 9.

192. Symbolum Nicaeno-Constantinopolitanum, ed. Dossetti, 1967, p. 244, 1-2. I acknowledge this observation to an anonymous reviewer.

origin, reminiscent of Proclus,[193] for instance. In this respect, since the name of Pappos the alchemist brings to mind the homonymous mathematician, Pappos of Alexandria (*ca.* early 4th cent.), it has been proposed by Paul Tannery that this oath may well be attributed to the latter. Tannery further concluded from the seemingly syncretistic content of the text that this was the work of a Gnostic (and consequently that this could be evidence for Pappos the mathematician being Gnostic, a hard-to-prove assumption).[194] Alexander Jones found Tannery's arguments regarding the attribution of the oath to Pappos of Alexandria plausible enough, but he added that the oath in its present form could not be entirely genuine, since he considered the references to heaven and earth, the cherubic chariots, and the angelic orders to be later additions. Furthermore, he noted the absence of any reference to alchemy,[195] which could support the argument that this oath is an adaptation of an earlier text (yet, it should be stressed that Christianos' oath does not refer explicitly to "alchemy" either). If this oath is indeed an adaptation – not necessarily, I would add, of a text by Pappos of Alexandria – then it follows that it was added to the technical text of the treatise. Be that as it may, the Byzantine reader of Pappos the alchemist must have had the impression that the oath was an integral part of his work and that its author was Christian.

The fact that the only two extant alchemical oaths bearing a (more or less profound) Christian character coincide in the period from the late 6th (?) to the 8th cent. raises interesting issues relating to the deeper understanding of their function. Why do we have a limited number of alchemical oaths? Why do the two Christian oaths date from roughly the same period? Also, what does their composition reveal about contemporary Byzantine society and culture? These questions are hard to answer, at least with our current state of knowledge. Nonetheless, it is most likely that a correlation exists between the function of the Christian oaths, their formulation, and the period they were written; in other words, they must be products of their age, associated with the evolving Christianization of alchemy. But this is a topic for another paper.

193. See *e.g.* Proclus, *Commentary on Plato's Parmenides* VII 1207, 4-6, ed. Steel, 2007-2009, III, p. 227; transl. Morrow & Dillon, 1987, p. 552: "for it is possible for things to be the same as each other both in measure and in time and in form [τῷ εἴδει] and in number [τῷ ἀριθμῷ] and in many other respects, through all of which the power of sameness extends". For the Neoplatonic character of the oath, see Jones, 1986, p. 14.

194. Tannery, 1896, pp. 31-33; cf. Gruner, 1807, p. 83. Interestingly, Tannery (1896, p. 32) notes: "*Le serment de Pappus me paraît particulièrement remarquable en ce qu'il est combiné de façon à pouvoir être prêté également par un chrétien et par un païen*"; see also Ver Eecke, 1933, pp. xii-xiii; Bulmer-Thomas, 1974, p. 301.

195. Jones, 1986, pp. 13-14.

## Bibliography

*AASS Maii* V = *Acta Sanctorum*, *Maii* V (1685). Antwerp: M. Cnobarus.

ACO II.1.2 = Schwartz, Eduardus (edition) (1933). *Concilium universale Chalcedonense*, vol. 1.2. Acta Conciliorum Oecumenicorum, II.1.2. Berlin & Leipzig: De Gruyter.

Allen, Pauline & Neil, Bronwen (eds.) (2015). *The Oxford Handbook of Maximus the Confessor*. Oxford: Oxford University Press.

Auzépy, Marie-France & Saint-Guillain, Guillaume (eds.) (2008). *Oralité et lien social au Moyen Âge (Occident, Byzance, Islam): parole donnée, foi jurée, serment*. Paris: ACHCByz.

Baehrens, Wilhelm Adolf (edition) (1925). *Origenes Werke*, vol. 8. Leipzig: J.C. Hinrichs.

Barkhuizen, Jan H. (1984). Justinian's Hymn Ὁ μονογενὴς υἱὸς τοῦ Θεοῦ. *Byzantinische Zeitschrift*, 77.1, pp. 3-5.

Bartha, Paul (2022). Analogy and Analogical Reasoning. In Zalta, 2022. https://plato.stanford.edu/archives/sum2022/entries/reasoning-analogy/.

Bernardi, Jean (edition) (1992). *Grégoire de Nazianze, Discours 42-43*. Paris: Les Éditions du Cerf.

Berthelot, Marcellin (1885). *Les origines de l'alchimie*. Paris: G. Steinheil.

Blanc, Cécile (edition) (1966). *Origène, Commentaire sur saint Jean*, vol. 1. Paris: Les Éditions du Cerf.

Blidstein, Moshe (2017). Swearing by the Book. Oaths and the Rise of Scripture in the Roman Empire. *ASDIWAL. Revue genevoise d'anthropologie et d'histoire des religions*, 12, pp. 53-72.

Blowers, Paul M. (1992). Maximus the Confessor, Gregory of Nyssa, and the Concept of "Perpetual Progress". *Vigiliae Christianae*, 46.2, pp. 151-171.

Boudignon, Christian (edition) (2011). *Maximi Confessoris Mystagogia*. Turnhout: Brepols.

Brightman, Frank E. (edition) (1896). *Liturgies, Eastern and Western. Being the Texts Original or Translated of the Principal Liturgies of the Church*, vol. 1: *Eastern Liturgies*. Oxford: Clarendon Press.

Browne, Charles A. (1920). The Poem of the Philosopher Theophrastos Upon the Sacred Art. A Metrical Translation with Comments upon the History of Alchemy. *The Scientific Monthly*, 11.3, pp. 193-214.

Browne, Charles A. (1946). Rhetorical and Religious Aspects of Greek Alchemy. Including a Commentary and Translation of the Poem of the Philosopher Archelaos upon the Sacred Art, Part I. *Ambix*, 2.3-4, pp. 129-137.

Browne, Charles A. (1948). Rhetorical and Religious Aspects of Greek Alchemy, Part II. *Ambix*, 3.1-2, pp. 15-25.

Bulmer-Thomas, Ivor (1974). Pappus of Alexandria. In Gillispie, 1974, pp. 293-304.

*CAAG* = Berthelot, Marcellin & Ruelle, Charles-Émile (1887-1888). *Collection des anciens alchimistes grecs*, 3 vols. Paris: G. Steinheil.

Cameron, Averil (1988). Eustratius' *Life* of the Patriarch Eutychius and the Fifth Ecumenical Council. In *Καθηγήτρια. Essays Presented to Joan Hussey for Her 80th Birthday*. Camberley: Porphyrogenitus, pp. 225-247.
Cameron, Averil (1990). Models of the Past in the Late Sixth Century. The Life of the Patriarch Eutychius. In Clarke *et al.*, 1990, pp. 205-223.
Cameron, Averil (1996). *Changing Cultures in Early Byzantium*. Aldershot: Variorum.
Caudano, Anne-Laurence (2020). Astronomy and Astrology. In Lazaris, 2020, pp. 202-230.
Clarke, Graeme *et al.* (eds.) (1990). *Reading the Past in Late Antiquity*. Canberra: Australian National University Press.
Colinet, Andrée (2000). Le *Travail des quatre éléments* ou lorsqu'un alchimiste byzantin s'inspire de Jabir. In Draelants, Tihon & van den Abeele, 2000, pp. 165-190.
Constas, Nicholas (edition and translation) (2014). *Maximos the Confessor, On Difficulties in the Church Fathers, The* Ambigua, 2 vols. Cambridge, MA: Harvard University Press.
Cornelli, Gabriele, McKirahan, Richard & Macris, Constantinos (eds.) (2013). *On Pythagoreanism*. Berlin & Boston: De Gruyter.
Costache, Doru (2015). Mapping Reality within the Experience of Holiness. In Allen & Neil, 2015, pp. 378-396.
Costache, Doru (2017). Being, Well-Being, Being for Ever. Creation's Existential Trajectory in Patristic Tradition. In Costache, Cronshaw & Harrison, 2017, pp. 55-87.
Costache, Doru (2020). Strange Bedfellows? Orthodox Perspectives on Theology, Spirituality, Science, and Technology. *Studia Universitatis Babeş-Bolyai Theologia Orthodoxa*, 65.2, pp. 5-25.
Costache, Doru, Cronshaw, Darren & Harrison, James R. (eds.) (2017). *Well-Being, Personal Wholeness and the Social Fabric*. Newcastle upon Tyne: Cambridge Scholars Publishing.
Cuomo, Serafina (2000). *Pappus of Alexandria and the Mathematics of Late Antiquity*. Cambridge: Cambridge University Press.
de Boor, Carolus (edition) (1883). *Theophanis Chronographia*, vol. 1. Leipzig: B.G. Teubner.
Declerck, José H. (edition) (1982). *Maximi Confessoris quaestiones et dubia*. Turnhout: Brepols.
Delehaye, Hippolytus (edition) (1902). *Propylaeum ad Acta Sanctorum Novembris. Synaxarium ecclesiae Constantinopolitanae*. Brussels: Socii Bollandiani.
Delouis, Olivier (2008). Église et serment à Byzance: norme et pratique. In Auzépy & Saint-Guillain, 2008, pp. 211-246.
Diehl, Ernestus (edition) (1903-1906). *Procli Diadochi in Platonis Timaeum commentaria*, 3 vols. Leipzig: B.G. Teubner.
Dindorf, Ludovicus (edition) (1832). *Chronicon Paschale*, vol. 1. Bonn: Weber.
Doolan, Gregory T. (ed.) (2012). *The Science of Being as Being. Metaphysical Investigations*. Washington, DC: The Catholic University of America Press.
Dossetti, Giuseppe Luigi (edition) (1967). *Il simbolo di Nicea e di Costantinopoli*. Rome: Herder.
Draelants, Isabelle, Tihon, Anne & van den Abeele, Baudouin (eds.) (2000). *Occident et Proche-Orient: contacts scientifiques au temps des Croisades*. Turnhout: Brepols.

Dufault, Olivier (2017). Transmutation Theory and the Dating of the Alchemical Recipe *On the Same Divine Water*. In Le Moli & Alexidze, 2017, pp. 67-84.

Dufault, Olivier (2019). *Early Greek Alchemy, Patronage and Innovation in Late Antiquity*. Berkeley, CA: California Classical Studies.

Dyer, Joanne, Tamburini, Diego & Sotiropoulou, Sophia (2018). The Identification of Lac as a Pigment in Ancient Greek Polychromy – The Case of a Hellenistic Oinochoe from Canosa di Puglia. *Dyes and Pigments*, 149, pp. 122-132.

Emery, Gilles & Levering, Matthew (eds.) (2011). *The Oxford Handbook of the Trinity*. Oxford: Oxford University Press.

Festugière, André-Jean (1944). *La révélation d'Hermès Trismégiste*, vol. 1: *L'astrologie et les sciences occultes*. Paris: Les Belles Lettres.

Feulner, Hans-Jürgen (ed.) (2013). *Liturgies in East and West. Ecumenical Relevance of Early Liturgical Development*. Zürich & Berlin: Lit Verlag.

Fowden, Garth (1993). *The Egyptian Hermes. A Historical Approach to the Late Pagan Mind*. Princeton, NJ: Princeton University Press (2nd ed.).

Fraser, Kyle A. (2004). Zosimos of Panopolis and the Book of Enoch. Alchemy as Forbidden Knowledge. *Aries*, 4.2, pp. 125-147.

Friedlein, Godofredus (edition) (1873). *Procli Diadochi in primum Euclidis Elementorum librum commentarii*. Leipzig: B.G. Teubner.

Galadza, Daniel (2018). *Liturgy and Byzantinization in Jerusalem*. Oxford: Oxford University Press.

Geffcken, Johannes (edition) (1902). *Die Oracula Sibyllina*. Leipzig: J.C. Hinrichs.

Giannouli, Antonia (2019). Hymn Writing in Byzantium. Forms and Writers. In Hörandner, Rhoby & Zagklas, 2019, pp. 487-516.

Gillispie, Charles Coulston (ed.-in-chief) (1974). *Dictionary of Scientific Biography*, vol. 10. New York: Charles Scribner's Sons.

Goldschmidt, Günther (edition) (1923). *Heliodori carmina quattuor ad fidem codicis Casselani*. Giessen: A. Töpelmann.

Golitzin, Alexander (2013). *Mystagogy. A Monastic Reading of Dionysius Areopagita*. Edited by Bogdan G. Bucur. Collegeville, MN: Cistercian Publications & Liturgical Press.

Grosdidier de Matons, José (edition) (1981). *Romanos le Mélode, Hymnes*, vol. 5. Paris: Les Éditions du Cerf.

Grumel, Venance (1923). L'auteur et la date de composition du tropaire Ὁ Μονογενής. *Échos d'Orient*, 22, pp. 398-418.

Gruner, Christianus Gottfridus (1807). *Isidis, Christiani et Pappi philosophi jusjurandum chemicum nunc primum Graece ac Latine editum*. Jena: Prager.

Gulmini, Monica *et al.* (2017). The "Coptic" Textiles of the "Museo Egizio" in Torino (Italy). A Focus on Dyes through a Multi-Technique Approach. *Archaeological and Anthropological Sciences*, 9.4, pp. 485-497.

Gutas, Dimitri (1998). *Greek Thought, Arabic Culture. The Graeco-Arabic Translation Movement in Baghdad and Early ʿAbbāsid Society (2nd-4th/8th-10th Centuries)*. London & New York: Routledge.

Halleux, Robert (1979). *Les textes alchimiques*. Turnhout: Brepols.

Halleux, Robert (edition) (1981). *Les alchimistes grecs*, vol. 1: *Papyrus de Leyde, papyrus de Stockholm. Fragments de recettes*. Paris: Les Belles Lettres.

Heikel, Ivar A. (edition) (1902). *Eusebius Werke*, vol. 1. Leipzig: J.C. Hinrichs.

Heil, Günter & Ritter, Adolf M. (edition) (2012). *Corpus Dionysiacum*, vol. 2: *Pseudo-Dionysius Areopagita. De coelesti hierarchia, De ecclesiastica hierarchia, De mystica theologia, Epistulae*. Berlin & Boston, MA: De Gruyter (2nd ed.).

Helmreich, Georgius (edition) (1904). *Galeni De temperamentis libri III*. Leipzig: B.G. Teubner.

Hendy, Michael F. (1985). *Studies in the Byzantine Monetary Economy, c. 300-1450*. Cambridge: Cambridge University Press.

Henry, René (edition) (1959). *Photius, Bibliothèque*, vol. 1. Paris: Les Belles Lettres.

Hörandner, Wolfram, Rhoby, Andreas & Zagklas, Nikos (eds.) (2019). *A Companion to Byzantine Poetry*. Leiden & Boston, MA: Brill.

Humphreys, Mike (ed.) (2021). *A Companion to Byzantine Iconoclasm*. Leiden & Boston, MA: Brill.

Janeras, Sebastià (2013). Le tropaire Ὁ Μονογενὴς dans les liturgies orientales et sa signification œcuménique. In Feulner, 2013, pp. 209-223.

Jones, Alexander (edition) (1986). *Pappus of Alexandria, Book 7 of the* Collection*, Part 1: Introduction, Text, and Translation*. New York: Springer-Verlag.

Joosse, Albert (ed.) (2021). *Olympiodorus of Alexandria. Exegete, Teacher, Platonic Philosopher*. Leiden & Boston, MA: Brill.

Kahn, Didier & Matton, Sylvain (eds.) (1995). *Alchimie: art, histoire et mythes*. Paris & Milan: S.É.H.A. & Archè.

Kaldellis, Anthony & Siniossoglou, Niketas (eds.) (2017). *The Cambridge Intellectual History of Byzantium*. Cambridge: Cambridge University Press.

Karpenko, Vladimír (1998). Alchemy as *donum dei*. *Hyle – An International Journal for the Philosophy of Chemistry*, 4.1, pp. 63-80.

Kazhdan, Alexander P. (ed.-in-chief) (1991). *The Oxford Dictionary of Byzantium*, 3 vols. New York & Oxford: Oxford University Press.

Keyser, Paul T. & Irby-Massie, Georgia L. (eds.) (2008). *The Encyclopedia of Ancient Natural Scientists. The Greek Tradition and Its Many Heirs*. London & New York, Routledge.

Keyser, Paul T. & Scarborough, John (eds.) (2018). *The Oxford Handbook of Science and Medicine in the Classical World*. Oxford: Oxford University Press.

Koetsier, Teun & Bergmans, Luc (eds.) (2005). *Mathematics and the Divine. A Historical Study*. Amsterdam: Elsevier.

Kominko, Maja (2013). *The World of Kosmas. Illustrated Byzantine Codices of the* Christian Topography. Cambridge: Cambridge University Press.

König, Jason & Woolf, Greg (eds.) (2013). *Encyclopaedism from Antiquity to the Renaissance*. Cambridge: Cambridge University Press.

Kotter, Bonifatius (edition) (1988). *Die Schriften des Johannes von Damaskos*, vol. 5. Berlin & New York: De Gruyter.

Koukoules, Phaidon (1949). *Βυζαντινῶν βίος καὶ πολιτισμός*, vol. 3. Athens: Collection de l'Institut français d'Athènes.

Koutalis, Vangelis, Martelli, Matteo & Merianos, Gerasimos (2018). Graeco-Egyptian, Byzantine and Post-Byzantine Alchemy. Introductory Remarks. In Nicolaidis, 2018, pp. 11-43.

Kraus, Paul (1942). *Jābir ibn Ḥayyān. Contribution à l'histoire des idées scientifiques dans l'Islam*, vol. 2. Cairo: Institut français d'archéologie orientale.

Kroll, Guilelmus (edition) (1899-1901). *Procli Diadochi in Platonis Rem publicam commentarii*, 2 vols. Leipzig: B.G. Teubner.

Laga, Carl (edition) (1992). *Eustratii presbyteri Vita Eutychii patriarchae Constantinopolitani*. Turnhout: Brepols.

Laiou, Angeliki E. (ed.-in-chief) (2002). *The Economic History of Byzantium, From the Seventh through the Fifteenth Century*, 3 vols. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Lamberton, Robert (1986). *Homer the Theologian. Neoplatonist Allegorical Reading and the Growth of the Epic Tradition*. Berkeley, CA: University of California Press.

Lauxtermann, Marc D. (2019). *Byzantine Poetry from Pisides to Geometres. Texts and Contexts*, vol. 2. Vienna: Austrian Academy of Sciences Press.

Lazaris, Stavros (ed.) (2020). *A Companion to Byzantine Science*. Leiden and Boston, MA: Brill.

Le Boulluec, Alain (edition) (1997). *Clément d'Alexandrie, Les Stromates: Stromate VII*. Paris: Les Éditions du Cerf.

Lemerle, Paul (1971). *Le premier humanisme byzantin. Notes et remarques sur enseignement et culture à Byzance des origines au X^e siècle*. Paris: Presses Universitaires de France.

Le Moli, Andrea & Alexidze, Lela (eds.) (2017). *Prote Hyle. Notions of Matter in the Platonic and Aristotelian Traditions*. Palermo: Palermo University Press.

Letrouit, Jean (1995). Chronologie des alchimistes grecs. In Kahn & Matton, 1995, pp. 11-93.

Lévêque, Pierre (1959). *Aurea catena Homeri. Une étude sur l'allégorie grecque*. Paris: Les Belles Lettres.

Lilie, Ralph-Johannes, Ludwig, Claudia, Zielke, Beate & Pratsch, Thomas (2013). Christianos: Χριστιανός. In *Prosopographie der mittelbyzantinischen Zeit Online*. Berlin & Boston, MA: De Gruyter. https://www.degruyter.com/document/database/PMBZ/entry/PMBZ12170/html.

Lindberg, David C. (2007). *The Beginnings of Western Science. The European Scientific Tradition in Philosophical, Religious, and Institutional Context, Prehistory to A.D. 1450*. Chicago, IL & London: The University of Chicago Press (2nd ed.).

Lloyd, D. Robert (2007). The Chemistry of Platonic Triangles. Problems in the Interpretation of the *Timaeus*. *Hyle – An International Journal for the Philosophy of Chemistry*, 13.2, pp. 99-118.

Lockett, Darian (2008a). God and "the World". Cosmology and Theology in the Letter of James. In Pennington & McDonough, 2008, pp. 144-156.

Lockett, Darian R. (2008b). *Purity and Worldview in the Epistle of James*. London & New York: T&T Clark.

Lopes da Silveira, Fabiana (2022). In the Melting Pot. Cultural Mixture and the Presentation of Alchemical Knowledge in the *Letter from Isis to Horus*. *Ambix*, 69.1, pp. 49-64.

*LSJ* = Liddell, Henry George, Scott, Robert & Jones, Henry Stuart (1996). *A Greek-English Lexicon. Ninth Edition with a Revised Supplement*. Oxford: Oxford University Press.

Magdalino, Paul (2006). *L'Orthodoxie des astrologues. La science entre le dogme et la divination à Byzance (VII^e^-XIV^e^ siècle)*. Paris: Lethielleux.

Magdalino, Paul (2011). Orthodoxy and History in Tenth-Century Byzantine "Encyclopedism". In Van Deun & Macé, 2011, pp. 143-159.

Magdalino, Paul (2013). Byzantine Encyclopaedism of the Ninth and Tenth Centuries. In König & Woolf, 2013, pp. 219-231.

Magdalino, Paul (2017a). Astrology. In Kaldellis & Siniossoglou, 2017, pp. 198-214.

Magdalino, Paul (2017b). Humanisme et mécénat impérial aux IX^e^ et X^e^ siècles. *Travaux et mémoires*, 21.2, pp. 3-21.

Magdalino, Paul & Mavroudi, Maria (eds.) (2006). *The Occult Sciences in Byzantium*. Geneva: La Pomme d'or.

Malingrey, Anne-Marie (1961). *"Philosophia". Étude d'un groupe de mots dans la littérature grecque, des Présocratiques au IV^e^ siècle après J.C.* Paris: C. Klincksieck.

Mango, Cyril (edition) (1990). *Nikephoros, Patriarch of Constantinople, Short History*. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Mango, Cyril & Scott, Roger (translation) (1997). *The Chronicle of Theophanes Confessor. Byzantine and Near Eastern History, AD 284-813*. Oxford: Clarendon Press.

Marcovich, Miroslav (edition) (1995). *Clementis Alexandrini Protrepticus*. Leiden: Brill.

Martelli, Matteo (2009). "Divine Water" in the Alchemical Writings of Pseudo-Democritus. *Ambix*, 56.1, pp. 5-22.

Martelli, Matteo (edition) (2011). *Pseudo-Democrito, Scritti alchemici, con il commentario di Sinesio*. Paris & Milan: S.É.H.A. & Archè.

Martelli, Matteo (edition and translation) (2013). *The Four Books of Pseudo-Democritus*. Leeds: Maney Publishing.

Mavroudi, Maria (2002). *A Byzantine Book on Dream Interpretation. The* Oneirocriticon of Achmet *and Its Arabic Sources*. Leiden: Brill.

McGuckin, John A. (1994). *St. Cyril of Alexandria, The Christological Controversy. Its History, Theology, and Texts*. Leiden: Brill.

Meredith, Anthony (1999). *Gregory of Nyssa*. London & New York: Routledge.

Merianos, Gerasimos (2017). Alchemy. In Kaldellis & Siniossoglou, 2017, pp. 234-251.

Merianos, Gerasimos (2021). Αναφορές στην ιατρική στο ελληνικό αλχημικό corpus. In Nikolaou & Gardikas, 2021, pp. 69-88.

Mertens, Michèle (1988). Une scène d'initiation alchimique: la "Lettre d'Isis à Horus". *Revue de l'histoire des religions*, 205.1, pp. 3-23.

Mertens, Michèle (edition) (1995). *Les alchimistes grecs*, vol. 4.1: *Zosime de Panopolis, Mémoires authentiques*. Paris: Les Belles Lettres.

Mertens, Michèle (2006). Graeco-Egyptian Alchemy in Byzantium. In Magdalino & Mavroudi, 2006, pp. 205-230.

Mondzain, Marie-José (2005). *Image, Icon, Economy. The Byzantine Origins of the Contemporary Imaginary*. Transl. by R. Franses. Stanford, CA: Stanford University Press.

Morani, Moreno (edition) (1987). *Nemesii Emeseni De natura hominis*. Leipzig: B.G. Teubner.

Morrow, Glenn R. (translation) (1970). *Proclus, A Commentary on the First Book of Euclid's Elements*. Princeton, NJ: Princeton University Press.

Morrow, Glenn R. & Dillon, John M. (translation) (1987). *Proclus' Commentary on Plato's Parmenides*. Princeton, NJ: Princeton University Press.

Mueller, Ian (2005). Mathematics and the Divine in Plato. In Koetsier & Bergmans, 2005, pp. 99-121.

Musurillo, Herbertus (edition) (1964). *Gregorii Nysseni De vita Moysis*. Gregorii Nysseni Opera, 7.1. Leiden: Brill.

Németh, András (2018). *The* Excerpta Constantiniana *and the Byzantine Appropriation of the Past*. Cambridge: Cambridge University Press.

Newman, William (1985). The Genesis of the *Summa perfectionis*. *Archives internationales d'histoire des sciences*, 35, pp. 240-302.

Newman, William R. (edition) (1991). *The* Summa perfectionis *of Pseudo-Geber. A Critical Edition, Translation and Study*. Leiden: Brill.

Newman, William R. (1994). *Gehennical Fire. The Lives of George Starkey, An American Alchemist in the Scientific Revolution*. Cambridge, MA & London: Harvard University Press.

Newman, William R. (2004). *Promethean Ambitions. Alchemy and the Quest to Perfect Nature*. The University of Chicago Press: Chicago, IL & London.

Newman, William R. (2019). *Newton the Alchemist. Science, Enigma, and the Quest for Nature's "Secret Fire"*. Princeton, NJ & Oxford: Princeton University Press.

Niarchos, Constantine (1985). The Concept of "Participation" According to Proclus, with Reference to the Criticism of Nicolaus of Methone. *Diotima*, 13, pp. 78-94.

Nichanian, Mikaël (2008). Iconoclasme et prestation de serment à Byzance: du contrôle social à la Nouvelle Alliance. In Auzépy & Saint-Guillain, 2008, pp. 81-101.

Nicolaidis, Efthymios (ed.) (2018). *Greek Alchemy from Late Antiquity to Early Modernity*. Turnhout: Brepols.

Nicolaidis, Efthymios, Delli, Eudoxie, Livanos, Nikolaos, Tampakis, Kostas & Vlahakis, George (2016). Science and Orthodox Christianity. An Overview. *Isis*, 107.3, pp. 542-566.

Nikolaou, Katerina & Gardikas, Katerina (eds.) (2021). *Ἰατρικὴ θεραπεία ἔστι μέν που καὶ σώματος, ἔστι δ' ἄρα καὶ ψυχῆς. Όψεις της Ιατρικής στο Βυζάντιο*. Athens: Department of History and Archaeology, National and Kapodistrian University of Athens.

Nummedal, Tara (2007). *Alchemy and Authority in the Holy Roman Empire*. Chicago, IL & London: The University of Chicago Press.

Odorico, Paolo (1990). La cultura della Συλλογή. 1) Il cosiddetto enciclopedismo bizantino. 2) Le tavole del sapere di Giovanni Damasceno. *Byzantinische Zeitschrift*, 83.1, pp. 1-21.

Odorico, Paolo (2011). Cadre d'exposition / cadre de pensée: la culture du recueil. In Van Deun & Macé, 2011, pp. 89-107.

Odorico, Paolo (2017). Du premier humanisme à l'encyclopédisme: une construction à revoir. *Travaux et mémoires*, 21.2, pp. 23-42.

Oikonomides, Nicolas (2002). The Role of the Byzantine State in the Economy. In Laiou, 2002, III, pp. 973-1058.

O' Meara, Dominic J. (1989). *Pythagoras Revived. Mathematics and Philosophy in Late Antiquity*. Oxford: Clarendon Press.

O' Meara, Dominic J. (1991). Philosophy. In Kazhdan, 1991, III, pp. 1658-1661.

O' Meara, Dominic J. (2005). Geometry and the Divine in Proclus. In Koetsier & Bergmans, 2005, pp. 133-145.

O' Meara, Dominic (2012). The Transformation of Metaphysics in Late Antiquity. In Doolan, 2012, pp. 36-52.

O' Meara, Dominic (2017). Conceptions of Science in Byzantium. In Kaldellis & Siniossoglou, 2017, pp. 169-182.

Papathanassiou, Maria (1990). Stephanus of Alexandria. Pharmaceutical Notions and Cosmology in His Alchemical Work. *Ambix*, 37.3, pp. 121-133.

Papathanassiou, Maria K. (1996). Stephanus of Alexandria. On the Structure and Date of His Alchemical Work. *Medicina nei secoli*, 8.2, pp. 247-266.

Papathanassiou, Maria K. (2005). L'œuvre alchimique de Stéphanos d'Alexandrie: structure et transformations de la matière, unité et pluralité, l'énigme des philosophes. In Viano, 2005a, pp. 113-133.

Papathanassiou, Maria K. (edition) (2017). *Stephanos von Alexandreia und sein alchemistisches Werk Die kritische Edition des griechischen Textes eingeschlossen*. Athens: Cosmosware.

Papathanassiou, Maria K. (2018). Stéphanos d'Alexandrie. La tradition patristique dans son œuvre alchimique. In Nicolaidis, 2018, pp. 71-97.

Papathanassiou, Maria K. (2020). The Occult Sciences in Byzantium. In Lazaris, 2020, pp. 464-495.

Pennington, Jonathan T. & McDonough, Sean M. (eds.) (2008). *Cosmology and New Testament Theology*. London & New York: T&T Clark.

Pérez Martín, Inmaculada (2017). Byzantine Books. In Kaldellis & Siniossoglou, 2017, pp. 37-46.

Pfister, Rodolphe (1936). Matériaux pour servir au classement des Textiles Égyptiens postérieurs à la Conquête Arabe. *Revue des arts asiatiques*, 10.1, pp. 1-16; 10.2, pp. 73-85.

*PG* 100 = Migne, Jacques-Paul (edition) (1865). *Patrologiae cursus completus. Series graeca*, vol. 100. Paris: J.-P. Migne.

Pistelli, Hermenegildus (edition) (1888). *Iamblichi Protrepticus ad fidem codicis Florentini*. Leipzig: B.G. Teubner.

Portaru, Marius (2015). Classical Philosophical Influences. Aristotle and Platonism. In Allen & Neil, 2015, pp. 127-148.

Principe, Lawrence M. (2013). *The Secrets of Alchemy*. Chicago, IL & London: The University of Chicago Press.

Rapp, Claudia (2016). *Brother-Making in Late Antiquity and Byzantium. Monks, Laymen, and Christian Ritual*. Oxford: Oxford University Press.

Reichardt, Gualterus (edition) (1897). *Joannis Philoponi De opificio mundi libri VII*. Leipzig: B.G. Teubner.

Riches, Aaron (2016). *Ecce Homo. On the Divine Unity of Christ*. Grand Rapids, MI: W.B. Eerdmans.

Riedweg, Christoph (2005). *Pythagoras. His Life, Teaching, and Influence*. Transl. by Steven Rendall in collaboration with Christoph Riedweg & Andreas Schatzmann. Ithaca, NY & London: Cornell University Press.

Riedweg, Christoph (2013). Approaching Pythagoras of Samos. Ritual, Natural Philosophy and Politics. In Cornelli, McKirahan & Macris, 2013, pp. 47-60.

Roberts, Alexandre M. (2019). Framing a Middle Byzantine Alchemical Codex. *Dumbarton Oaks Papers*, 73, pp. 69-102.

Roberts, Alexandre M. (2020). A Greek Alchemical Epigram in Its Middle Byzantine Context. *Journal of the Warburg and Courtauld Institutes*, 83, pp. 1-36.

Roberts, Alexandre M. (2022). Byzantine Engagement with Islamicate Alchemy. *Isis*, 113.3, pp. 559-580.

Rochow, Ilse (1994). *Kaiser Konstantin V. (741-775). Materialien zu seinem Leben und Nachleben*. Frankfurt am Main: P. Lang.

Russell, Norman (2004). *The Doctrine of Deification in the Greek Patristic Tradition*. Oxford: Oxford University Press.

Saffrey, Henri Dominique (1981). Présentation. In Halleux, 1981, pp. vii-xv.

Saffrey, Henri Dominique (1995). Historique et description du manuscrit alchimique de Venise *Marcianus Graecus 299*. In Kahn & Matton, 1995, pp. 1-10.

Schamp, Jacques (1987). *Photios, historien des lettres. La* Bibliothèque *et ses notices biographiques*. Paris: Les Belles Lettres.

Singer, Peter N., van der Eijk, Philip J. & Tassinari, Piero (translation) (2018). *Galen, Works on Human Nature*, vol. 1. *Mixtures (De temperamentis)*. Cambridge: Cambridge University Press.

Siorvanes, Lucas (1996). *Proclus. Neo-Platonic Philosophy and Science*. Edinburgh: Edinburgh University Press.

Smith, J. Warren (2011). The Trinity in the Fourth-Century Fathers. In Emery & Levering, 2011, pp. 109-122.
Steel, Carlos (edition) (2007-2009). *Procli in Platonis Parmenidem commentaria*, 3 vols. Oxford: Oxford University Press.
Stephanides, Michael K. (1927). Μουσικὴ καὶ χρυσοποιία κατὰ τοὺς βυζαντινοὺς χυμευτάς. Ἐπετηρὶς Ἑταιρείας Βυζαντινῶν Σπουδῶν, 4, pp. 39-45.
Strohmaier, Gotthard (1991). ʿUmāra ibn Ḥamza, Constantine V, and the Invention of the Elixir. *Graeco-Arabica*, 4, pp. 21-24.
Svoronos, Nicolas G. (1951). Le serment de fidélité à l'empereur byzantin et sa signification constitutionnelle. *Revue des études byzantines*, 9, pp. 106-142.
Tannery, Paul (1896). Sur la religion des derniers mathématiciens de l'antiquité. *Annales de philosophie chrétienne*, 34, pp. 26-36.
Tartaglia, Luigi (edition) (2016). *Georgii Cedreni Historiarum compendium*, 2 vols. Rome: Bardi.
Thurn, Ioannes (edition) (2000). *Ioannis Malalae Chronographia*. Berlin & New York: De Gruyter.
Tihon, Anne (2017). Astronomy. In Kaldellis & Siniossoglou, pp. 183-197.
Van Deun, Peter & Macé, Caroline (eds.) (2011). *Encyclopedic Trends in Byzantium?* Leuven: Peeters & Departement Oosterse Studies.
Ver Eecke, Paul (1933). *Pappus d'Alexandrie. La collection mathématique*, vol. 1. Paris & Bruges: Desclée de Brouwer.
Viano, Cristina (1996). Aristote et l'alchimie grecque: la transmutation et le modèle aristotélicien entre théorie et pratique. *Revue d'histoire des sciences*, 49.2-3, pp. 189-213.
Viano, Cristina (ed.) (2005a). *L'alchimie et ses racines philosophiques. La tradition grecque et la tradition arabe*. Paris: Vrin.
Viano, Cristina (2005b). Les alchimistes gréco-alexandrins et le *Timée* de Platon. In Viano, 2005a, pp. 91-107.
Viano, Cristina (2008). Anonymous Alchemist "Christianus" (500-800 CE?). In Keyser & Irby-Massie, 2008, pp. 87-88.
Viano, Cristina (2018). Byzantine Alchemy, or the Era of Systematization. In Keyser & Scarborough, 2018, pp. 943-964.
Viano, Cristina (2021). Olympiodorus and Greco-Alexandrian Alchemy. In Joosse, 2021, pp. 14-30.
von Lippmann, Edmund Oscar (1919). *Entstehung und Ausbreitung der Alchemie*, vol. 1. Berlin: Julius Springer.
Wellesz, Egon (1951). Music in the Treatises of Greek Gnostics and Alchemists. *Ambix*, 4.3-4, pp. 145-158.
Westerink, Leendert Gerrit (edition) (1970). *Olympiodori in Platonis Gorgiam commentaria*. Leipzig: B.G. Teubner.
Whitby, Michael & Whitby, Mary (translation) (1989). *Chronicon Paschale, 284-628 AD*. Liverpool: Liverpool University Press.

Wolska-Conus, Wanda (edition) (1968-1973). *Cosmas Indicopleustès, Topographie chrétienne*, 3 vols. Paris: Les Éditions du Cerf.

Zalta, Edward N. (ed.) (2022). *The Stanford Encyclopedia of Philosophy* (Summer 2022 Edition). https://plato.stanford.edu.