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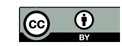

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MONOGRÁFICO

Miracles of Technology and Art: Ancient Religious Aesthetics and Byzantine Iconoclasm

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Abstract: This article explores the role of technology in arousing religious awe from classical antiquity to the time of Emperor Theophilos. People's fascination with technology ensured that this trend, increasingly popular in Greco-Roman religious festivals from the Hellenistic period onwards, persevered in Christian veneration practice after an initial period of rejecting pagan religious aesthetics. Technology was highly prized by both pagan and Christian rulers who typically sought to impress their subjects by displaying the technology available at their disposal. However, while the emperors' reliance on technology to allude to divine favour was tolerated, technology employed to stage miracles or influence faith was deeply harmful for Christianity. Theophilos' father is reported by Eutychius to have punished paradigmatically the mastermind of one such mechanically enabled miracle in his native Phrygia. Thus, Theophilos' iconoclastic views as well as his known obsession with automata are explored as part of a longstanding debate on Christian religious aesthetics.
Keywords: automata; technology; painting; iconoclasm; Hero of Alexandria; Theophilos; religious aesthetics; miracles

[ENG] Milagros de la tecnología y el arte: la estética religiosa antigua y la iconoclasia bizantina

Abstract: Este artículo explora el papel de la tecnología en el despertar del respeto religioso desde la antigüedad clásica hasta la época del emperador Teófilo. La fascinación de la gente por la tecnología hizo que esta tendencia, cada vez más popular en los festivales religiosos grecorromanos a partir del período helenístico, ganara impulso entre los cristianos después de un período inicial de rechazo de la estética religiosa pagana. La tecnología era muy apreciada tanto por los gobernantes paganos como por los cristianos, que normalmente buscaban impresionar a sus súbditos mostrando la tecnología disponible a su disposición. Sin embargo, mientras la dependencia de los emperadores de la tecnología para aludir al favor divino era tolerada, la tecnología empleada para escenificar milagros o influir en la fe era profundamente dañina para el cristianismo. Eutiquio relata que el padre de Teófilo castigó paradigmáticamente al autor intelectual de uno de esos milagros activados mecánicamente en su Frigia natal. De este modo, se exploran las opiniones iconoclastas de Teófilo, así como su conocida obsesión por los autómatas, como parte de un debate de larga data sobre la estética religiosa cristiana.
Keywords: Autómata; tecnología; pintura; iconoclasma; Héroe de Alejandría; Teófilo; estética religiosa; milagros.

Summary: 1. Introduction. 2. Machines and Miracles from Pagan Antiquity to Early Christianity. 3. Art and Technology: The Religious Aesthetics of late antique Christianity. 4. Emperor Theophilos: Automata and Iconoclasm 5. Concluding Remarks. 6. Bibliographical References

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Once out of nature I shall never take
My bodily form from any natural thing,
But such a form as Grecian goldsmiths make
Of hammered gold and gold enamelling
To keep a drowsy Emperor awake;
Or set upon a golden bough to sing
To lords and ladies of Byzantium
Of what is past, or passing, or to come.1

1. Introduction

Technology, broadly defined as the process of applying conceptual knowledge to invent or improve reproductible tools or devices, techniques, and systems that benefit the social, cultural, and economic life of humans,[2] has always had an uneasy relationship both with pagan philosophy and Christian religion.[3] Already in Hesiod, Prometheus, the people-loving yet "crooked of counsel"[4] Titan who introduced technology to humans,[5] is portrayed as effecting an irreparable rift between them and Zeus[6] –a rift comparable to the exile of humans from Eden due to Eve's ill curiosity for forbidden knowledge.[7] Prometheus' reputation as a trickster[8], alongside his exemplary punishment by Zeus with eternal torture, inspired early Christian thinkers to compare Prometheus' theft of fire to the alleged theft and corruption of Moses' wisdom by pagan philosophers.[9] Christian theologians were equally uncomfortable with Plato's influential depiction of the universe as the work of a divine Craftsman in the *Timaeus*,[10] and hence as a product of technology;[11] furthermore, technological advance implied comfort and even luxury, a cardinal sin that contradicted the ascetic neglect of worldly goods reiterated across the writings of the evangelists and the Christian fathers who rejected vain materialism as a major hurdle to securing salvation.[12]

A revision of this deeply entrenched attitude toward technology begins in the fourth century with Basil of Caesarea, followed by Gregogy of Nyssa, who defends *technē* as a way of reiterating the greatness of God,[13] and by John Chrysostom who celebrates technology as divine gift.[14] The fourth century coincides with Christianity's serious involvement in state affairs,[15] led by Constantine's zeal to ensure the auspices of the Christian god for his rule.[16] Constantine's political vision marks the beginning of a long period

1 William Butler Yeats, "Sailing to Byzantium", in *The Collected Poems of W.B. Yeats: A New Edition*, ed. by Richard J. Finneran (New York: Mcmillan, 1989), 194.

2 For a discussion on definitions of ancient technology, see Kevin Greene "Historiography and Theoretical Approaches", in *The Oxford Handbook of Engineering and Technology in the Classical Word*, ed. by John Peter Oleson (Oxford: Oxford University Press, 2008); in the same volume, also see Sefanina Cuomo, "Ancient Written Sources for Engineering and Technology" and Roger Ulrich, "Representations of Technical Processes"; cf. Serafina Cuomo, *Technology and Culture in Greek and Roman Antiquity* (Cambridge: Cambridge University Press, 2007a), 12–14, 16, 22ff. on the definition of ancient *techne*, emphasizing the diversity of the topic which prevents us from reaching an all-inclusive definition (and also covering issues such as the teachability of *techne* and the often rehashed dichotomy between nature and *techne*/technical skill); also see Sylvia Berryman, "Ancient Greek Mechanics and the Mechanical Hypothesis", in *The Cambridge Companion to Ancient Greek and Roman Science*, ed. by Liba Taub (Cambridge: Cambridge University Press, 2020), 229.

3 I would like to thank the reviewers of this article as well as Anthony Kaldellis for generously offering advice on how to improve the argument. Any remaining errors are my own responsibility.

4 ἀγκυλομήτης; see Hesiod, *Theogony* 546 (LCL 57); *Works and Days* 48 (LCL 145) with Guy Stroumsa, "Myth into Metaphor: The Case of Prometheus", in *Gilgul, Essays on Transformation, Revolution and Permanence in the History of Religions, Dedicated to R.J. Zwi Werblowsky*, ed. by Guy Stroumsa, Shaul Shaked, and David Shulman (Leiden: Brill, 1987), 311.

5 Aeschylus, *Prometheus Bound* 442–506 (LCL 145) concluding: πᾶσαι τέχναι βροτοῖσιν ἐκ Προμηθέως ("every art possessed by humans derives from Prometheus"). Adrienne Mayor, *Gods and Robots: Myths, Machines, and Ancient Dreams of Technology* (Princeton: Princeton University Press, 2018), 62.

6 Hesiod, *Works and Days* 42–105 (LCL 57).

7 Cf. Walter Headlam, "Prometheus and the Garden of Eden: Notes for a Lecture by the Late Walter Headlam". *The Classical Quarterly* 28.2 (1934): 63–71.

8 Stroumsa, "Myth into Metaphor", 312–313: "from the fourth century B.C.E. on, as a new, pessimistic attitude towards culture becomes pervading, more clearly expressed condemnations of Prometheus appear". cf. Plato, *Protagoras* 321e–322d (LCL 165) claiming that despite being endowed with technology by Prometheus, humans still lacked "civic art" (οὐκ ἔχοντες τὴν πολιτικὴν τέχνην).

9 Stroumsa, "Myth into Metaphor", 316–317 citing Tertullian, *Apologeticum* 47.14 (CCSL 1); Clement, *Stromata* 1.17.81.4 (SC 30) and SC 5.89–41 (SC 278); Origen, *Against Celsus* 6.44 (ed. by Miroslav Marcovich 2001, 421).

10 Plato, *Timaeus* 28c3–5 (LCL 234): τὸν μὲν οὖν ποιητὴν καὶ πατέρα τοῦδε τοῦ παντὸς εὑρεῖν τε ἔργον καὶ εὑρόντα εἰς πάντας ἀδύνατον λέγειν ("To find the maker and father of this universe is a difficult task, and even once found, it's impossible to declare him to all"); cf. Aristotle, *Physics* 199a16–17 (LCL 228): ὅλως τε ἡ τέχνη τὰ μὲν ἐπιτελεῖ ἃ ἡ φύσις ἀδυνατεῖ ἀπεργάσασθαι, τὰ δὲ μιμεῖται ("generally, art partly completes what nature cannot bring to a finish, and partly imitates her"). See Vladimir Fr. Shmaliy, "Cosmology of the Cappadocian Fathers: A Contribution to Dialogue Between Science and Theology Today". *Faith and Philosophy: Journal of the Society of Christian Philosophers* 22.5 (2005): 528–542 at 538–541 with nn18 and 130 below.

11 Stroumsa, "Myth into Metaphor", 321 with Tertullian, *Adversus Marcionem* 1.1.4 (CCSL 1) insisting that "God the Creator is the true Prometheus" (*verus Prometheus Deus omnipotens*).

12 In the New Testament the inability of the rich to enter God's kingdom is ubiquitous: see, for example, Mark 10:23–27 and Mark 4:19; Matthew 6:19– 21 and 19:23–27; Luke 16:10–15; also, Paul 1 Timothy 6:9; cf. Clement, *Quis dives salvetur* (GCS 17.2); Basil of Caesarea, *Homilia in divites* (PL 29), etc.

13 For example, Gregory's *On the Soul and Resurrection* 40M (ed. by Andreas Spira 2014, 23.12–13): ἡ δὲ τέχνη διάνοιά ἐστιν ασφαλής πρός τινα σκοπόν ἐνεργουμένη διά τῆς ὕλης and again 123M (ed. by id., 92.13–16): Καὶ μὴν οὐδὲν ἔξωθεν τῆς θείας φύσεως ὁ λόγος βλέπει. Ἢ γὰρ ἂν διασχισθείη πρὸς διαφόρους ἀρχὰς ἡ ὑπόληψις, εἴ τι τῆς ποιητικῆς αἰτίας ἔξω νομισθείη, παρ᾽ οὗ ἡ τεχνικὴ σοφία, τὰς πρὸς τὴν κτίσιν παρασκευὰς ἐρανίζεται.

14 Panayiotis Nellas, *Deification in Christ. The Nature of the Human Person*. Translated by Norman Russell (New York: St Vladimir's Seminary Press, 1987), 97–100, 103 with numerous citations to John Chrysostom, especially his homily *On Genesis* 29.3 (PG 53, 264); 20.2 (PG 53, 168) and 27.1 (PG 53, 240); also, *On the Statues* 11.4 (PG 49, 124) and 2.5 (PG 49, 42). Cf. Michelle Freeman, "Seeing Sanctity: John Chrysostom's Use of Optics in His Homilies on the Saints". *Journal of Early Christian Studies* 31.2 (2023).

15 Averil Cameron, "Constantine and the 'peace of the church'", in *The Cambridge History of Christianity*, ed. by Margaret M. Mitchell and Frances M. Young (Cambridge: Cambridge University Press, 2006), 542ff. For the involvement of Constantine in ecclesiastical politics, see Timothy David Barnes, "Emperors and bishops 324–44: some problems". *American Journal of Ancient History* 3 (1978): 53–75.

16 Cameron, "Constantine", esp. 551 on Eusebios' *Life of Constantine*: "For the enthusiastic Eusebius, Constantine was quite simply God's vice-gerent on earth, and earth the microcosm of heaven".

of synthesis between pagan and Christian traditions, gradually allowing earlier Greco-Roman projections of power to be reworked into mainstream Christian culture in a systematic way, which also informs the Christian theology of the icons.[17] Thus, despite rejecting the aforesaid Platonic notion of the Demiurge which appealed to gnostic groups,[18] early Christians increasingly address Christ both in art and their writings as *ktistes* (builder/founder),[19] a cultic title of god Dionysus (as well as Apollo, Heracles, and even Hermes) but also of pagan emperors in the context of their imperial cults, particularly Hadrian.[20] My article explores the Christian adaptation of pagan artistic and religious aesthetics and its role in shaping Christian attitudes to technology from the fourth to the ninth century. I begin by outlining the role of technology in pagan cults and its increasing association with imperial grandeur, as background to the hesitation of early Christian authors toward technological innovation. Then, I explore the Christian adaptation of pagan attitudes toward technology, focusing on the role of painting and architecture in enhancing religious sentiments and their implications, theological and political. In time, Christian thinkers also engage with Neoplatonic views on science, especially those of Proclus, who stresses its anagogic character as a providential pathway for ascending from mathematical observations pertaining to the sensible world to perceiving the causes of the divine mind.[21] Proclus expounds many of his ideas in his *Commentary on the First book of Euclid's Elements*, a text that also attracts the interest of Arab thinkers from the late eighth century onwards.[22] Gradually, technological advance develops into a means of diplomatic rivalry between the Byzantines and the Arabs, often barely disguising cultural and religious tensions. By the time of Emperor Theophilos, known for his penchant for advanced technology as well as his iconoclastic views, technology has been employed in the service of both God and Emperor for several centuries. In my view, Theophilos' iconoclasm must be examined in the context of an ever-renewed, yet often-overlooked, debate on aesthetics as a form of culturally conditioned cognition. Aesthetics determines attitudes to technology as valid means of acquiring true knowledge about God, informing religious art and architecture as well as practices of worship.

2. Machines and Miracles from Pagan Antiquity to Early Christianity

Our fascination with machines is not new; already in Homer we come across miraculous contraptions such as the automated tripods[23] and golden handmaids[24] manufactured by Hephaestus, while by the fourth century BCE Plato casually draws his metaphors from the *daidala*, the mobile statues attributed to mythical Daedalus, who had allegedly learned his craft from Hephaestus.[25] Aristotle, again, was familiar with wondrous devices, such as the self-moving puppet theatres,[26] built by contemporary craftsmen who mesmerized audiences with their skill, tempting them to imagine of a future where automation would

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17 Ernst Kitzinger, "The Cult of Images in the Age before Iconoclasm". *Dumbarton Oaks Papers* 8 (1954): 83–150; John Elsner, *Imperial Rome and Christian Triumph. The art of the Roman Empire A.D. 100-450* (Oxford: Oxford University Press, 1998), 10–11, 58-88. On Constantine's depiction as Christ the king, see Jonathan Bardill, *Constantine: Divine Emperor of the Christian Golden Age* (Cambridge: Cambrdige University Press, 2012), 334–384; cf. Manuela Studer-Karlen, "The Emperor's Image in Byzantium. Perceptions and Functions", in *Meanings and Functions of the Ruler's Image in the Mediterranean World (11th – 15th Centuries)*, ed. by Michele Bacci, Manuela Studer-Karlen, and Mirko Vagnoni (Leiden: Brill, 2022), 136.

18 See, for example, 1 Timothy 1:3–4.

19 Cf. 1 Peter 4:19: Ὥστε καὶ οἱ πάσχοντες κατὰ τὸ θέλημα τοῦ Θεοῦ, ὡς πιστῷ κτίστῃ παρατιθέσθωσαν τὰς ψυχὰς αὐτῶν ἐν ἀγαθοποιΐᾳ; see the 6th century Acathist hymn of Romanos the melodist: Acath. γ΄: Χαῖρε, δι᾽ ἧς νεουργεῖται ἡ κτίσις·/ χαῖρε, δι᾽ ἧς βρεφουργεῖται ο Κτίστης/….. Νέαν ἔδειξε κτίσιν, ἐμφανίσας ὁ Κτίστης, ἡμῖν τοῖς ὑπ᾽ αὐτοῦ γενομένοις· but also the Christmas canon of Cosmas the melodist composed in the 8th century (ά: Ἰδὼν ὁ Κτίστης ὀλλύμενον, τὸν ἄνθρωπον χερσὶν ὃν ἐποίησε, κλίνας οὐρανοὺς κατέρχεται.

20 For Dionysus as *ktistis*, see for example, Leah Di Segni, "A Dated Inscription from Beth Shean and the Cult of Dionysos Ktistes in Roman Scythopolis". *Scripta Classica Israelica* 16 (1997): 139–161 at 143–144 and 148ff.; for Hadrian as *ktistis* (as well as Saviour, euergetes, and Olympios), see Francesco Camia, "Which relationship between Greek Gods and Roman Emperors? The cultic implications of the 'assimilation' of Emperors to Gods in mainland Greece". *Arys* 16 (2018): 105–137 at 118–119 with nn57 and 62; cf. Anna Persig, "The Language of Imperial Cult and Roman Religion in the Latin New Testament: The Latin Renderings of 'Saviour'". *New Testament Studies* 69.1 (2013): 21–34 (on the title saviour). Also, see Leah Di Segni, "The Greek Inscriptions", in Michelle Piccirillo and Eugenio Alliata (eds.), *Mount Nebo: New Archaeological Excavations, 1967-1997, volume 2* (Jerusalem: Stadium Biblicum Franciscanum, 1998); and in the same volume Michele Piccirillo, "The Mosaics", 301 on a mosaic found in the basilica of Moses at Mount Nebo with an inscription, addressing Christ as: ὁ κτίστης κ(αὶ) δημιουργὸς τῶν ἁπάντων Χ(ριστὸ)ς ὁ θ(εὸ)ς ἡμῶν·

21 Proclus, *In Euclidem* 54.14–56.22 (ed. by Gottfried Friedlein 1873); also, *On Providence* 1-2 (ed. by Helmut Boese 1960). Cf. Robert Goulding, "Geometry and the Gods: Theurgy in Proclus's Commentary on the First Book of Euclid's Elements", *Perspectives on Science* 30.3 (2022): 358–406 at 392 noting that although Euclid did not intend to teach theurgy "in the *Elements*; yet the work could be used theurgically".

22 There are over twenty Arabic manuscripts of Euclid's *Elements*; see Anthony Lo Bello, *Gerard of Cremona's translation of the commentary of Al-Nayrizi on Book I of Euclid's Elements of Geometry, with an introductory account of the twenty-two early extant Arabic manuscripts of the Elements* (Leiden: Brill, 2003), xii-xxix; and Gregg De Young, "Two hitherto unknown Arabic Euclid Manuscripts", *Historia Mathematica* 42.2 (2015): 133–154. Also, see Sonja Brentjes, "Who Translated Euclid's Elements into Arabic?", in *Translation and Transmission: Collection of Articles*, ed. by Jaakko Hämeen-Anttila and Ilkka Lindstedt (Münster: Ugarit Verlag, 2018), 21–54. Proclus' *Commentary* was also certainly known among Arab thinkers; cf. Sonja Brentjes, "Mathematical commentaries in Arabic and Persian – purposes, forms, and styles". *Historia Mathematica* 47 (2019): 54–66 at 61.

23 Homer, *Iliad* 18.372–379 (LCL 171) with Martin Devecka, "Did the Greeks Believe in their Robots?" *The Cambridge Classical Journal* 59 (2013): 52–69 at 56–59; also, Mayor, *Gods and Robots*, 145–150.

24 Homer, *Iliad* 18.417–421 (LCL 171).

25 Plato *Meno* 97e–98a (LCL 165) and *Euthyphro* 11c (LCL 36) with Devecka, "Did the Greeks Believe in their Robots", 59 and 63; cf. Euripides, *Hecuba* 836–838 (LCL 484). Hephaestus poses as an ancestor of Daedalus in Plato, *Alcibiades I* 121a1 (LCL 201) with Sarah P. Morris*, Daidalos and the Origins of Greek Art* (New Jersey: Princeton University Press, 1992), 99.

26 Aristotle, *Generation of animals* 734b9–b17 (LCL 366); cf. Plato, *Laws* 644d (LCL 187) with Devecka, "Did the Greeks Believe in their Robots", 57–58; also see Mayor, *Gods and Robots*, 93.

make life simpler, perhaps even rendering slavery defunct.[27] In the aftermath of the classical period, the court culture(s) that arose in the Hellenistic kingdoms further fostered technological innovation with key figures like Philo of Byzantium (280–220 BCE),[28] and the Alexandrians Ctesibius (285–222 BCE)[29] and Hero (ca. 10–85 CE)[30] making important contributions to mechanics and engineering which the Romans keenly adopted, already from the late Republican period, appreciative of the fact that technological progress did not merely serve practical utility but had profound philosophical and political implications.[31] Thus, leaders were increasingly keen to employ technology in their public displays of majesty, notably in religious festivals,[32] as symbols of their dynastic prestige and evidence of the technology available at their disposal,[33] including military war machines.[34] While, however, pagan leaders were on the whole keen to recognize the divine will which inspired the construction of automata and other mechanical wonders, affording their subjects enhanced religious experiences, early Christian writers strongly criticized pagan religious aesthetics as mere superstition.

Rufinus thus, while reporting the dramatic events that lead to the vandalism of the Serapeum

27 Athenaeus, *Deipnosophists* 6.267e (LCL 224) preserving a comic dialogue from Crates, a mid- to late fifth century comic playwright. Devecka, "Did the Greeks Believe in their Robots", 64.

28 On the contributions of all three thinkers, see Mayor, *Gods and Robots*, esp. 199–202.

29 Vitruvius, *On architecture* 1.1.7 (LCL 251) (insisting that one must learn the "fundamental principles of physics from philosophy" (*ex philosophia principia rerum naturae noverit*) for otherwise, will not be able to understand the works of Ctesibius or Archimedes "*Item qui Ctesibii aut Archimedis ..., leget, sentire non poterit, nisi his rebus a philosophis erit institutus*"); also, 7.14 (LCL 280) (citing Ctesibius and Philo among others who wrote treatises on machines); 9.8.2 and 4 (LCL 280) on Ctesibius (ascribing to him the discovery of natural pressure of the air and pneumatic principles and praising his work on water organs); 10.7.1-5 (LCL 280) (the pump of Ctesibius).

30 There has been extensive discussion on the dates of Heron; see Alan Dorin and Eva Anagnostou-Laoutides, "The Silver Triton: Suetonius Claud. 21.6.13-6". *Nuncius* 33.1 (2018): 1–24 at 9–10 with nn.21–26, citing Otto E. Neugebauer, "Über Eine Methode Zur Distanzbestimmung Alexandria – Rom Bei Heron". *Kongelige Danske Videnskabernes Selskabs Skrifter* 26 (1938): 3–26 (opting for late first century) and Gilbert Argoud, "Héron d'Alexandrie et les 'Pneumatiques'", in *Sciences exactes et sciences appliquées à Alexandrie*, ed. by Gilbert Argoud and Jean-Yves Guillaumin (Saint-Étienne: Publications de l'Université de Saint-Étienne, 1998); also, Nathan Sidoli, "Heron's Dioptra 35 and Analemma Methods: An Astronomical Determination of the Distance between Two Cities". *Centaurus* 47 (2005): 236–258 and id. "Heron of Alexandria's Date". *Centaurus* 53 (2011): 55–61; Pierre Souffrin, "Remarques sur la datation de la 'Dioptre' d'Héron par l'éclipse de lune de 62", in *Autour de la dioptre d'Héron d'Alexandrie*, ed. by Gilbert Argoud and Jean-Yves Guillaumin (Saint-Étienne: Publications de l'Université de Saint-Étienne, 2000), 13–17; Ramon Masià, "On Dating Hero of Alexandria". *Archive for History of Exact Sciences* 69.3 (2015): 231–255. For the suggestion that Heron should be placed at the time of Nero, see Paul Keyser, "Suetonius 'Nero' 41.2 and the Date of Heron Mechanicus of Alexandria". *Classical Philology* 83 (1988): 218–220; Dimitris Raïos, "La date d'Héron d'Alexandrie: témoignages internes et cadre historico-culturel", in *Autour de la dioptre d'Héron d'Alexandrie*, ed. by Gilbert Argoud and Jean-Yves Guillaumin (Saint-Étienne: Publications de l'Université de Saint-Étienne, 2000), 19–36 ; and Markus Asper 2001, "Dionysios (Heron, Def. 14.3) Und Die Datierung Herons von Alexandria". *Hermes* 129.1 (2001): 135–137; cf. Manuela Rausch, *Heron von Alexandria: die Automatentheater und die Erfindung der ersten antiken Programmsteuerung* (Hamburg: Diplomica Verlag, 2012), 12–14; also, Michael Lewis and Jonathan Taunton, *Surveying Instruments of Greece and Rome* (Cambridge: Cambridge University Press, 2001), 54.

31 Karin Tybjerg, "Wonder-making and Philosophical Wonder in Hero of Alexandria". *Studies in the History and Philosophy of Science* (2003): 34.3, 443–466 at 460–462; and id. "Hero of Alexandria's Mechanical Treatises: between Theory and Practice", in *Physik/Mechanik. Geschichte der Mathematik und der Naturwissenschaften*, ed. by Astrid Schürmann (Stuttgart: Steiner, 2005), 204 with n.2; Giuseppe Cambiano, "Automaton", *Studi Storici* 35.3 (1994): 613–633 at 617–619; cf. Derek J. de Solla Price, "Automata and the Origins of Mechanism and Mechanistic Philosophy". *Technology and Culture* 5 (1964): 9–23. Also, see Cuomo, "Technology and Culture", 177 and id. *Pappus of Alexandria and the Mathematics of Late Antiquity* (Cambridge: Cambridge University Press, 2007b), 103–104; Lynne Lancaster, "Roman Engineering and Construction", in *The Oxford Handbook of Engineering and Technology in the Classical World*, ed. by John Peter Oleson (Oxford: Oxford University Press, 2008), 263 and Matthew M. Mars, "The Repurposing and Legacy of Innovation", in *A Cross-Disciplinary Primer on the Meaning of Principles of Innovation*, ed. by Matthew M. Mars, Gary D. Libecap, and Sherry Hoskinson (United Kingdom, North America, Japan, India, Malaysia, China: Emerald, 2013), 56. For Hero as a scholarly engineer-mechanic, more of an intellectual rather than a pioneering practitioner, see Sylvia Berryman, "Ancient Automata and Mechanical Explanation". *Phronesis* 48.4 (2003): 344–369 at 361–365 and Bernard Vitrac, "Faut-il réhabiliter Héron d'Alexandrie? Faut-il réhabiliter Héron d'Alexandrie?", in *L'homme et la science. Actes du XVIe Congrès international et quinquennal de l'Association Guillaume Budé organisé à l'Université Paul-Valéry, Montpellier III, du 1er au 4 Septembre 2008*, ed. by Jacques Jouanna, Michel Fartzoff, and Béatrice Bakhouche (Paris, Les Belles Lettres, 2011); also, Jan N. Bremmer, "Richard Reitzenstein's Hellenistische Wundererzählungen", in *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, ed. by Tobias Nicklas and Janet E. Spittler (Tubingen: Mohr Siebeck, 2013). For the Roman interest in Greek engineering and automata, see Dorin and Anagnostou-Laoutides, "The Silver Triton", *passim* with relevant bibliography.

32 For more references to automata, for example, the four-metre-tall statue of Nysa commissioned by Ptolemy II, which was apparently paraded as part of a remarkable procession in 270 BCE, see Athenaeus, *Deipnosophists* 5.198–199 (LCL 208); see Dorin and Anagnostou-Laoutides, "The Silver Triton", 16n46 citing among others Ellen Rice, *The Grand Procession of Ptolemy Philadelphus* (Oxford: Oxford University Press, 1983), 62–68 and 138–150; also see Dustan Lowe, "Twisting in the Wind: Monumental Weathervanes in Classical Antiquity". *The Cambridge Classical Journal* 62 (2016): 147–169 at 166–167 with n66, also citing Polybius, *Histories* 12.13.2 (LCL 159) (on the mechanical snail of Demetrios of Phaleron invented to lead the procession of the Great Dionysia in 308 BCE). The episode is also reported by Diogenes Laertius 5.75 (LCL 184). Also, see Lowe, ibid., 167n66 citing Polybius, *Histories* 2.20.147 (LCL 128) (on the bloodied wax statue of Julius Caesar, which rotated mechanically on his bier (τὸ δὲ ἀνδρείκελον ἐκ μηχανῆς ἐπεστρέφετο πάντῃ); Philostratus, *Lives of Sophists* 550 (LCL 134) (on the self-propelled ship carrying Athena's peplos in Herodes Atticus' Panathenaic procession). For similar wonders assumed to have existed in the famous temple of Artemis in Ephesos, see Edward Falkener, *The Temple of Diana in Ephesus* (London: Day & Son, 1862), 301-302.

33 Dorin and Anagnostou-Laoutides, "The Silver Triton", 4–5.

34 See Mark J. Schiefsky, "Technē and Method in Ancient Artillery Construction: The Belopoeica of Philo of Byzantium", in *The Frontiers of Ancient Science: Essays in Honor of Heinrich von Staden*, ed. by Brooke Holmes and Klaus-Dietrich Fischer (Berlin/Boston: De Gruyter, 2015), on artillery engines by Philo of Byzantium; Archimedes, of course, features large in this tradition; cf. Dennis L. Simms, "Archimedes and the Invention of Artillery and Gunpowder". *Technology and Culture* 28.1 (1987): 67–79.

at Alexandria by a Christian mob in 391, notes that Ptolemy Euergetes had commissioned for the temple a huge statue of Helios, “a monstrosity reported to have been composed of every kind of metal and wood” (*quod monstrum ex omnibus generibus metallorum lignorumque compositum ferebatur*) to which Alexandrian engineers were able to add certain features “cunningly and skilfully devised to excite the amazement and wonder of those who saw them” (*Erant etiam quaedam ad stuporem admirationemque videntium, dolis et arte composita*); Rufinus also explains that Ptolemy’s engineers had manipulated magnetic properties to make “the statue appearing to the people to rise and hang in the air” (*assurexisse populo simulachrum, et in aere pendere videretur*). Rufinus assures his readers that the temple hosted many more such mechanical wonders “built on the site by those of old for the purpose of deception” (*Sed et multa alia decipiendi caussa a veteribus in loco fuerant constructa, quae nunc longum est enumerare per singula*),[35] before relating how a soldier “armed with faith” (*fide…munitus*) revealed the fallacious superstition of the pagans which led to public uproar and the destruction of the famous statue.[36] Notably, through their exclusive access to bleeding-edge technology, Roman Emperors could further defend their claims for proximity to the divine; however, starting with Constantine the Great, and certainly under Theodosios I who sanctioned the distraction of the Serapeum, the locus on imperial power shifted to the Christian God.[37]

Christian miracles (*thaumata/ miracula*) starting with those performed by Christ,[38] were understood as proof of his true divinity,[39] while miracles performed at the relics of martyrs, were deemed as the result of them being witnesses to His resurrection (*Cui, nisi huic fidei adtestantur ista miracula, in qua praedicatur Christus resurrexisse in carne et in caelum ascendisse cum carne?*)[40] and evidence of the martyrs’ faith in Him. According to Augustine, Christian miracles, performed through prayers alone[41] rather than any action on their part (*eis orantibus tantum et inpetrantibus, non etiam operantibus fiant*), “offer testament to that faith which professes the resurrection of the flesh unto all eternity” (*ei tamen adtestantur haec fidei, in qua carnis in aeternum resurrectio praedicatur*) and aim to “confirm that faith” (*ut fides illa proficiat*).[42] Accordingly, tension characterized the first Christian centuries during which pagan cultic practices were relentlessly attacked by the early Apologists who strove to distinguish pagan fallacy from the true religion,[43] especially as Christian gnostic groups were keen to acknowledge similarities between Jesus and deities worshipped in popular pagan mystery cults such as Dionysus, Orpheus, and Mithras.[44]

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35 Rufinus, *Ecclesiastical History* 2.23 (GCS 9/2, 1028) with Lowe, “Twisting in the Wind”, 166; Dorin and Anagnostou-Laoutides, “The Silver Triton”, 16.

36 Troels Myrup Christensen, “Religious Conflict in Late Antique Alexandria: Christian Responses to ‘Pagan’ Statues in the Fourth and Fifth Centuries CE”, in *Alexandria: A Cultural and Religious Melting Pot*, ed. by George Hinge and Jens Krasilnikoff (Santa Barbara: Aarhus University Press, 2010), 162; Dirk Rohmann, “The Destruction of the Serapeum of Alexandria, Its Library, and the Immediate Reactions”. *Klio* 104.1 (2022); Socrates Scholasticus, *Ecclesiastical History* 5.16–17 (PG 67, 603–610).

37 John F. Shean, “The Destruction of the Serapeum in 391: Religious Violence and Intolerance in an Imperial Age”. *Journal of Religion and Violence* 9.2/3 (2021): 149–170 at 157–164.

38 Jesus mainly performed acts of exorcising and healing; see Matthew 8:14–17, 23–27, 28–34, 9:1–8, 18–26, 27–31, 12:9–14, 15–21, 22–30, 14:13–21; Mark 1:29–31, 40–45; 5:1–20; 7:24–30; 9:14–20; Luke 4:31–37, 38–39, 40–41, 5:12–16, 17–26; John 2:1–12, 4:46–54; 5:1–18; 6:1–15, 16–21; 9:1–7; 11:1–57. Wendy Cotter, *Miracles in Greco-Roman Antiquity: A sourcebook* (London: Routledge, 1999), 54–72; cf. Brandon Walker, “Performing Miracles: Discipleship and the Miracle Tradition of Jesus”. *Transformation* 33.2 (2016): 85–98; also, see John A. Hardon, “The Miracle Narrative in the Acs of the Apostles”. *The Catholic Biblical Quarterly* 16.3 (1954a): 303–318; René Latourelle, “Originalité et Fonctions des Miracles de Jésus”. *Gregorianum* 66.4 (1985): 641–653; Kim Paffenroth, “Jesus as Anointed and Healing Son of David in the Gospel of Matthew”. *Biblica* 80.4 (1999): 547–554; Philip Michael Forness, *Preaching Christology in the Roman Near East: A Study of Jacob of Serugh* (Oxford: Oxford University Press, 2018), 56–88.

39 Eusebius, *Ecclesiastical History* 4.3.2 (LCL 153) cites Quadratus of Athens on Christ’s ability to resurrect the dead: ‘τοῦ δὲ σωτῆρος ἡμῶν τὰ ἔργα ἀεὶ παρῆν ἀληθῆ γὰρ ἦν, οἱ θεραπευθέντες, οἱ ἀναστάντες ἐκ νεκρῶν, οἳ οὐκ ὤφθησαν μόνον θεραπευόμενοι καὶ ἀνιστάμενοι, ἀλλὰ καὶ ἀεὶ παρόντες, οὐδὲ ἐπιδημοῦντος μόνον τοῦ σωτῆρος, ἀλλὰ καὶ ἀπαλλαγέντος ἦσαν ἐπὶ χρόνον ἱκανόν, ὥστε καὶ εἰς τοὺς ἡμετέρους χρόνους τινὲς αὐτῶν ἀφίκοντο.’ (“But the works of our Saviour were always present, for they were true, those who were cured, those who rose from the dead, who not merely appeared as cured and risen, but were constantly present, not only while the Saviour was living, but even for some time after he had gone, so that some of them survived even till our own time”); cf. John Chrysostom on Apostle Thomas, PG 59, 500: Δεῦρο λάβε τὸ θαῦμα τῇ πείρᾳ· μάθε τὴν ἀνάστασιν ἔργῳ· Bishop Paul of Samosata in his letter to Sabinus, writes (Diekamp ^{2}1981, 303): Τῷ ἁγίῳ Πνεύματι χρισθεὶς προσηγορεύθη Χριστὸς, πάσχων κατὰ φύσιν, θαυματουργῶν κατὰ χάριν. Τῷ γὰρ ἀτρέπτῳ τῆς γνώμης ὁμοιωθεὶς τῷ Θεῷ καὶ μείνας καθαρὸς ἁμαρτίας, ἡνώθη αὐτῷ καὶ ἐνηργήθη ποιεῖσθαι τὴν τῶν θαυμάτων δυναστείαν, ἐξ ὧν μίαν αὐτῷ καὶ τὴν αὐτὴν πρὸς τῇ θελήσει ἐνέργειαν ἔχων, δειχθεὶς λυτρωτὴς τοῦ γένους καὶ Σωτὴρ ἐχρημάτισεν (“Anointed by the Holy Spirit he was called Christ, suffering according to nature, performing miracles according to grace. Assimilated to God by remaining steadfast in his conviction and remaining pure from sin, he was united with Him and empowered to perform the works of miracles, from which he was shown to be both the Redeemer of the human race and its Savior”).

40 Augustine, *City of God* 22.9 (LCL 417).

41 Early Christians, keen to deflect accusations of magic, insist that Christ performed his miracles “without the power of incantations, without liquids from herbs and plants, without any scrupulous observation of rituals, libations and opportune moments” [Arnobius, *adversus nationes* 1.43: *qui sine ulla vi carminum, sine herbarum et graminum sucis, sine ulla aliqua observatione sollicita sacrorum, libaminum, temporum* (ed. by Franz Oehler 1846, 29)]. Cf. Maijastina Kahlos, “A Christian cannot employ magic”, in *Rhetorical Self-fashioning of the Magicless Christianity of Late Antiquity Rhetoric and Religious Identity in Late Antiquity*, ed. by Richard Flower and Morwenna Ludlow (Oxford: Oxford University Press, 2020), 132.

42 Augustine, *City of God* 22.10 (LCL 417); on the role of miracles in the spread of Christianity, see Matthew dal Santo, *Debating the Saints’ Cult in the Age of Gregory the Great* (Oxford: Oxford University Press, 2012), 23–26; cf. Robin Lane Fox, *Pagans and Christians* (London: Viking/ New York: Knopf, 1986), 243, 265 (on a miracle performed by Paul) and 284.

43 Massey Hamilton Shepherd, “The Early Apologists and Christian Worship”. *The Journal of Religion* 18.1 (1938): 60–79. Lane Fox, *Pagans and Christians*, 79–80.

44 For example, Clement, *Protrepticus* 2.12.1ff. (SC 2bis) attacks especially the Bacchic and Orphic mysteries; Jan N. Bremmer, *Initiation into the Mysteries of the Ancient World* (Berlin/Boston: De Gruyter, 2014), 147–167; Harold Remus, *Pagan-Christian Conflict over Miracle in the Second Century* (Cambridge, MA: The Philadelphia Patristic Foundation, 1983), 121–130; Trevor W. Thompson, “Antinoos, The New

Eventually, however, a tendency for fertile osmosis prevailed, facilitated by the fact that the language of the mysteries was widespread across the Roman Empire and accessible both to the uneducated poor who flocked to temples desperate for spiritual reprieve from hardship[45] and the privileged who could afford good education, savouring Greco-Roman literature, rhetoric, and philosophy – notably featuring Plato who had famously adopted the language of the mysteries to refer to ethical progress.[46] His penchant for metaphors to convey philosophical truths was eagerly adopted by early Christian Fathers,[47] making Platonic/Platonising allegory the *lingua franca* of Christian exegesis. Although Plato's metaphorical language and its pedagogical value had been questioned already in antiquity,[48] Plotinus made a significant contribution to the discussion: seeking in a typically Neoplatonic manner to reconcile the views of Plato and Aristotle, Plotinus posits that imagination is crucial for understanding the activity of the Intellect; accordingly, the creative imagination involved in arts provides a link between the world of the senses and transcendental realities,[49] a thesis further developed by Proclus, as we shall discuss, who took a special interest in mathematics and its applications in engineering and optics. Platonic and Neoplatonic tenets provided an important platform for the rapprochement between pagan intellectual traditions and the Christian dogma, especially after 313 when Christianity was recognized as an acceptable religion within the Empire.

Furthermore, Constantine, the first emperor who actively sought to incorporate Christianity in the state apparatus, based his political campaign on pagan models of claiming legitimacy investing oracles and pagan religious practices with Christian content. Hence, he eagerly promoted godsent signs, such as the famous Chi-Rho vision as evidence of his divine appointment by the Christian God.[50] Imperial spectacles continued to appeal to the citizens of the Empire, and the Hippodrome in Constantinople became the centre of social life.[51] Well-versed in the art of enthusing the crowds, Constantine embarked on ambitious architectural projects,[52] embellishing the capital with numerous churches and impressive buildings, that aimed to stress his role as God's ally[53] and friend.[54] Constantine supported fervently technological innovation, including "the mechanisation of hydraulic rotated structures, the acceleration in textile production, the transformation in techniques of navigation and the radical changes in the shape of agricultural implements".[55] No empire could afford to ignore the benefits of technological advance and Byzantine emperors keenly engaged with both their pagan and Christian subjects to ensure that the

God: Origen on Miracle and Belief in Third-Century Egypt", in *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, ed. by Tobias Nicklas and Janet E. Spittler (Tubingen: Mohr Siebeck, 2013) and in the same volume Joseph Verheyden, "Talking Miracles – Celsus and Origen in Dispute. The Evidence of *Contra Celsum* I"; cf. Arthur Darby Nock, "Hellenistic Mysteries and Christian Sacraments". *Mnemosyne* 5.3 (1952): 177–213; Paul Andrews, "Pagan Mysteries and Christian Sacraments". *Studies: An Irish Quarterly Review* 47.185 (1958): 54–65;
Luther H. Martin, "Roman Mithraism and Christianity". *Numen* 36.1 (1989): 2–15 (on Mithraic mysteries); cf. John Moles, "Jesus and Dionysus in 'The Acts of The Apostles' and early Christianity". *Hermathena* 180 (2006): 65–104.

45 Cf. Lane Fox, *Pagans and Christians*, 343–384 on visionary experiences in pagan cults and early Christianity.

46 Hence, Clement in the *Protrepticus* (SC 2bis) refers to the Christian "mysteries of wisdom" (8.80.1: σοφίας…μυστήρια), the "true mysteries" (12.120.1: Ὢ τῶν ἁγίων ὡς ἀληθῶς μυστηρίων), while in the *Stromata* he compares Jesus to a Dionysian mystagogue (4.25.162.3, SC 463). The language of mysteries is prominent also in Paul's First Epistle to the Corinthians (e.g. 1 Corinthians 1:26–27; 2:7); cf. Andrew Louth, *The Origins of the Christian Mystical Tradition from Plato to Denys* (Oxford: Oxford University Press, [2]2007), 205: "the true meaning that is revealed in Christ, a meaning that remains mysterious, for it is no simple message, but the life in Christ that is endless in its implications".

47 See, for example, Ilaria Ramelli, "The Philosophical Stance of Allegory in Stoicism and its Reception in Platonism, Pagan and Christian: Origen in Dialogue with the Stoics and Plato". *International Journal of Classical Tradition* 18 (2011): 335–371.

48 Demetrius, *On Style* 80 (LCL 199). Stephen Halliwell, *Between Ecstasy and Truth. Interpretations of Greek Poetics from Homer to Longinus* (Oxford: Oxford University Press, 2001), 359–367; cf. Paul Millet, "The Trial of Socrates Re-visited". *European Review of History* 12 (2005): 23–62 at 26–27 on the so-called Sokratikoi logoi which likely included critique (as much as praise) of Socrates (and so of Plato's style).

49 John Dillon, "Plotinus and the Transcendental Imagination", in *Religious Imagination*, ed. by James P. Mackey (Edinburgh: Edinburgh University Press, 1986), 57–61; see, for example, Plotinus, *Enneads* V.8(31).6.6–10 (LCL 444): ἀγάλματα δὲ γράψαντες καὶ ἓν ἕκαστον ἑκάστου πράγματος ἄγαλμα ἐντυπώσαντες ἐν τοῖς ἱεροῖς τὴν ἐκείνου <οὐ> διέξοδον ἐμφῆναι, ὡς ἄρα τις καὶ ἐπιστήμη καὶ σοφία ἕκαστόν ἐστιν ἄγαλμα καὶ ὑποκείμενον καὶ ἀθρόον καὶ οὐ διανόησις οὐδὲ βούλευσις ("by drawing images and inscribing in their temples one particular image of each particular thing, they manifested the non-discursiveness of the intelligible world, that is, that every image is a kind of knowledge and wisdom and is a subject of statements, all together in one, and not discourse or deliberation").

50 Ramsay MacMullen, "Constantine and the Miraculous". *Greek, Roman, and Byzantine Studies* 9.1 (1968): 81–96; Richard Price, "In Hoc Signo Vinces: The Original Context of the Vision of Constantine". *Studies in Church History* 41 (2005): 1–10; Jan N. Bremmer, "The Vision of Constantine", in *Land of Dreams*, ed. by André Lardinois, Marc van der Poel, and Vincent Hunink (Leiden: Brill, 2006); Jan Willem Drijvers, "The Power of the Cross: Celestial Cross Appearances in the Fourth Century", in *The Power of Religion in Late Antiquity*, ed. by Andrew Cain and Noel Lenski (*Farnham/Burlington, VT: Ashgate*, 2009), 237–248, etc.

51 See, for example, David Alan Parnell, "Spectacle and Sport in Constantinople in the Sixth Century CE", in *Companion to Sport and Spectacle in Greek and Roman Antiquity*, ed. by Donald G. Kyle and Paul Christesen (Chichester, UK and Malden, MA: Wiley Blackwell, 2013), on public spectacles in 6th century Constantinople (and attendant rioting).

52 Albrecht Berger, "Constantine's City: The Early Days of a Christian Capital". *Studia Ceranea* 10 (2020): 11– 29; cf. John R. Curran, *Pagan City and Christian Capital. Rome in the 4th Century* (Oxford: Oxford University Press, 2000).

53 Eva Anagnostou-Laoutides, "Tyrants and Saviours in *Pan. Lat.* XII(9): pro-Constantinian Readings of the Aeneid". *Journal of Late Antiquity* 14.1 (2021): 75–96 at 84 with Eusebius, *Ecclesiastical History* 9.9.1 (θεοῦ συμμαχοῦντος αὐτῷ).

54 Ibid. with Eusebius 10.9.2 (LCL 265, βασιλεὺς ὁ τῷ θεῷ φίλος); for continuity and careful adaptation of pagan imperial cult aspects under Constantine, see Bardill, *Constantine*, *passim*.

55 Sophia Germanidou, "The time of Constantine the Great as an era of technological achievements -an outline". *Nis and Byzantium* XII (2014a): 155–162 at 156 and 161 where she cites Themistius, *Orations* 9.151a (Dindorf 1832, 179) and his criticism of Constantine's obsession with embellishing his new capital with fine pieces of art "but letting it die of thirst", pointing to the lack of a water grid in the city; at the same time, however, Augustine, *City of God* 22.24 (LCL 417) cannot stop gushing at the marvellous technological advances his age has witnessed.

defence of the capital was state of the art – even to the point of entertaining historically unfounded stories such as the popular tradition reported by John Malalas that the philosopher Proclus had anything to do with the defence of Constantinople from a usurper's attack during Anastasius' reign.[56]

Sceptics about the use of technology to inspire or enhance religious feelings existed on both sides,[57] undeniably encouraged by non-infrequent scandals of counterfeit miracles and pseudo-prophets ready to feign divine visitations.[58] Thus, in his polemic against heretics, Epiphanius not only uses systematically the word *mēchanē* to refer to the twisted logic of dangerous heretics, but directly compares their arguments to advanced machinery; he assures his audience that "there are many arguments in rebuttal of Marcion's stage-machinery and melodrama, which, contrary to him, are drawn from pious reason and creditable exposition"[59] (καὶ πολλά ἐστι τὰ πρὸς ἀνατροπὴν τῆς τούτου μηχανῆς καὶ τραγῳδίας ἐξ εὐσεβοῦς λογισμοῦ καὶ εὐλόγου ὁρμώμενα ἐμφάσεως ἐν τῇ πρὸς αὐτὸν ἀντιρρήσει), obviously inspired by theatrical machinery which had become indispensable in Roman shows.[60] Furthermore, in comparing the power of God's will which enables his human intermediaries to perform miraculous feats, Epiphanius insists that "this was God's command, to show his will to work wonders. For there were no machines or catapults, no battering-rams, no siege engines; the enemy's walls sagged and fell solely at the sound of a ram's horn and the prayer of a righteous person" (ἦν δὲ τοῦτο πρόσταγμα θεοῦ, ἵνα δείξῃ αὐτοῦ τὸ θέλημα τῆς θαυματουργίας. οὔτε γὰρ μηχαναὶ οὔτε μάγγανα ἦν, οὐ κριοί, οὐχ ἑλεπόλεις, ἀλλὰ μόνῃ φωνῇ σάλπιγγος κερατίνης καὶ εὐχῇ δικαίου ἐκλίθησαν καταπεσόντα τὰ τείχη τῶν ὑπεναντίων).[61]

Yet, as mentioned, already in the fourth century the Cappadocian Fathers reaffirm the importance of secular learning in cultivating virtue. Basil of Caesarea and Gregory Nazianzus, both fervent advocates of education and fellow students of Julian (who would become the Emperor Julian the Apostate) in the philosophical school of Athens,[62] together with Basil's brother Gregory of Nyssa, incorporate numerous references to contemporary technological innovations in their writings which they appreciate as tokens of god's perfection. In the next century, Theodosios II reorganizes in Constantinople the school of higher education whose origins can be allegedly traced to Constantine the Great,[63] and thus he establishes the Pandidakterion in Constantinople, inaugurated in 425, a major state initiative with "the exclusive purpose of educating officials for the administration of the state".[64] Between this period and Justinian's closure of the Athens Academy in 529[65] an important period intervenes in which technological advance goes hand in hand with questions about technology's ability to represent divine wisdom – questions which in turn inform the Christian theology about the icons.

3. Art and Technology: The Religious Aesthetics of late antique Christianity

The writings of the Cappadocian Fathers – alongside those of John Chysostom who draws on them,[66] offer ample evidence of the view that technology and craftmanship – engineering, architecture, and notably painting among other arts, ought to be perceived as a reminder of the unity of heaven and earth, a unity

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56 Malalas, *Chronographia* 16.16 (ed. by Hans Thurn 2000, 330–332) Proclus had been dead for twenty years before the alleged events supposedly took place; see John Duffy, "Proclus the Philosopher and A Weapon of Mass Destruction: History or Legend?", in *Theatron: Rhetorical Culture in Late Antiquity and the Middle Ages*, ed. by Michael Grünbart (Berlin, Boston: De Gruyter, 2007).

57 See, for example, Heinz-Günther Nesselrath, "Wundergeschichten in der Perspektive eines paganen satirischen Skeptikers: Lukian von Samosata", in *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, ed. by Tobias Nicklas and Janet E. Spittler (Tubingen: Mohr Siebeck, 2013) on Lucian's comic take on people's tendency for exaggeration alongside his critique of their gullibility and in the same volume Gilbert van Belle, "The Criticism of the Miracles in the Fourth Gospel: A Reflection on the Ideological Criterion of the Semeia Hypothesis", esp. 315 on the view that in the Gospel of John Christians are urged to rest their faith in Jesus' word (rather than miracles).

58 See Remus, *Pagan-Christian Conflict*, 161–181 on Alexander, the deceptive oracle of Asclepius, ridiculed by Lucian; Hermas' accusation in the *Shepherd of Hermas* that Christians seek advice about their future from pseudo-prophets; and the pseudo-ecstasy of Christian Montanists in Phrygia; on the latter, see Maria Dell'Isola, "Montanism and Ecstasy: The Case of Theodotus' Death (Eus. *HE* V,16,14-15)", in *Texts, Practices, and Groups, Multidisciplinary Approaches to the History of Jesus' Followers in the First Two Centuries*, ed. by Adriana Destro and Mauro Pesce (Turnhout: Brepols, 2017), 394 with Laura Salah Nasrallah, *An Ecstasy of Folly: Prophecy and Authority in early Christianity* (Cambridge, MA: Harvard University Press, 2003), 162.

59 Epiphanius, *Panarion* 8.8 (ed. by Karl Holl 1915, 104); translation Frank Williams, *The Panarion of Epiphanius of Salamis. Book I (Sects 1–46)* (Leiden: Brill, 2009), 302.

60 Dorin and Anagnostou-Laoutides, "The Silver Triton", 7–8 citing Vitruvius, *On Architecture* 5 and 10 Praef. 3; cf. Fritz Graf, "Religion and Drama", in *Cambridge Companion to Greek and Roman Theatre*, ed. by Marianne McDonald and Michael Walton (Cambridge: Cambridge University Press, 2007), 64–66; Donald J. Mastronarde, *The Art of Euripides: Dramatic Technique and Social Context* (Cambridge: Cambridge University Press, 2010), 181–184; Richard Beacham, *The Roman Theatre and Its Audience* (Cambridge, MA: Harvard University Press, 1991), 168–171, and id. "Heron of Alexandria's 'Toy Theatre' Automaton: Reality, Allusion and Illusion", in *Theatre, Performance and Analogue Technology. Historical Interfaces and Intermedialities*, ed. by Kara Reilly (New York: Palgrave Macmillan, 2013), 30–33; Stephen di Benedetto, *An Introduction to Theatre Design* (New York: Routledge, 2013), 27–28.

61 Epiphanius, *Panarion* 82.5 (ed. by Karl Holl 1915, 124).

62 See, for example, Julian's *Epistle* 26 (LCL 157) to Basil, written in early 362; cf. John Malalas, *Chronographia* 13.25 (ed. by Hans Thurn 2000, 257). Gregory of Nazianzus was also a fellow student of Basil at Athens; see Rosemary Ruether, *Gregory of Nazianzus. Rhetor and Philosopher* (Oxford: Clarendon Press, 1969), 24–25.

63 Paul Lemerle, *Byzantine humanism: the first phase, notes and remarks on education and culture in Byzantium from its origins to the 10th century*. Trans. Helen Lindsay and Ann Moffatt (Canberra: Australian Association for Byzantine Studies, 1986), 54–55, 62–64.

64 Athanasios Markopoulos, "In Search for 'Higher Education' in Byzantium". *Recueil des travaux de l'Institut d'études byzantines* 50 (2013): 29–44 at 34 with C dex Theodosianus 14.9.3 (ed. by Theodor Mommsen and Paul Martin Meyer 1905, 787) = Codex Justinianus 11.19.1 (ed. by Fred H. Blume and Bruce W. Frier 2016, 2687–2689).

65 Filippomaria Pontani, "Scholarship in the Byzantine Empire (529–1453)", in *History of Ancient Greek Scholarship. From the Beginnings to the End of the Byzantine Age*, ed. by Franco Montanari (Leiden: Brill, 2020), 374–375; cf. his pp. 386–397 on the decline of education in 6th century Constantinople.

66 See n15 above.

enabled thanks to the incarnated Logos and His sacrifice, which the faithful can experience through the mystery of the eucharist.[67] Gregory of Nyssa, for example, employs in his *On the Soul and Resurrection* many references to automated constructions;[68] Gregory comes up with a devil's advocate argument to give voice to contemporary fears of automation (which re-emerge from time to time throughout history even to this day) according to which increased reliance on machines may cause people to doubt the existence of the soul:[69]

> such effects, for instance, as we often see produced by the mechanists (Οἷα δὴ πολλὰ βλέπομεν ὑπὸ τῶν μηχανοποιῶν), in whose hands matter, combined according to the rules of art, imitates Nature (μιμεῖται τὴν φύσιν), exhibiting resemblance not in figure alone but even in motion, so that when the piece of mechanism sounds in its resonant part it mimics a human voice (οὐκ ἐν τῷ σχήματι μόνῳ δεικνῦσα τὸ ὅμοιον, ἀλλὰ καὶ ἐν κινή σει γίνεται, καὶ φθόγγον τινὰ ὑποκρίνεται, ἠχοῦντος ἐν τῷ φωνητικῷ μέρει τοῦ μηχανήματος), without, however, our being able to perceive anywhere any mental force (νοητήν τινα δύναμιν) working out the particular figure, character, sound, and movement; suppose, I say, we were to affirm that all this was produced as well in the organic machine of our natural bodies (τοῦτο τῆς φύσεως ἡμῶν ὄργανον), ...; would not then the fact stand proved of the absolute nonexistence of that intellectual and impalpable Being, the soul, which you talk of? (τὴν νοητὴν ἐκείνην καὶ ἀσώματον τῆς ψυχῆς οὐσίαν ἀποδεικνύοιτο, ἢ τὸ μηδόλως εἶναι;)

As Ludlow has argued,[70] Macrina, Gregory's interlocutor in his treatise, employs in her response a bold example based on the description of a marvellous mechanical device, probably inspired by the sound-making pneumatic devices of Hero of Alexandria. Macrina counterargues that such machines[71]

> could not exist without human designers with rational souls who observe the characteristics of water and air, and then create and design machines which use those forces in their operation.

Further, Macrina insists that such inventions are meant to remind souls of the Creator, just like[72]

> a garment suggests to any one the weaver of it (Καὶ ἱμάτιον μέν τις ἰδὼν τὸν ὑφάντην ἀνελογίσατο), and the thought of the shipwright comes at the sight of the ship (καὶ διὰ τῆς νηὸς τὸν ναυπηγὸν ἐνενόησεν), and the hand of the builder is brought to the mind of him who sees the building (, ἥ τε αὐτοῦ οἰκοδόμου χεὶρ ὁμοῦ τῇ τοῦ οἰκοδομήματος ὄψει τῇ διανοίᾳ τῶν θεωμένων ἐγγίνεται).

Gregory reiterates the idea in the sixth *oratio* of his *de Beautitudinibus* where he admits that grasping the essence of God is a challenging task for the human mind. Yet, we can appreciate God's wisdom by closely observing his creation:[73]

> For through the wisdom that is manifest in everything (Ἔστι γὰρ καὶ διὰ τῆς ἐμφαινομένης τῷ παντὶ σοφίας), one can contemplatively perceive Him who has made all things in wisdom (τὸν ἐν σοφίᾳ πάντα πεποιηκότα στοχαστικῶς ἰδεῖν). Just as in human creations, the creator of the intended artifact can be perceived in some way by the mind (Καθάπερ καὶ ἐπὶ τῶν ἀνθρωπίνων δημιουργημάτων ὁρᾶται τρόπον τινὰ τῇ διανοίᾳ ὁ δημιουργὸς τοῦ προκειμένου κατασκευάσματος), having placed the art in his work (τὴν τέχνην τῷ ἔργῳ ἐναποθέμενος). However, what is seen is not the nature of the artist, but only the technical skill that the craftsman has put in the construction (Ὁρᾶται δὲ οὐχ ἡ φύσις τοῦ τεχνητεύσαντος, ἀλλὰ μόνον ἡ τεχνικὴ ἐπιστήμη, ἣν ὁ τεχνίτης τῇ κατασκευῇ ἐν απέθετο). Thus, when we look at the world in the creation, we are impressed not by the essence, but by the wisdom of Him who has wisely made all things (Οὕτω καὶ πρὸς τὸν ἐν τῇ κτίσει βλέποντες κόσμον, ἔννοιαν οὐ τῆς οὐσίας, ἀλλὰ τῆς σοφίας τοῦ κατὰ πάντα σοφῶς πεποιηκότος ἀνατυπούμεθα). And if we consider the cause of our life, that it did not come from necessity, but from a good will to create humans (Κἂν τῆς ἡμετέρας ζωῆς τὴν αἰτίαν λογισώμεθα, ὅτι οὐκ ἐξ ἀνάγκης, ἀλλ' ἐξ ἀγαθῆς προαιρέσεως ἦλθεν εἰς τὸ κτίσαι τὸν ἄνθρωπον), we again say that we have seen God in this way, being products of His goodness not of His essence in contemplation (πάλιν καὶ διὰ τούτου τοῦ τρόπου καθεωρακέναι λέγομεν τὸν Θεὸν, τῆς ἀγαθότητος οὐ τῆς οὐσίας ἐν περινοίᾳ γενόμενοι·).

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[67] On the role of the eucharist in iconoclasm, see Andrew Louth, "The Doctrine of the Eucharist in the Iconoclast Controversy", in *Selected Essays, Volume I: Studies in Patristics*, ed. by Lewis Ayres, and John Behr (Oxford: Oxford University Press, 2023); cf. Vladimir Baranov, "The doctrine of the Icon-Eucharist for the Byzantine iconoclasts". *Studia Patristica* 44 (2010): 41–48; cf. Aleksandar Djakovac, "Iconical Ontology of St. Maximus the Confessor", in *Ars Liturgica. From the Image of Glory to the Images of the Idols of Modernity*, ed. by Dimitru A. Vanca, Mark J. Cherry, and A. Albu (Alba Iulia: Reintregirea, 2017), esp. 62–67.

[68] Sophia Germanidou, "Attitudes of Early Patristic Writers toward Technology in the Sphere of Byzantium". *Greek Orthodox Theological Review* 59.1/4 (2014b): 41–53 at 42–43 with John F. Callahan, "Greek Philosophy and the Cappadocian Cosmology". *Dumbarton Oaks Papers* 12 (1958): 29–57 at 33–36 and Morwenna Ludlow, "Science and Technology in Gregory of Nyssa's *De Anima et Resurrectione*: Astronomy and Automata". *Journal of Theological Studies* 60.2 (2009): 467–489.

[69] All translations of Gregory's *On the Soul and Resurrection* are from NPNF 2–5 with minor modifications.

[70] Ludlow, "Science and Technology", 478–482.

[71] Ludlow, "Science and Technology", 478; cf. *On the Soul and Resurrection* 36M (ed. by Andreas Spira 2014, 21.1–5) where man is said "to be able through his imaginative and inventive power to grasp the function of machines in himself and design them in thought, so to put them into action through skill and to demonstrate thought in matter" (ᾧ ταῦτα πέφυκε διὰ τῆς θεωρητικῆς καὶ ἐφευρετικῆς δυνάμεως κατανοεῖν τε ἐν ἑαυτῷ καὶ προκατασκευάζειν τῇ διανοίᾳ τὰ μηχανήματα, εἶθ' οὕτως εἰς ἐνέργειαν διὰ τῆς τέχνης ἄγειν, καὶ διὰ τῆς ὕλης δεικνύειν τὸ νόημα).

[72] Ludlow, "Science and Technology", 483–484 with *On the Soul and Resurrection* 24M (ed. by Andreas Spira 2014, 9.15–10.4).

[73] PG 44, 1268D.

John Chrysostom, referring to God as ὁ σοφὸς καὶ εὐμήχανος τῆς ἡμετέρας φύσεως δημιουργὸς ("the wise and inventive demiurge of our nature"),[74] echoes Gregory's views and invites Christians to observe divine providence which enables each of them to "become the inventor of some art from its beginning under God's intelligence which is implanted in nature".[75] Gregory also employs painting as a metaphor in his *De Anima* to defend the immortality of the soul as a pre-condition for its posthumous union with its spiritual body, characterized as its resurrection:[76] like a painter knows the consistency of his colours and the steps he has followed to achieve a certain depiction – he argues, so the Creator has endowed each soul with the ability to recognize its constituent parts; therefore, by clinging to what feels familiar through the power of recognition (τῇ γνωστικῇ δυνάμει τοῦ οἰκείου ἐφαπτομένη) the soul is attracted to its spiritual body. The ability of human creative skill to stimulate the senses and instruct us in how to bridge the distance between the disappointing reality of our earthly bodies and spiritual transcendence, lies at the heart of Gregory's defence of icons and their role in Christian worship.

The Nyssen is one of many fourth-century Christian Fathers who explicitly defend the educational role of icons through which Christian congregations may be consoled for their worldly sufferings by being reminded of God's glory and the heavenly bliss awaiting His martyrs.[77] Gregory's confidence in the persuasive power of the arts which transforms the tombs of martyrs to places of spiritual transcendence is illustrated in his *Eulogy to the Great Martyr Theodore*.[78] There, he argues, although most people feel underwhelmed at the sight of corpses because it evokes to them the futility of human life, yet the tombs of martyrs are transformed into places of reflection, support, and spiritual guidance when craftsmen construct and decorate them adeptly:[79]

> Should someone come to a place similar to this, where we have gathered today (a martyr's tomb), where the memory of the just and his holy relics are present (Ἐλθὼν δὲ εἴς τι χωρίον ὅμοιον τούτῳ, ἔνθα σήμερον ὁ ἡμέτερος σύλλογος, ὅπου μνήμη δικαίου καὶ ἅγιον λείψανον), first, he will console his soul with the splendour of what he sees (πρῶτον μὲν τῇ μεγαλοπρεπείᾳ τῶν ὁρωμένων ψυχαγωγεῖται), perceiving this house as a temple of God (οἶκον βλέπων ὡς Θεοῦ ναὸν), stunningly decorated with the grandeur of the construction (ἐξησκημένον λαμπρῶς τῷ μεγέθει τῆς οἰκοδομῆς), and the beauty of decorations (καὶ τῷ τῆς ἐπικοσμήσεως κάλλει), where the carver gave the wood the appearance of animals, and the stonecutter smoothed the slabs to the sheen of silver (ἔνθα καὶ τέκτων εἰς ζώων φαντασίαν τὸ ξύλον ἐμόρφωσε, καὶ λιθοξόος εἰς ἀργύρου λειότητα τὰς πλάκας ἀπέξεσεν). And the painter coloured artistic flowers (Ἐπέχρωσε δὲ καὶ ζωγράφος τὰ ἄνθη τῆς τέχνης), drawing in the picture the valiant deeds of the martyr (ἐν εἰκόνι διαγραψάμενος, τὰς ἀριστείας τοῦ μάρτυρος), his firm standing at the court (τὰς ἐνστάσεις), his sufferings (τὰς ἀλγηδόνας), the bestial faces of his tormentors (τὰς θηριώδεις τῶν τυράννων μορφὰς), their violent insults (τὰς ἐπηρείας), the flame-consuming furnace (τὴν φλογοτρόφον ἐκείνην κάμινον), the most blessed death of the athlete (of Christ) (τὴν μακαριωτάτην τελείωσιν τοῦ ἀθλητοῦ), the imprint of the human image of adjudicating Christ (τοῦ ἀγωνοθέτου Χριστοῦ τῆς ἀνθρωπίνης μορφῆς τὸ ἐκτύπωμα); having skilfully drawn all this for us with colours, as if in some word-conveying book (πάντα ἡμῶν ὡς ἐν βιβλίῳ τινὶ γλωττοφόρῳ διὰ χρωμάτων τεχνουργησάμενος), he clearly narrated the exploits of the martyr (σαφῶς διηγόρευσε τοὺς ἀγῶνας τοῦ μάρτυρος) and brightly embellished the temple, as if a flowering meadow (καὶ ὡς λειμῶνα λαμπρὸν τὸν νεὼν κατηγλάϊσεν) For even painting can silently speak on the walls and deliver the greatest benefit (οἶδε γὰρ καὶ γραφὴ σιωπῶσα ἐν τοίχῳ λαλεῖν, καὶ τὰ μέγιστα ὠφελεῖν). And the maker of the mosaics created a history worthy of the trodden ground (καὶ ὁ τῶν ψηφίδων συνθέτης, ἱστορίας ἄξιον ἐποίησε τὸ πατούμενον ἔδαφος). Having this addressed the senses with such craftmanship (Καὶ τοῖς αἰσθητοῖς οὕτω φιλοτεχνήμασιν ἐνευπα θήσας τὴν ὄψιν), the visitor wishes to approach the shrine itself (ἐπιθυμεῖ λοιπὸν καὶ αὐτῇ πλησιάσαι τῇ θήκῃ), believing that the touch is a sanctification and a blessing (ἁγιασμὸν καὶ εὐλογίαν τὴν ἐπαφὴν εἶναι πιστεύων).

Gregory continues to illustrate the psychological effect that the relics have on the faithful, causing them to shed tears of reverence and worship the martyr, a defender of God, with prayers;[80] while John Chrysostom in his revision of the theme emphasizes the consolation that relics afford those who gaze at them (so that they desist from uncontrollable mourning).[81]

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74 *On Genesis* 15.2 (PG 53, 120).

75 *On Genesis* 29.3 (PG 53, 264): καὶ ἕκαστος ὑπὸ τῆς παρὰ Θεοῦ σοφίας ἐγκειμένης τῇ φύσει εὑρετὴς ἐχ προοιμίων τέχνης τινὸς γέγονε καὶ οὕτως εἰς τὸν βίον εἰσήνεγκε τὰ τῶν τεχνῶν ἐπιτηδεύματα ...

76 PG 46, 73B; Eirene Artemi, "The Aspect of the Body in the Writing 'On the Soul and the Resurrection' by Gregory of Nyssa". *SingiLogos* 2.1 (2020): 113–129 at 118.

77 Cf. David Rylaardam, *John Chrysostom on Divine Pedagogy: The Coherence of his Theology and Preaching* (Oxford: Oxford University Press, 2014), 266–267 on John's portrayal of God as a teacher of philosophy who invites us to move from corporeal images to visualizing the potential that every person can realize under His guidance.

78 The eulogy was delivered on 7 February 386; Jean Danielou, "Chronologie des Sermons de Saint Gregoire de Nysse". *Revue des Sciences Religieuses* 29 (1955): 346–372 at 355–356.

79 PG 46, 739–740; cf. Morwenna Ludlow, *Art, Craft, and Theology in Fourth-Century Christian Authors* (Oxford: Oxford University Press, 2020), 40, 44–45.

80 PG 46, 740: τὸ τοῦ πάθους ἐπιχέοντες δάκρυον, ὡς ὁλοκλήρῳ καὶ φαινομένῳ τῷ μάρτυρι τὴν τοῦ πρεσβεύειν ἱκεσίαν προσάγουσιν, ὡς δορυφόρον τοῦ Θεοῦ παρακαλοῦντες.

81 *De sancto Babyla, contra Julianum et gentiles* 66 (SC 362, 176) in Freeman, "Seeing Sanctity", 190; see below nn. 121–122.

We come across similar views in Basil of Caesarea;[82] in one of his *Letters* Basil suggests that the "lives of saintly men (οἱ βίοι τῶν μακαρίων ἀνδρῶν) should be recorded and handed down to us (ἀνδρῶν ἀνάγραπτοι παραδεδομένοι) like living images of God's way of life (εἰκόνες τινὲς ἔμψυχοι τῆς κατὰ Θεὸν πολιτείας) for our imitation of their good works (τῷ μιμήματι τῶν ἀγαθῶν ἔργων).[83] Elsewhere in his corpus, Basil praises God as the "craftsman and creator" of Heavenly Jerusalem (ἧς τεχνίτης καὶ δημιουργὸς ὁ θεός),[84] while he also compares Him to an architect, a woodworker, a metallurgist, and a weaver in his creation of humanity:[85]

> In the creative arts (ἐπὶ δὲ τῶν ποιητικῶν τεχνῶν), however, (i.e. unlike dancing and music) the work lasts after the action (καὶ παυσαμένων τῆς ἐνεργείας, προκείμενόν ἐστι τὸ ἔργον). Such is architecture and woodwork and metallurgy and weaving (ὡς οἰκοδομικῆς καὶ τεκτονικῆς καὶ χαλκευτικῆς καὶ ὑφαντικῆς), and all such arts which, even when the artisan is no longer present (καὶ ὅσαι τοιαῦται, αἳ, κἂν μὴ παρῇ ὁ τεχνίτης), they can manifest through themselves a creative intelligence (ἱκανῶς ἐν ἑαυταῖς τοὺς τεχνικοὺς λόγους ἐμφαίνουσι) and make it possible to admire the architect, the metallurgist or the weaver, on account of his work (καὶ ἔξεστί σοι θαυμάσαι τὸν οἰκοδόμον ἀπὸ τοῦ ἔργου, καὶ τὸν χαλκέα καὶ τὸν ὑφάντην). Thus, then, to show that the world is a work of art (ὅτι ὁ κόσμος τεχνικόν ἐστι κατασκεύασμα) displayed for the beholding of all people (προκείμενον πᾶσιν εἰς θεωρίαν), so that through it wisdom of Him who created it can be known (ὥστε δι' αὐτοῦ τὴν τοῦ ποιήσαντος αὐτὸν σοφίαν ἐπιγινώσκεσθαι), sagacious Moses did not use any other word but said "In the beginning, God created" (οὐκ ἄλλη τινὶ φωνῇ ἐχρήσατο ὁ σοφὸς Μωϋσῆς περὶ αὐτοῦ, ἀλλ' εἶπεν, Ἐν ἀρχῇ ἐποίησεν).

Such views reflect a bold reworking during the fourth century of the Platonic and Neoplatonic concept of *mimesis*,[86] in combination with the longstanding literary technique of ekphrasis,[87] which had notably given rise to the so-called technical ekphrases – that is, vivid and elaborate descriptions of mechanical, scientific, and mathematical inventions. Hero of Alexandria, who as mentioned, Gregory of Nyssa was familiar with, thrived in such ekphrases that aimed to stir the imagination of the readers, urging them to visualize as clearly as possible[88] the contraptions described while maximising admiration for their utility.[89]

By the fourth century, Christian Fathers, who had also absorbed the teachings of Clement of Alexandria on Christian faith as a kind of *epistēmē* (i.e. science that relies on demonstrable first principles),[90] unproblematically recognize that the power of hand-made constructions and artistic works which inspires people to sense the greatness of God is culturally conditioned.[91] This is most evident in the case of icons whose veneration preserves strong elements associated with pagan imperial cults.[92] In the *Commentary on Isaiah* attributed to Basil, he writes:[93]

> For the lawless hurl insults at the temple (Οἱ γὰρ ἄνομοι ἐξυβρίζουσι μὲν εἰς τὸν ναὸν), at their neighbour (εἰς τὸν πλησίον), at what is created in the image of the Creator (εἰς τὸ κατ' εἰκόνα τοῦ Κτίσαντος), and through the image their abuse ascends to the Creator (διὰ τῆς εἰκόνος ἡ ὕβρις ἀναβαίνει ἐπὶ τὸν Κτίσαντα). For just as he who desecrates the royal image is judged as having sinned against the king himself (Ὥσπερ γὰρ ὁ βασιλικὴν εἰκόνα καθυβρίσας, ὡς εἰς αὐτὸν ἐξαμαρτήσας τὸν βασιλέα κρίνεται), so, obviously, the one who desecrates Him created in the image is guilty of sinning against Him (οὕτω δηλονότι ὑπόδικός ἐστι τῇ ἁμαρτίᾳ ὁ τὸν κατ' εἰκόνα γεγενημένον καθυβρίζων).

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[82] Cf. Anne Karahan, "Beauty in the Eyes of God. Byzantine Aesthetics and Basil of Caesarea", *Byzantion* 82 (2012): 165–212, esp. 194–200 also citing Basil, *Hexaemeron* 1.6 (PG 29, 16B–C) where the world is described as "a training place for rational souls for attaining the knowledge of God, because through the visible and perceptible objects it provides guidance to the mind for the contemplation of the invisible" (ψυχῶν λογικῶν διδασκαλεῖον καὶ θεογνωσίας ἐστὶ παιδευτήριον, διὰ τῶν ὁρωμένων καὶ αἰσθητῶν χειραγωγίαν τῷ νῷ παρεχόμενος πρὸς τὴν θεωρίαν τῶν ἀοράτων).

[83] Basil, *Epistle* 2 (LCL 190); Ludlow, *Art, Craft, and Theology*, 4.

[84] Basil, *Forty Martyrs* 2 (PG 31, 508D–509C) again in Ludlow, *Art, Craft, and Theology*, 4. The notion is repeated in John Chrysostom, for example, *On the Statues* 17.12 (PG 49, 177: τῆς πόλεως ἡμῶν τεχνίτης καὶ δημιουργός ἔστιν ὁ Θεός).

[85] Basil, *Hexaemeron* 1.7 (PG 29, 17B) with Ludlow, *Art, Craft, and Theology*, 11. Translation of Basil's *Hexaemeron* is from NPNF 2–8.

[86] Ludlow, *Art, Craft, and Theology*, esp. 6–11, 24–25, 57–64, 73–75, 83–86, 95–96, 215–217, 237–239.

[87] Ludlow, *Art, Craft, and Theology*, esp. 37–39, 41, 48, 54, 57–58, etc; Ruth Webb, "The Aesthetics of Sacred Space: Narrative, Metaphor, and Motion in 'Ekphraseis' of Church Buildings". *Dumbarton Oaks Papers* 53 (1999): 59–74.

[88] The desired result is *enargeia* ("clarity of imaginary vision"), a quality highly praised in pagan rhetorical education, and eagerly utilized by the early Christian Fathers. See Courtney Roby, *Technical Ekphrasis in Greek and Roman Science and Literature. The Written Machine between Alexandria and Rome* (Cambridge: Cambridge University Press, 2016), 1–3 with John Elsner, "Introduction: the genres of ekphrasis". *Ramus* 31.1/2 (2001): 1–18 at 2–3.

[89] See Hero, *Dioptra* 34.9 (ed. by Hermann Schöne 1976, 292.24) referring to an odometer as the *graphomenon organon* (described/drawn instrument); cf. his *Peri automatopoiētikēs* 5.1, 9.4, 13.3, 28.1–3 (ed. by Wilhelm Schmidt 1899, 354, 368, 384, 440–442) describing theatrical mechanisms; with Roby, *Technical Ekphrasis*, 3 and 5.

[90] Andrew Radde-Gallwitz, *Basil of Caesarea, Gregory of Nyssa, and the Transformation of Divine Simplicity* (Oxford: Oxford University Press, 2009), 38–66 discussing the Aristotelian but also Stoic and Epicurean views that Clement draws on. Note Clement's use of the adjective enarges (clear), a paramount feature of scientific proof that he grafts onto Christian faith. Clement, *Stromata* 8.3.7 (SC 428) with Radde-Gallwitz ibid., 44; cf. Marc Gasser-Wingate, "Aristotle on Induction and First Principles". *Philosophers' Imprint* 16.4 (2016): 1–20.

[91] On the Byzantine notion of the "right kind of imitation", see Karahan "Beauty in the Eyes of God", esp. 189– 194; cf. n119 below.

[92] Cf. Robin Jensen, "Allusions to Imperial Rituals in Fourth-Century Christian Art", in *The Art of Empire: Christian Art in Its Imperial Context*, ed. by Lee M. Jefferson and Robin M. Jensen (Minneapolis: Fortress Press, 2015); and in the same volume, Lee M. Jefferson, "Revisiting the Emperor Mystique: The Traditio Legis as an Anti-Imperial Image" and Jacob A. Latham, "Representing Ritual, Christianizing the pompa circensis: Imperial Spectacle at Rome in a Christianizing Empire.

[93] Basil, *Commentary on Isaiah* 13.267 (PG 30, 589A–B). Translation mine.

Basil revisits the topic in his treatise *On the Holy Spirit*; while discussing the nature of the divine Trinity, an argument that Theodore Stoudite will reiterate later during the second phase of iconoclasm,[94] Basil writes:[95]

> ...we speak of a king and of the king's image, and not of two kings (βασιλεὺς λέγεται καὶ ἡ τοῦ βασιλέως εἰκὼν, καὶ οὐ δύο βασιλεῖς). For neither majesty is not split in two, nor the glory divided (Οὔτε γὰρ τὸ κράτος σχίζεται, οὔτε ἡ δόξα διαμερίζεται). ...; because the honor paid to the image passes on to the prototype (διότι ἡ τῆς εἰκόνος τιμὴ ἐπὶ τὸ πρωτότυπον ἀναβαίνει). Hence, what the image stands for by reason of imitation, the Son stands for by nature (Ὃ οὖν ἐστιν ἐνταῦθα μιμητικῶς ἡ εἰκὼν, τοῦτο ἐκεῖ φυσικῶς ὁ Υἱός); and as in artificial works the likeness depends on the form (καὶ ὥσπερ ἐπὶ τῶν τεχνητῶν κατὰ τὴν μορφὴν ἡ ὁμοίωσις), so in the case of the divine and uncompounded nature the union consists in the communion of the divinity (οὕτω καὶ ἐπὶ τῆς θείας καὶ ἀσυνθέτου φύσεως ἐν τῇ κοινωνίᾳ τῆς θεότητός ἐστιν ἡ ἕνωσις).

The connection of Christian practices of worship, including temple decoration with wall-painting, the erection of statues to Christ and/or the Apostles,[96] and the production of icons for venerated martyrs and saints, with imperial cult is explicitly drawn by Methodius of Olympus, who was known for his philosophical education and for elaborating on the Scriptural comparison of God with a potter (drawing on Jer. 18:3–6).[97] Notably, lines from Methodius' second *Discourse on the Resurrection* are cited by John Damascene at the conclusion of his *Defence* of icon veneration. John writes:[98]

> For instance, then, the images of our kings here, even though they be not made by the much more precious materials — gold or silver — are honoured in every way (Αὐτίκα οὖν τῶν τῇδε βασιλέων αἱ εἰκόνες, κἂν μὴ ἀπὸ τῆς πολὺ τιμιωτέρας <ὕλης>, χρυσοῦ τε καὶ ἀργύρου, ὦσι κατεσκευασμέναι, τιμὴν ἔχουσι πρὸς ἁπάντων). For men ...honor every image in the world, even though it be of chalk or bronze (...οἱ ἄνθρωποι …πᾶσαν ἐπίσης τιμῶσιν, εἰ καὶ ἀπὸ γύψου ἢ χαλκοῦ ὑπάρχουσι). And he who vilifies either of them, is not acquitted as if he had only spoken against clay, nor condemned for having despised gold, but for having been disrespectful towards the King and Lord Himself (καὶ ὁ δυσφημήσας εἰς ὁποτέραν οὔτε ὡς εἰς πηλὸν ἀφίεται, οὔτε ὡς χρυσὸν ἐξευτελίσας κρίνεται, ἀλλ' ὡς εἰς αὐτὸν ἀσεβήσας τὸν βασιλέα καὶ κύριον). The images of God's angels, which are fashioned of gold, the principalities and powers, we make to His honour and glory (Τὰς μὲν ἀπὸ χρυσοῦ κατεσκευασμένας εἰκόνας τῶν αὐτοῦ ἀγγέλων, τὰς ἀρχὰς καὶ τὰς ἐξουσίας, εἰς τιμὴν καὶ δόξαν αὐτοῦ ποιοῦμεν).

John Chrysostom,[99] Athanasius of Alexandria,[100] Gregory of Nazianzus,[101] and Eusebios,[102] all offer similar arguments, further pointing to the Christian adaptation of pagan artistic aesthetics from the time of Constantine onwards.[103] Hence, in his *Church History*, Eusebios observes:[104]

> And there is nothing strange (θαυμαστὸν οὐδὲν) about it, that those pagans who were benefited by our Saviour in the past have done these things (τοὺς πάλαι ἐξ ἐθνῶν εὐεργετηθέντας πρὸς τοῦ σωτῆρος ἡμῶν ταῦτα πεποιηκέναι), since we have learned that the images of His apostles Paul and Peter, and of Christ himself, are preserved in coloured paintings (ὅτε καὶ τῶν ἀποστόλων αὐτοῦ τὰς εἰκόνας Παύλου καὶ Πέτρου καὶ αὐτοῦ δὴ τοῦ Χριστοῦ διὰ χρωμάτων ἐν γραφαῖς σῳζομένας ἱστορήσαμεν), as it is appropriate (ὡς εἰκός) for the ancients, having been accustomed to offering such honour indiscriminately to those regarded by them as saviours following pagan habit (τῶν παλαιῶν ἀπαραφυλάκτως οἷα σωτῆρας ἐθνικῇ συνηθείᾳ παρ' ἑαυτοῖς τοῦτον τιμᾶν εἰωθότων τὸν τρόπον).

Eusebios' point is highly accurate given the continuity of tradition between early cult images of Christian martyrs, mainly made by encaustic painting on wood, and the funerary art of Roman Egypt[105] – especially as scholarship has moved beyond the early scholarly arguments on the matter about "the degenerative effects of an oriental influence on Roman art's

94 Oksana Yu. Goncharko and Dmitry N. Goncharko, "A Byzantine Logician's "Image" within the Second Iconoclastic Controversy. Theodore the Studite", *Scrinium* 5 (2019): 163–177 at 171 and 176.

95 Basil, *On the Holy Spirit* 18.45 (PG 32, 149B–C). Translation from NPNF 2–8.

96 See Michael Peppard, "Was the Presence of Christ in Statues? The Challenge of Divine Media for a Jewish Roman God", in *The Art of Empire: Christian Art in Its Imperial Context*, ed. by Lee M. Jefferson and Robin M. Jensen (Minneapolis: Fortress Press, 2015), 230–257 on the role of Constantine in honouring Christ with statues.

97 Thomas D. McGlothlin, *Resurrection as Salvation. Development and Conflict in Pre-Nicene Paulinism* (Cambridge: Cambridge University Press, 2018), 215–216.

98 *Defence* III.54 (PG 94, 1420). Translation from NPNF 1-6

99 *Exposition on Psalm 3* (PG 55, 35); *Homily in Praise of St Meletios*, PG 50, 516.

100 *Against the Arians*, PG 26, 332.

101 *Against Julian the Apostate*, PG 35, 591.

102 See *Ecclesiastical History* 7.18.3 (LCL 265) describing the miraculous statue of the woman that Jesus had heeled from chronic bleeding as well as a miraculous statue of Jesus at Caesarea Philippi/Paneas. Note that in the previous chapter Eusebios describes a miracle performed by Jesus when Astyrius prayed to him to bring an end to the superstitious folly of local people who worshipped their gods with cruel sacrifices. Cf. Patricia Varona, "Chronographical Polemics in Ninth-Century Constantinople: George Synkellos, Iconoclasm and the Greek Chronicle Tradition". *Eranos* 108 (2017): 117–136 arguing that later George Synkellos targeted Eusebios as an iconoclast.

103 Cf. Kitzinger, "The Cult of Images", 88–95.

104 *Ecclesiastical History* 7.18.4 (LCL 265, on which I also rely for the translation with modifications); on the ways in which the cult of saints adapted pagan beliefs, see Peter Brown, *The Cult of the Saints. Its Rise and Function in Latin Christianity* (London: Chicago University Press, 1981), 5–22.

105 Thomas F. Matthews, *The Clash of Gods. A Reinterpretation of Early Christian Art* (Princeton, NJ: Princeton University Press, 1999), 177–190; also, id. *The Dawn of Christian Art in Panel Paintings and Icons* (Los Angeles: J. Paul Getty Museum, 2016), 21–27; and id. "The Origin of Icons", in *The Oxford Handbook of Byzantine Art and Architecture*, ed. by Ellen C. Schwartz (Oxford: Oxford University Press, 2021), 21–30.

decreasing naturalism during the early centuries of the Christian empire".[106] Nevertheless, the role of technology, which had long served pagan societies by fulfilling the emotional needs of their members on various levels (whether to achieve an intimate connection to the divine, or their ancestors, or recently deceased family members),[107] was now increasingly promoted as a sound manifestation of the worthiness of humans, who are God's most excellent handiwork.[108] By the turn of the fifth century, images of Christ are are reportedly more visible in public spaces across the empire, including the capital.[109] Emperors were increasingly seen as "an image of God" – not unlike Saints (Constantine and his mother were recognized as saints for their discovery of the Passion relics),[110] and were invested with the power to intercede on behalf of their people.[111]

By the fifth century, Proclus in his antagonistic relationship with Plotinus (despite the overall agreement of their metaphysical conceptions) tried to explain mathematics (comprising mechanics, astronomy, optics, geodesy, canonics, and calculation) as the lowest application of science, which nonetheless,[112]

> as it moves upwards it attains unitary and immaterial insights that enable it to perfect its partial judgments and the knowledge gained through discursive thought, bringing its own genera and species into conformity with those higher realities and exhibiting in its own reasonings the truth about the gods and the science of being.

In his *On Providence*, Proclus tries to disprove the views of his friend Theodorus, an engineer "expert in the methods of science and the discoveries of geometry and arithmetic" (*expertus earum que secundum eruditionem viarum et geometrie et arismetice inventionum*),[113] who doubted that free will is afforded to humans in a universe created by the Platonic Demiurge.[114] Proclus begins his response to Theodorus in jest, pointing out that for Theodorus the universe operates like a mechanical clock:[115]

> Rather, to use your own words, the inescapable cause, which moves all things that this cosmos 'comprehends within itself', is 'mechanic', and the universe is, as it were, one machine, wherein the celestial spheres are analogous to the interlocking wheels and the particular beings, the animals and the souls, are like the things moved by the wheels, and everything depends upon one moving principle. Perhaps you have entertained such views to honour your own discipline, considering the maker of the universe to be some kind of engineer and yourself as the imitator of 'the best of all causes'.

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106 Katherine L. Marsengill, *Portraits and Icons: Between Reality and Holiness in Byzantium* (PhD Thesis. Princeton University, 2010), 35.

107 Marsengill, *Portraits and Icons*, 28–80; cf. John Damascene, PG 95.313A (in Marsengill ibid., 32) comparing "the common impulse to keep portraits (eikones) of loved ones, born of affection and fond memory, ...to the same feelings evoked by portraits (eikones) of Christ".

108 Ephesians 2:10: αὐτοῦ γάρ ἐσμεν ποίημα, κτισθέντες ἐν Χριστῷ Ἰησοῦ ἐπὶ ἔργοις ἀγαθοῖς; cf. n21 above.

109 Katherine L. Marsengill, "The Visualization of the Imperial Cult in Late Antique Constantinople", in *The Art of Empire: Christian Art in Its Imperial Context*, ed. by Lee M. Jefferson and Robin M. Jensen (Minneapolis: Fortress Press, 2015), 273: "Public mosaics and paintings of Christ eventually did appear in Constantinople, but it is still a question of when". Yet, Marsengill goes on to discuss a reference by Theophilos of Alexandria to a statue of Virgin Mary (p.274 with n7 citing Theophilos of Alexandria, *Homily on the Virgin* 90.1, preserved in a Coptic manuscript published by William H. Worrell, *The Coptic Manuscripts in the Freer Collection* (New York: Macmillan, 1923), 308–309 (text) and 375 (translation) as well as an icon of Virgin and Christ that Constantine had set up near his porphyry column in the capital (also p. 274 with n8 citing *Parastaseis syntomoi chronikai* 10 and Averil Cameron and Judith Herrin, *Constantinople in the early eighth century: the Parastaseis syntomoi chronikai: introduction, translation, and commentary* (Leiden: Brill, 1984), 69.

110 See, for example, Sławomir Bralewski, "The Porphyry Column in Constantinople and the Relics of the True Cross", *Studia Ceranea* 1 (2011): 87–100 at 94–99 on the Porphyry Column of Constantine, a focal point during the foundation ceremony of the new capital, and the tradition that Passion relics were concealed in it; cf. Holger A. Klein, "The Crown of His Kingdom: Imperial Ideology, Palace Ritual, and the Relics of Christ's Passion", in *The Emperor's House: Palaces from Augustus to the Age of Absolutism*, ed. by Michael Featherstone, Jean-Michel Spieser, Gülru Tanman, and Ulrike Wulf-Rheidt (Berlin/München/Boston: De Gruyter, 2015), 201–212.

111 Marsengill, *Portraits and Icons*, 207–223 and 253–286 with Pacatus' *Panegyric on Theodosios* (dat. 389; ed. by Virgilio Paladini and Paolo Fedeli 1976); Corippus, *Laudes Justini* II.427–428 (ed. by Averil Cameron 2003, 60; cf. II.52f. in id., 52 and commentary p. 152f.); Averil Cameron, "Corippus' Poem on Justin II: A Terminus of Antique Art?", *Annali della Scuola Normale Superiore di Pisa* 5.1 (1975): 129–165; cf. Anagnostou-Laoutides, "Tyrants and Saviours" on Constantine and the Christian God; also, Marsengill ibid., 119–120 with John Damascene, *Defence* III.17 (PG 94, 1176–1177), arguing that God is revealed in the image of Christ.

112 *In Euclidem* 19.28–20.6 (Gottfried Friedlein 1873): καὶ ἐν ταῖς ἀνόδοις τῶν ἀμερίστων καὶ ἀΰλων νοήσεων ἀντιλαμβάνεται καὶ μετ' ἐκείνων τελειοῖ τὰς μεριστὰς ἐπιβολὰς καὶ τὰς ἐν διεξόδοις φερομένας γνώσεις, τά τε ἑαυτῆς γένη καὶ εἴδη ταῖς οὐσίαις ἐκείναις ἀφομοιοῖ καὶ τὴν περὶ θεῶν ἀλήθειαν καὶ τὴν περὶ τῶν ὄντων θεωρίαν ἐν τοῖς οἰκείοις ἐκφαίνει λογισμοῖς. Translation, Glenn R. Morrow, *Proclus. A Commentary on the First Book of Euclid's Elements* (Princeton, NJ: Princeton University Press, 1970), 17; cf. *In Euclidem* 8.22.

113 *On Providence* 41.3–4 (ed. by Helmut Boese 1960). On Archimedes' theorem which relates that any amount of force will move an object of any mass, see Archimedes, fragment 15 (ed. by Johan Ludvig Heiberg and Evangelos Stamatis 1972) = Pappus of Alexandria, *Synagoge* VIII [ed. by Friedrich Otto Hultsch, 1876, 3.1060(19). 1–5]: Τῆς αὐτῆς δέ ἐστιν θεωρίας "τὸ δοθὲν βάρος τῇ δοθείσῃ δυνάμει κινῆσαι"· τοῦτο γὰρ Ἀρχιμήδους μὲν εὕρημα λέγεται μηχανικόν, ἐφ' ᾧ λέγεται εἰρηκέναι· "δός μοι, φησί, ποῦ στῶ, καὶ κινῶ τὴν γῆν".

114 Theodorus' views appear to accord with those of Plotinus; for example, see *Enneads* III 2(47).18.7–11 (LCL 442) where he argues that humans are unable to change the predetermined universal plan.

115 *On Providence* 1.2.14–21 (ed. by Helmut Boese 1960): *ut tuis verbis assequens dicam — mechanica facientem quidem esse irrefragabilem causam omnia moventem, quecumque mundus iste comprehendens in se ipso habet; mechanemate autem uno quasi ente universo, tympanis quidem implicatis proportionaliter totas esse speras, hiis autem que ab hiis moventur partialia, animalia et animas, et omnia ab uno dependere movente. Et forte tuimet artem honorans et hec estimasti, ut et universi factor mechanicus quidam sit et tu imitator optimi causarum. Sed hoc quidem cum studio ludum commiscentes scripsimus.* Translation Carlos G. Steel, *Proclus On Providence* (London, New Delhi, New York, Sydney: Bloomsbury, 2007), 42.

However, for Proclus, mathematics functions in a theurgic way as a purifying virtue that prepares the intellect for the contemplation of the divine.[116]

> Just as we judge the usefulness or uselessness of the cathartic virtues in general by looking not to the needs of living, but rather to the life of contemplation, so we must refer the purpose of mathematics to intellectual insight and the consummation of wisdom.

Furthermore, Proclus regards dialectic is the "unifying principle" of the mathematical sciences (or their "capstone"),[117] which allows humans to distinguish between mere images that can be deceptive and their symbols that extend all the way to the invisible divine.[118] Under the influence of Proclus, pseudo-Dionysius Areopagite defended icons as[119]

> a symbolic-hypostatic representation that invites the viewer to transcend the symbol, to communicate to the hypostasis, in order to participate in the indescribable

Hence, in his *Ecclesiastical Hierarchy* pseudo-Dionysius insists that humans "ascend through images perceived through the senses to divine contemplations",[120] and similarly in his *On the Divine Names* he writes that, unable to approximate the divine hyperrealities by means of our limited perceptual capabilities,[121]

> we use, to the best of our ability, symbols suitable to Divine things (Νῦν δέ, ὡς ἡμῖν ἐφικτόν, οἰκείοις μὲν εἰς τὰ θεῖα συμβόλοις χρώμεθα), and from these we elevate ourselves further, according to our ability, to the simple and unified truth of the spiritual visions (κἀκ τούτων αὖθις ἐπὶ τὴν ἁπλῆν καὶ ἡνωμένην τῶν νοητῶν θεαμάτων ἀλήθειαν ἀναλόγως ἀνατεινόμεθα).

Pseudo-Dionysius had a profound impact on John Damascene, Maximus Confessor, and Theodore Stoudite[122] and thus he decidedly infused Neoplatonic, especially Proclean, perspectives into the Christian debate about the veneration of the icons and the use of technical knowledge to incite the mind to contemplation of the divine. Importantly, through pseudo-Dionysius,[123]

> in the eighth century Proclus' theurgy seems to have played some part in the controversy between iconoclasts and defenders of images in Byzantium, helping the latter to explain in what sense images may be illuminated by divine presence.

Importantly, Proclus' theurgic investment of science, especially of optics, was already anticipated in John's Chrysostom's use of optical theories to defend the veneration of relics. As discussed above, John believed that the sight of the relics could protect Christians from temptation by "cooling down" the fire of emotional or carnal indulgement. As Freeman has pointed out,[124] the sight of the blessed relics, compared to soothing dew (ἡ παρὰ τοῦ μακαρίου δρόσος) affects those who gaze at them through the eyes (διὰ τῶν ὄψεων εἰς τὴν τῶν ὁρώντων) and descending into their soul (καταβαίνουσα ψυχὴν τήν τε φλόγα) lulls and extinguishes the fire (ἐκοίμισε καὶ τὸν ἐμπρησμὸν ἔστησε), instilling great piety in the mind (καὶ πολλὴν τῆς διανοίας κατέσταξε τὴν εὐλάβειαν). The viewing of the relics (θεωρία μαρτύρων) is a transformational experience and indeed it is impressed upon "the gaze, the posture, the walking, the contrition, and composed thoughts" (τῷ βλέμματι, τῷ σχήματι, τῇ βαδίσει, τῇ κατανύξει, τῇ συναγωγῇ τῆς διανοίας) of those who have returned from such a pilgrimage.[125]

Veneration of icons and relics, intensified under Justinian by which time certain adverse consequences of the phenomenon could be no longer ignored. While icon veneration contributes greatly to the development of artificial lightning and associated technology in Byzantium,[126] people now tend to rely on icons rather than doctors to cure their ailments, and therefore they flock to churches hoping for divine cures. The phenomenon was widespread and worrying enough to have been discussed both at the Council of Hieria in 754 and of Nicaea in 787.[127] Constantine V, who summoned the Council of Hieria, and his bishops supported the notion of spiritual,

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116 *In Euclidem* 28.7–11: ὥσπερ οὖν τὴν καθαρτικὴν ὅλην ἀρετὴν οὐ πρὸς τὰς βιωτικὰς χρείας ἀποβλέποντες χρησίμην ἢ ἄχρηστόν φαμεν, ἀλλὰ πρὸς τὸν ἐν θεωρίᾳ βίον, οὑτωσὶ καὶ τῆς μαθηματικῆς τὸ τέλος εἰς νοῦν ἀναπέμπειν προσήκει καὶ τὴν σύμπασαν σοφίαν. Translation, Morrow, *Proclus*, 24.

117 *In Euclidem* 42.9–44.24 (Gottfried Friedlein 1873).

118 Radek Chlup, *Proclus. An Introduction* (Cambridge: Cambridge University Press, 2012), 188: "Images are based on the principle of mimesis: their task is to imitate their models. Symbols, on the other hand, are related to their referents by means of analogy".

119 Filip Ivanović, *Symbol & Icon. Dionysius the Areopagite and the Iconoclastic Crisis* (Eugene, OR: Pickwick), 49 with ps-Dionysius Areopagite, De *Divinis Nominibus* PG 3, 701A–B and Kenneth Parry, *Depicting the Word: Byzantine Iconophile Thought of the Eighth and Ninth Centuries* (Leiden: Brill, 1996), 123–124.

120 PG 3, 573A–B: ἡμεῖς δὲ αἰσθηταῖς εἰκόσιν ἐπὶ τὰς θείας ὡς δυνατὸν ἀναγόμεθα θεωρίας.

121 PG 3, 592B. Translation based on John Parker, *The Works of Dionysius the Areopagite* (London: James Parker and Co, 1897), 7 with modifications.

122 Ivanović, *Symbol & Icon*, 44–48, 52.

123 Chlup, *Proclus*, 280 with Ugo Criscuolo, "Iconoclasmo bizantino e filosofia delle immagini divine", in *Platonism in Late Antiquity*, ed. by Stephen Gersh and Charles Kannengiesser (Notre Dame: University of Notre Dame Press).

124 Freeman, "Seeing Sanctity", 195 citing John Chrysostom, *De sancto Babyla, contra Julianum et gentiles* 72 (SC 362, 188); translation Margaret A. Schatkin and Paul W. Harkins, *The Fathers of the Church. Saint John Apologist* (Washington, DC: The Catholic University of America Press, 1985), 117 with my modifications.

125 Freeman, "Seeing Sanctity", 193 with John Chrysostom, *In martyres* (PG 50, 665–666); translation Wendy Mayer and Pauline Allen, *John Chrysostom* (New York: Routledge, 2000), 97.

126 For example, we observe rising demand in oil lamps that are lit in front of icons, both in private homes and sacred places (churches, martyr tombs and monuments, etc); see Ioannis K. Motsianos, *Φῶς Ἱλαρόν. Ο Τεχνητός Φωτισμός στο Βυζάντιο* (PhD Thesis, University of Thessaly, Volos, 2011), esp. 256–261.

127 Lennart Rydén, "The Role of the Icon in Byzantine Piety". *Scripta Instituti Donneriani Aboensis* 10 (1979): 41–52 at 45 with n21; also, Maria Christina Carile, "Holy icon or sacred body? The image of the emperor in the iconoclastic controversy", *Byzantine and Modern Greek Studies* 48.1 (2023) 42–65 at 61–62.

rather than material images,[128] a view also clearly articulated by John Damascene who insists that[129]

> the faithful do not venerate images as gods like the Greeks/idolaters (ὡς θεοὺς τὰς εἰκόνας προσκυνοῦμεν οἱ πιστοί, μὴ γένοιτο, ὥσπερ οἱ Ἕλληνες) but rather declare the relationship only and the longing of our love for the character of the person of the image (ἀλλὰ τὴν σχέσιν μόνον καὶ τὸν πόθον τῆς ἡμῶν ἀγάπης πρὸς τὸν χαρακτῆρα τοῦ προσώπου τῆς εἰκόνος ἐμφανίζοντες).

Nevetheless, Epiphanius clearly points to the simmering tensions that eventually led to iconoclasm, protesting that he had been often ignored when pleading with bishops, teachers, and fellow ministers (καίτοι γε ἐπισκόποις οἷσι καὶ διδασκάλοις καὶ συλλειτουργοῖς, ὑπὸ πάντων οὐκ ἠκούσθην, ἀλλ' ὑπ ενίων...)[130] to limit their reliance on icons in religious worship. For, he says,

> who has ever heard of this? (τίς ἤκουσε τοιαῦτα πώποτε;) Who among the ancient fathers has painted an image of Christ in a church or placed it in his own house? (Τίς τῶν παλαιῶν πατέρων Χριστοῦ εἰκόνα ζωγραφήσας ἐν ἐκκλησίᾳ ἢ ἐν οἴκῳ ἰδίῳ κατέθετο;) Who among the ancient bishops has painted Christ on door curtains, dishonoring him in this way? (Τίς ἐν βήλοις θυρῶν τῶν ἀρχαίων ἐπισκόπων Χριστὸν ἀτιμάσας ἐζωγράφησε;) And who has ever painted on door curtains or on walls Abraham, Isaac, Jacob, Moses, and the other prophets and patriarchs, or Peter, Andrew, James, John, Paul, or the other apostles τίς τὸν Ἀβραὰμ καὶ Ἰσαακ καὶ Ἰακὼβ Μωσέα τε καὶ τοὺς λοιποὺς προφήτας καὶ πατριάρχας, ἢ Πέτρον ἢ Ἀνδρέαν ἢ Ἰάκωβον ἢ Ἰωάννην ἢ Παῦλον ἤ τοὺς λοιποὺς ἀποστόλους ἐν βήλοις ἢ ἐν τοίχοις ζωγραφήσας...).

Epiphanius is unconvinced by the argument that unlike pagan idols which were despised by the Church Fathers, Christians[131] "make images of the saints in their memory (τὰς εἰκόνας τῶν ἁγίων ποιοῦμεν εἰς μνημόσυνον αὐτῶν) and prostrate in front of them in their honour" (καὶ εἰς τιμὴν ἐκείνων ταύτας προσκυνοῦμεν). For him, the emotional investment on the icons, often exaggerated and unrestrained, is not consequential with the ability to differentiate between likeness and essence and is, therefore, plainly dangerous.

The debate on Christian aesthetics and the use of technical knowledge in worship that pertains to the veneration of icons and relics is also relevant to contemporary arguments about the purpose(s) of Christian architecture.[132] The political ramifications of the debate are also significant, as evident from the comments of the Gothic king Athanaric during an official visit to Constantinople; invited by Emperor Theodosios, Athanaric had the chance to admire the marvellous embellishments of the capital as well as an impressing military parade, before exclaiming:[133]

> Truly the Emperor is a god on earth, and whoso raises a hand against him is guilty of his own blood (*Deus ...sine dubio terrenus est Imperator, et quisquis adversus eum manum moverit, ipse sui sanguinis reus exsistit*)

In the capital, of course, where the centre of religious authority would be relocated, a conscious effort had been under way from the start;[134] Constantine lay the foundations of more than twenty churches in Jerusalem, Rome, and Constantinople alone, as well as across the Empire.[135] At the same time, however, to Eusebios' ire, he tried to solidify the status of the city as an imperial centre[136] by adorning its public spaces with numerous pagan statues transported from across the Empire. Only from the time of Theodosios II, martyr relics were systematically transferred to the capital, which was rapidly transforming into a city of saints and miracles, a sacred city.[137] This effort

128 Rydén, "The Role of the Icon", 41–44.

129 *Defence* III.59 (PG 94, 1368A).

130 Herman Hennephof, *Textus Byzantini ad Iconomachiam Pertinentes* (Leiden: Brill, 1969), 44–45 (nos. 113 and 114); translation based on Frank Williams, The Panarion of Epiphanius of Salamis (Leiden: Brill, 2009), 147–148.

131 Hennephof, *Textus*, 48 (no 121).

132 John Elsner, "The viewer and the vision: The case of the Sinai Apse". *Art History* 17.1 (1994): 81–102 with Marsengill, *Portraits and Icons*, 139–140; also, see John Elsner, "Iconoclasm as Discourse: From Antiquity to Byzantium". *The Art Bulletin* 94.3 (2012): 368–394. Hence, as Rydén, "The Role of the Icon", 47 pointed out, the Council in Trullo (692) was quick to intervene and ban the latest artistic fad according to which artists represented Christ as a lamb, in line with the abstractive tendencies of later Byzantine art. Also see Thalia Anagnostopoulos, "Aristotle and Byzantine Iconoclasm". *Greek, Roman, and Byzantine Studies* 53 (2013): 763–790 who discusses Aristotle's theory of metaphor and its contribution to the debate on the icons, especially in light of the 9th century cultural revival; cf. Ernesto Sergio Mainoldi, "Deifying Beauty. Toward the Definition of a Paradigm for Byzantine Aesthetics", *Aisthesis. Pratiche, Linguaggi E Saperi Dell'Estetico* 11.1 (2018): 13–29.

133 Jordanes, *Getica* 28 (ed. by August Carl Closs, 1861, 107) with Edward N. Luttwak, *The Grand Strategy of the Byzantine Empire* (Cambridge, MA/London: Harvard University Press, 2009), 125.

134 Robert G. Ousterhout, "The Sanctity of Place and the Sanctity of Buildings: Jerusalem versus Constantinople", in *Architecture of the Sacred: Space, Ritual, and Experience from Classical Greece to Byzantium*, ed. by Bonna D. Wescoat and Robert G. Ousterhout (Cambridge: Cambridge University Press, 2012), 281–306; Bradford Andrew Kirkegaard, *Emperors and Cities: The Transformation of Sacred Space in Late Antiquity* (PhD Thesis. University of Pennsylvania, 2007) and Sarah E. Insley, *Constructing a Sacred Center: Constantinople as a holy city in early Byzantine literature* (PhD Thesis. Harvard University, 2011) with detailed descriptions and bibliography.

135 Gregory T. Armstrong, "Constantine's Churches: Symbol and Structure". *Journal of the Society of Architectural Historians* 33.1 (1974): 5–16 at 5–6 referring to the Great Church in Heliopolis (Eusebius, *Life of Constantine* 5.38, GCS 1/1; Socrates Scholasticus 1.18, PG 67, 124); the Great Church or Octagon Church in Antioch (Eusebius, *Life of Constantine* 3.50, GCS 1/1; Socrates Scholastics 2.8 in PG 67, 196–197 and 5.22; Sozomen 2.3, 3.5, PG 67, 940–941 and 1041–1044); the Basilica of the Savior at Nicomedia in Bithynia (*Life of Constantine* 3.50, GCS 1/1; Sozomen 2.3, PG 67); the double basilica at Trier and that at Aquileia (Athanasius, *Apologia ad Constantium* 15, PG 25, 612–613).

136 Eusebius, *Life of Constantine* 3.34 (GCS 1/1).

137 Brown, *The Cult of Saints*, 66–67 (on mass conversions during the fourth century which brought about the "corruption" of the Church) and 92 (on Theodosius' promotion of the cult of relics). On the proliferation of miraculous holy men in the fourth century, see Claudia Rapp, "'For next to God, you are my salvation': reflections on the rise of the holy man in late antiquity", in *The Cult of Saints in Late Antiquity and the Middle*

reached new heights under Justinian with the reconstruction of the Hagia Sophia, which offered a sensational, indescribable experience to stunned visitors. As Kieckhefer notes,[138] Procopius offers us the earliest ekphrasis for the Church where every aspect of the building, including its size and its golden dome which appears to be suspended from Heaven, is detailed:[139]

> It was by many skilful devices that the Emperor Justinian and the master-builder Anthemius and Isidorus secured the stability of the church, hanging, as it does, in mid-air (Μηχαναῖς δὲ πολλαῖς βασιλεύς τε Ἰουστινιανὸς καὶ Ἀνθέμιος ὁ μηχανοποιὸς σὺν τῷ Ἰσιδώρῳ οὕτω δὴ μετεωριζομένην τὴν ἐκκλησίαν ἐν τῷ ἀσφαλεῖ διεπράξαντο εἶναι·). Some of these it is both hopeless for me to understand in their entirety, and impossible to explain in words (ὥσπερ τὰς μὲν ἄλλας ἁπάσας ἐμοὶ εἰδέναι τε ἄπορον καὶ λόγῳ φράσαι ἀμήχανον, μία δέ μοι μόνον ἔν γε τῷ παρόντι γεγράψεται ᾗ δύναιτ' ἄν τις σύμπασαν τοῦ ἔργου τεκμηριῶσαι τὴν δύναμιν).

Still, the effect that all the details have on the visitor is unmistakable, and almost eerily familiar to the visitor of the Serapeum, discussed above:[140]

> One might imagine that he had come upon a meadow with its flowers in full bloom. For he would surely marvel at the purple of some, the green tint of others, and at those on which the crimson glows and those from which the white flashes (θαυμάσειε γὰρ ἂν εἰκότως τῶν μὲν τὸ ἁλουργόν, τῶν δὲ τὸ χλοάζον, καὶ οἷς τὸ φοινικοῦν ἐπανθεῖ καὶ ὧν τὸ λευκὸν ἀπαστράπτει), and again at those which Nature, like some painter, varies with the most contrasting colours (ἔτι μέντοι καὶ οὓς ταῖς ἐναντιωτάταις ποικίλλει χροιαῖς ὥσπερ τις ζωγράφος ἡ φύσις). And whenever anyone enters this church to pray, he understands at once that it is not by any human power or skill (ὁπηνίκα δέ τις εὐξόμενος ἐς αὐτὸ ἴοι, ξυνίησι μὲν εὐθὺς ὡς οὐκ ἀνθρωπείᾳ δυνάμει ἢ τέχνῃ), but **by the influence of God, that this work has been so finely turned (ἀλλὰ θεοῦ ῥοπῇ τὸ ἔργον τοῦτο ἀποτετόρνευται).** And so his mind is lifted up toward God and exalted (ὁ νοῦς δέ οἱ πρὸς τὸν θεὸν ἐπαιρόμενος ἀεροβατεῖ), feeling that He cannot be far away (οὐ μακράν που ἡγούμενος αὐτὸν εἶναι), but must especially love to dwell in this place which He has chosen (ἀλλ' ἐμφιλοχωρεῖν μάλιστα οἷς αὐτὸς εἵλετο).

The construction of the Hagia Sophia for which Justinian was rewarded with repeated miraculous healings from his numerous ailments,[141] is symptomatic of the increasing Byzantine fascination with miracles, both divine *and* those based on advanced technological knowledge. Notably, Anthemius of Tralles, one of the architects of Hagia Sophia had studied at Alexandria under the philosopher Ammonius, a student of Proclus.[142] Anthemius excelled in mathematics and engineering, expanding on the work of ancient Alexandrian engineers, including that of Hero,[143] and was undoubtedly familiar with Proclus' appreciation of mechanics and optics as means of achieving union with the divine; he seems to have introduced to the architecture of Hagia Sophia several "light and visual effects … so as to augment the symbolic significance of the ecclesiastical space".[144] As Kaldellis has pointed out, the Neoplatonic aesthetics that Anthemius, likely a pagan,[145] applied to the architecture of Hagia Sophia operated as a common language between pagans and Christians who despite their differences drew on the same intellectual tradition to express their religious sentiments.[146] Indeed, like pseudo-Dionysius Areopagite found in Proclean imagery the tools to best express Christian

Ages. Essays on the Contribution of Peter Brown, ed. by James Howard-Johnston and Paul Antony Hayward (Oxford: Oxford University Press, 1999); cf. Candida Moss, "Miraculous Events in Early Christian Stories about Martyrs", in *Credible, incredible. The miraculous in the ancient Mediterranean*, ed. by Tobias Nicklas and Janet E. Spittler (Tübingen: Mohr Siebeck, 2013) on miracles in early stories of martyrdom.

138 Richard Kieckhefer, *Theology in Stone Church Architecture from Byzantium to Berkeley* (Oxford: Oxford University Press, 2004), 114–116.

139 Procopius, *On Buildings* 1.1.50 (LCL 343, on which I also rely for the translation); cf. the decorations of the magnificent Church of St. George the Martyr rebuilt under Constantine VII, see Michael Psellos *Chronographia* 6.186.10–20 (Reinsch 2014, 189): Ὁ μὲν γὰρ ναὸς, ὥσπέρ τις οὐρανὸς χρυσοῖς ἀστράσι πάντοθεν ἐπεποίκιλτο. μᾶλλον δὲ τὸ μὲν αἰθέριον σῶμα ἐκ διαστημάτων κατακεχρύσωται· ἐκείνῳ δὲ ὁ χρυσὸς, ὥσπερ ἐκ κέντρου ῥυεὶς, ἀφθόνῳ τῷ ῥεύματι πᾶσαν ἀδιαστάτως ἐπέδραμεν ἐπιφάνειαν. …· τὰ δ' ἐπὶ τούτοις, λειμῶνες ἀνθέων πλήρεις, οἱ μὲν πέριξ· οἱ δὲ κατὰ μέσον διήκοντες. ὑδάτων δὲ ἀγωγή· καὶ φιάλαι ἐκεῖθεν πληρούμεναι. καὶ τῶν ἀλσῶν, τὸ μὲν μετέωρον· τὸ δ' εἰς πεδιάδας καθειμένον. καὶ λουτροῦ χάρις ἀμύθητος. ("The church was decorated with golden stars everywhere, like the vault of heaven, but whereas the real sky is adorned with golden stars only at intervals, in this one gold, flowing from its centre in a never-ending stream, covered all its surface. …On top of these, there were flower beds in full bloom, some on the circumference, others down the centre. There were fountains which filled basins of water; gardens, some hanging, others sloping down to the level ground; a bath that was beautiful beyond description"). Also, see n149 below.

140 *On Buildings* 1.1.59–63 (LCL 343); on the ekphrasis of Hagia Sophia by Paul Silentiary, see Ruth Macrides and Paul Magdalino, "The Architecture of Ekphrasis: Construction and Context of Paul the Silentiary's Poem on Hagia Sophia". *Byzantine and Modern Greek Studies* 12 (1988): 47–82.

141 See, for example, Procopius, *Secret History* 3.20–29 (LCL 290) and *On Buildings* 1.6.5–7 (LCL 343), on the miracle of Kosmas and Damien who cured the emperor when all physicians had despaired); on the rising importance of miracles in 6th-century Constantinople and particularly the intercession of saints, see ; cf. Averil Cameron, "Images of Authority: Elites and Icons in Late Sixth-Century Byzantium". *Past and Present* 84 (1979): 3–35 on the imperial promotion of the cult of the Virgin under Justinian.

142 Anthony Kaldellis, "The Making of Hagia Sophia and the Last Pagans of New Rome", *Journal of Late Antiquity* 6.2 (2013): 347–366.

143 George Leonard Huxley, *Anthemius of Tralles: A Study of Later Greek Geometry* (Cambridge, MA: Eaton Press, 1959), 2, 16; also see his p.37 for Tzetzes, *Chiliades* 12.457.975 (ed Gottlieb Kiessling 1826, 479) referring to Hero of Alexandria alongside Anthemius, and implying that Anthemius had read the works of Archimedes.

144 Kaldellis, "The Making of Hagia Sophia", 357–358 with Nadine Schibille, "Astronomical and Optical Principles in the Architecture of Hagia Sophia in Constantinople," *Science in Context* 22 (2009): 27–46 at 28.

145 Kaldellis, "The Making of Hagia Sophia", 356–357.

146 Nadine Schibille, *Hagia Sophia* (London: Ashgate, 2014), 232.

metaphysical realities,[147] so John Lydus, a sixth-century pagan intellectual, could still appreciate Hagia Sophia as the Temenos of the Great God (τὸ τοῦ μεγάλου θεοῦ Τέμενος), inspired by Plato's assertion that the Great God dictates the orbit of the sun.[148] Anthemius' colleague, Isidore of Miletus shared his intellectual background having edited the works of Archimedes on which Eutocius based his own commentaries.[149] Probably a teacher of Leontius who preserved the fifteenth book of Euclid's *Elements*,[150] Isidore had also annotated Hero's *Kamarika* (*On Vaulting*)[151] which has not survived. It becomes clear, then, that a critical mass of Christian and pagan intellectuals ensured that the Byzantines had access to the works of ancient Alexandrian scientists such as Hero and Pappus,[152] and to the aesthetics of their miraculous machines, such as the famous sixth-century water-clock of Gaza.[153]

Ancient technological knowledge, principally at the service of emperors, survived to the ninth century, a period of frantic re-engagement with technological innovation and ancient scientific works. Thus, we hear that Emperor Theophilos used to impress his visitors with the amazing contraptions of his Magnaura palace. These included a magnificent hydraulic throne (also known as the throne of Solomon) which was mechanically raised to the ceiling of the great hall during the emperor's audience with foreign envoys. As the ambassadors were presenting their questions to the emperor, mechanic gold-plated lions on either side of the throne would start roaring, while in front of the throne mechanical birds on a gold-plated tree would start singing.[154] By then, automata, alongside impressive architecture and grand processions, had claimed a role in the communication of political power between Byzantium and its rivals, especially the 'Abbāsid courts.[155] The rise of the Islamic caliphates and the ongoing Arab-Byzantine wars from the seventh century onwards, following the ruinous Byzantine-Sassanian wars, caused substantial instability in the region; yet, the competition between empires spurred a revival of interest in technological miracles[156] and at the same time a revision of the Christian fascination with religious miracles. Thus, the final part of the article examines iconoclasm in the context of these developments, arguing that Theophilos' preference for technological miracles is an attempt to emphasize a more secular appreciation of the miraculous.

4. Emperor Theophilos: Automata and Iconoclasm

By the time of Theophilos' ascension to the throne in 829, the debate about religious aesthetics had lost its fourth-century rhetorical character and had

147 Nadine Schibille, *Hagia Sophia and the Byzantine Aesthetic Experience* (Farnham, Surrey: Ashgate, 2014), 174–176, 181, 195, 210, 212.

148 Kaldellis, "The Making of Hagia Sophia", 364–365 with John Lydus, *On the Months* 4.67 (ed. by Richard Wuensch 1903, 121). Kaldellis also points out the in his *On Buildings* 1.1.46 Procopius never intended to compare the dome of Hagia Sophia to a sphere suspended from Heavens but instead of σφαῖρα the manuscripts say σειρά, because Procopius has in mind the golden chain with which Zeus the other gods to drug him down from Olympus in *Iliad* 8.19.

149 Kaldellis, "The Making of Hagia Sophia", 358–359. Averil Cameron, "Models of the past in the late sixth century: the Life of the patriarch Eutychius", in R*eading the Past in Late Antiquity*, ed. by Brian Croke, Alanna Nobbs, Raoul Mortley, Graeme Clarke (Canberra: Australian National University, 1990), 103.

150 Huxley, *Anthemius of Tralles*, 3; Karl Vogel, "Byzantine Science", in *The Cambridge Medieval History 4/2*, ed. by Joan M. Hussey (Cambridge: Cambridge University Press, 1967), 302–303; Fabio Acerbi, "Byzantine Recensions of Greek Mathematical and Astronomical Texts: A Survey". *Revista de Estudios Bizantinos* 4 (2016):133–213 at 145, 147–148, 171.

151 Cameron, "Models of the Past", 120.

152 Pappus refers to Hero's treatises on *Automata* and *Balances* in his *Compendium* of earlier inventions. On Pappus' *Commentary* on Euclid's *Elements*, see Cuomo, "Pappus of Alexandria", 52, 59ff.; cf. her pp. 92ff (on Pappus' mechanics and Hero).

153 For Procopius' ekphrasis on the Horologium, see Eugenio Amato, *Rose di Gaza. Gli scritti retorico-sofistici e le Epistole di Procopio di Gaza* (Alessandria: Edizioni dell'Orso, 2010), 204–213 with Anette Schomberg, "'To amaze the world' –A contribution to the shape and meaning of the water clock in antiquity", in *Cura Aquarum in Greece: Proceedings of the 16th International Conference on the History of Water Management and Hydraulic Engineering in the Mediterranean Region, Athens, Greece, 28–30 March 2015*, ed. by Kai Wellbrock (Clausthal-Zellerfeld: Papierfliegerverlag GmbH, 2017), 304. For Procopius' description of mythological paintings in six-century Gaza, see Rina Talgam, "The Ekphrasis Eikonos of Procopius of Gaza: The depiction of mythological themes in Palestine and Arabia during the fifth and sixth centuries", in *Christian Gaza in Late Antiquity*, ed. by Brouria Bitton-Ashkelony and Aryeh Kofsky (Leiden and Boston: Brill, 2004), 209–234.

154 Gerard Brett, "The Automata in the Byzantine 'Throne of Solomon'". *Speculum* 29.3 (1954): 477–487; Constantin Canavas, "Automaten in Byzanz. Der Thron von Magnaura", in *Automaten in Kunst und Literatur des Mittelalters und der Frühen Neuzeit*, ed. by Klaus Grubmüller and Markus Stock (Wiesbaden: Harrasowitz, 2003); Jeffrey Featherstone, "Δ ' ἔνδειξιν: Display in Court Ceremonial (De Cerimoniis II, 15)", in *The Material and the Ideal: Essays in Medieval Art and Archaeology in Honour of Jean-Michel Spieser*, ed. by Anthony Cutler and Ariette Papaconstantinou (Leiden: Brill, 2007). We have two descriptions of the Magnaura automata; one, from the *Antapodosis* of Liudprand, bishop of Cremona, who writes (6.5 in Wright 1930, 207–208): "...Before the emperor's seat stood a tree, made of bronze gilded over, whose branches were filled with birds, also made of gilded bronze, which uttered different cries, each according to its varying species. The throne itself was so marvellously fashioned that at one moment it seemed a low structure, and at another it rose high into the air. It was of immense size and was guarded by lions, made either of bronze or of wood covered over with gold, who beat the ground with their tails and gave a dreadful roar with open mouth and quivering tongue". The second is from Constantine VII Porphyrogenitus, *De Ceremoniis* 2.15 (Reiske 1829, 567ff.); cf. Albrecht Berger, "The Byzantine Court as a Physical Space", *The Byzantine court: Source of Power and Culture; Papers from The Second International Sevgi Gönül Byzantine Studies Symposium, Istanbul 21–23 June 2010*, ed. by Ayla Ödekan, Nevra Necipoglu, and Engin Akyürek (Centre for Hellenic Studies, King's College London, Istanbul: Koç University Press, 2013).

155 For the 917 (=305 Hegira) Byzantine delegation in Baghdad during the reign of al-Muqtadir, see David Bruce Jay Marmer, *The Political Culture of the Abbasid Court, 279-324 (A.H.)* (PhD Thesis. Princeton University, 1994), 66–69; Olof Heilo, "The ʿAbbāsids and the Byzantine Empire", in *Baghdād, From Its Beginnings to the 14th Century*, ed. by Jens Scheiner and Isabel Toral (Leiden: Brill, 2022), 339–370.

156 Dimitris Gutas, *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early 'Abbāsid Society (2nd-4th/8th-10th Centuries)* (London/New York: Routledge, 1998), 175–186 with Jakub Sypiański, "Arabo-Byzantine relations in the 9th and 10th centuries as an area of cultural rivalry", in *Byzantium and the Arab World: Encounter of Civilizations*, ed. by Apostolos Kralides and Andreas Goutzioukostas (Thessaloniki: Aristoteles University of Thessaloniki, 2011), 465.

turned vicious.[157] Since the seventh century and until Theophilos' reign, Constantinople had been unsuccessfully sieged no fewer than eight times by successive waves of ever-eager enemy armies. This was a volatile era marred by constant wars, diseases, widespread poverty, and suffering. The Byzantines were desperately searching for divine signs to confirm their future that the second advent was about to happen.[158] As Magdalino has argued,[159] after 500 several factors, including the

> a) liturgification of public life, ...b) the refinement of Christian neoplatonism in the works of Pseudo-Dionysios the Areopagite,...c) the development of the theme of intercession, ... most evident...in the cult of the saints, in particular the Virgin... also to be found in poems on religious pictures and in praise of the emperor ...d) The assimilation of the earthly empire to the Kingdom of Heaven...e) the proliferation of holy phenomena

intensified eschatological speculation and with it the Byzantine's obsession with religious miracles.[160] Among his examples, Magdalino refers to Paul Silentiary's *Ekphrasis of Hagia Sophia* which "celebrated the building above all as a work of salvation" as well as to miraculous icons, especially the so-called "acheiropoietoi"(not-made-by-human-hands),which[161]

> provide the most direct evidence of a link between the new ideological trends and contemporary expectations of the Second Coming.

Magdalino cites the example of the Kamouliana icon, reported to have appeared miraculously in a fountain of water to a faithful Christian woman who was anxious about the correct way of venerating Christ. The icon, described in the Syriac *Chronicle of Zachariah of Mytiline*, was renowned; thus, when the village of Dibudin in Amasia was burnt down by barbarians, its inhabitants, following imperial advice, are said to have paraded the icon for nine whole years so to collect sufficient funds to rebuild their church and their homes. The chronicler continues:[162]

> ...I believe that these things happened under the direction of Providence, because there are two comings of Christ according to the purport of the Scriptures, one in humility, ..., and a future one in glory, which we are awaiting; and this same thing is a type of the progress of the mystery and picture and wreathed image of the King and Lord of those above and those below, which shall be quickly revealed.

In similar tone, when the Byzantines successfully defended the capital from a combined attack of the Sassanians and the Avars in 626, credit for the victory was given to the Virgin as well as to an *acheiropoietos* icon which the patriarch Sergios carried round the walls of the city in a prayerful procession.[163] Although Magdalino's understanding of the Byzantine preoccupation with icon veneration and divine intercession as symptomatic of increased eschatological anxiety during the sixth century has been dismissed as "overreaching", yet by the seventh century, "[O]n the eve of Islam,...apocalypticism—and more importantly, imperial apocalypticism—...becomes more prevalent and pronounced".[164] In my view, by paying attention to the socio-political circumstances that led to the eruption of iconoclasm in 726 under Leo III,[165] we can better explain the phenomenon as a case of aesthetics of technology put to the test: while the differing perspectives on the use of technology for religious purposes were tolerated for centuries, the decline of the Empire incited anxiety about the Byzantines' access to the divinely-inspired technologies that had long supported their cultural and political dominance. In fact, the ability to defend the Empire from external enemies was seen as a direct result of being able to know God's plan for His people,[166] especially given

157 See Rydén, "The Role of the Icon", 48–49 on the order of Leo III that the image of Christ be removed from the entrance of the Great Palace in Constantinople, an action that sparked the first iconoclastic phase during which the iconophiles accused their opponents of lack of education.

158 See, for example, Gerrit J. Reinink, "Heraclius, the New Alexander. Apocalyptic prophecies during the reign of Heraclius", in *The reign of Heraclius (610-641): Crisis and Confrontation. Groningen studies in cultural change, v. 2*, ed. by Gerrit J. Reinink and Bernard H. Stolte (Leuven: Peeters, 2002).

159 Paul Magdalino, "The History of the Future and Its Uses: Prophecy, Policy, and Propaganda", in *The Making of Byzantine History: Studies Dedicated to Donald M. Nicol*, ed. by Roderick Beaton and Charlotte Roueché (Aldershot: Variorum, 1993), 13–15; on miracles in the sixth century, see Derek Krueger, "Christian Piety and Practice in the Sixth Century", in *The Cambridge Companion to the Age of Justinian*, ed. Michael Maas (Cambridge: Cambridge University Press, 2006), 307–311; cf. Dal Santo, *Debating the Saints' Cult*, 268 on the contemporary debate about the saints' ability to perform miracles after death; also, Averil Cameron, "The Cult of the Virgin in Late Antiquity: Religious Development and Myth-Making", in *The Church and Mary*, ed. by Robert Norman Swanson (Oxford: Oxford University Press), 2004.

160 Stephen J. Shoemaker, *The Apocalypse of Empire. Imperial Eschatology in Late Antiquity and Early Islam* (Philadelphia, PA: University of Pennsylvania Press, 2018), 74 concedes although he finds Magdalino's description exaggerated.

161 Magdalino, "The History of the Future", 15 with Kitzinger, "The Cult of Images", 99–100.

162 Frederick John Hamilton and Ernest Walter Brooks, *The Syriac Chronicle Known as that of Zachariah of Mytilene* (London: Methuen & co, 1899), 320–321.

163 Leslie Brubaker, *Inventing Byzantine Iconoclasm* (London: Bristol University Press, 2012), 15.

164 Stephen J. Shoemaker, *The Apocalypse of Empire: Imperial Eschatology in Late Antiquity and Early Islam* (Philadelphia: University of Pennsylvania Press, 2018), 74. Although for Shoemaker, the rise of imperial apocalypticism is *sudden*, in my view, the debate has been brewing for centuries; see Marie-France Auzépy, "Manifestations de la propagande en faveur de l'orthodoxie", in *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies,* ed. by Leslie Brubaker (Birmingham, Aldershot: Ashgate, 1998), and in the same volume Robin Cormack, "Away from the Centre: 'Provincial' Art in the Ninth Century, Dead or alive? The Byzantine World in the Ninth Century".

165 Leo allegedly ordered the removal of the Chalke Christ; see Leslie Brubaker, "The Chalke gate, the construction of the past, and the Trier ivory". *Byzantine and Modern Greek Studies* 23 (1999): 258–285; John F. Haldon and Bryan Ward-Perkins. "Evidence from Rome for the image of Christ on the Chalke gate in Constantinople". Byzantine and Modern Greek Studies 23 (1999): 286–296; Vladimir Baranov, "Visual and Ideological Context of the Chalke Inscription at the Entrance to the Great Palace of Constantinople", *Scrinium* 13.1 (2017): 19–42.

166 See, for example, Alex Roland, "Secrecy, Technology, and War: Greek Fire and the Defense of Byzantium", *Technology*

the close association of the fate of Constantinople with the end of history.[167]

Theophilos, who had initially allied with the Arabs against Theodosius III, was met with suspicion despite his eventual success in defending the empire against its Muslim adversaries, and was accused of being "Saracen-minded" (σαρακηνόφρων).[168] Thus, he was believed to have incited iconoclasm influenced by Muslim hostility to images and by the Prophet's alternative sensibility to perceiving the supernatural.[169] Overall, the Byzantines often resorted to explaining iconoclasm as the result of hostility between creeds, as is obvious by the report of Theophanes Confessor that when Yezid II issued a decree ordering the destruction of all Christian images in his region, he did so on the advice of a certain Jewish sorcerer from Tiberias.[170] In the face, however, of the rising threat of Arab Muslims the competition between the followers of Jesus and Muhammad intensified and several Christian doctrines were reassessed,[171] like the Second Coming and its related concept of the God-saved Empire. It is in this context that the aesthetics of icon veneration were revised yet again.[172] As we saw, the debate goes all the way back to the establishment of the Empire, when, for example, Evagrius Ponticus questions as blasphemous the views of Theodore Ascidas, archbishop of Caesarea in Cappadocia, who apparently wondered:[173]

> If the apostles and martyrs perform miracles and receive so much honour now (Εἰ νῦν οἱ ἀπόστολοι καὶ οἱ μάρτυρες θαυματουργοῦσι καὶ ἐν τῇ τοσαύτῃ τιμῇ ὑπάρχουσιν), what form of restoration is there for them (ποία ἀποκατάστασις αὐτοῖς ἐστιν), unless they become equal to Christ in the Apocatastasis (ἐν τῇ ἀποκαταστάσει εἰ μὴ ἴσοι γένοιντο τῷ Χριστῷ)?

By the seventh century, even John Damascene, a great defender of icons, admits that overzeal often turned commemorations of saints into joyous festivals (Νῦν δὲ τῶν ἁγίων ἑορτάζεται τὰ μνημόσυνα).[174] Furthermore, as Bartlett has noted,[175] the Christian preoccupation with the veneration of saints and holy icons was increasingly criticized by their Muslim adversaries; for example, Muslim accounts comment with disdain on the customs of Ethiopian Christians who build places of worship at the graves of dead religious men and decorate it with pictures; equally, in a letter supposedly sent to Leo III, caliph Umar II (717–720) found fault with the Christian practice of burying "your dead in your places of prayer, which God ordered

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and Culture 33.4 (1992): 655–679 at 665 citing Constantine Porphyrogenitus' *de administrando imperio* where he warns foreigners from seeking to learn the secret weapons of the Byzantines, notably of the so-called Greek fire, noting among others: "This too was revealed and taught by God through an angel to the great and holy Constantine, the first Christian emperor, and concerning this . . that it should be manufactured among the Christians only and in the city ruled by them, and nowhere else at all, nor should it be sent nor taught to any other nation whatsoever". Moreover when a military governor betrayed the secret, "since God could not endure to leave unavenged this transgression, as he was about to enter the holy church of God, fire came down out of heaven and devoured and consumed him utterly". (καὶ αὐτὸ ἀπὸ τοῦ (Θεοῦ δι' ἀγγέλου τῷ μεγάλῳ nat πρώτῳ βασιλεῖ Χριστιανῷ, ἁγίῳ Κωνσταντίνῳ ἐφανερώθη καὶ ἐδιδάχθη. Παραγγελίας δὲ μεγάλας καὶ περὶ τούτου παρὰ τοῦ αὐτοῦ ἀγγέλου ἐδέξατο, ὡς παρὰ πατέρων καὶ πάππων πιστωθέντες πληροφορούμεθα, ἵνα ἐν μόνοις τοῖς Χριστιανοῖς καὶ τῇ ὑπ' αὐτῶν βασιλευομένῃ πόλει κατασκευάζηται, ἀλλαχοῦ δὲ μηδαμῶς, μήτε εἰς ἕτερον ἔθνος τὸ οἱονδήποτε παραπέμπηται, μήτε διδάσκηται. . . .καὶ μὴ ἀνεχομένου τοῦ Θεοῦ ἀνεκδίκητον καταλιπεῖν τὴν παράβασιν, ἐν τῷ μέλλειν αὐτὸν ἐν τῇ ἁγίᾳ τοῦ Θεοῦ εἰσιέναι ἐκκλησίᾳ πῦρ ἐκ τοῦ οὐρανοῦ κατελθὸν τοῦτον κατέφαγε καὶ ἀνάλωσεν); text and translation by Gyula Moravcsik and Romily J.H. Jenkins. *Constantine Porphyrogenitus. De administrando Imperio* (Washington, DC: Dumbarton Oaks, 1967), 67–70.

[167] Paul Magdalino, "The End of Time in Byzantium", in *Endzeiten. Eschatologie in den monotheistischen Weltreligionen*, ed. Wolfram Brandes, Alexander Demandt, Helmut Krasser, Hartmut Leppin, Peter von Möllendorff (Berlin: De Gruyter, 2008), 122.

[168] Theophanes, *Chronographia* 1.405.14 (ed. by Karl de Boor 1883).

[169] Chase Robinson, "Prophecy and Holy Men in early Islam", in *The Cult of Saints in Late Antiquity and the Middle Ages. Essays on the Contribution of Peter Brown*, ed. by James Howard-Johnston and Paul Antony Hayward (Oxford: Oxford University Press, 1999), esp. 245, 256–262 noting the links between Muslim mysticism and saint veneration; in the same volume, Joseph F. Meri, "The etiquette of devotion in the Islamic cult of saints" also discusses the ways in which Muslims negotiated pilgrimage, saint cults, and intercession despite rejecting icon veneration. Once more, the conflict is about aesthetics as much as it is about theology.

[170] Gustav Edmund von Grunebaum, "Byzantine Iconoclasm and the Influence of the Islamic Environment". *History of Religions* 2.1 (1962): 1–10 at 2 citing Alexander A. Vasiliev, "The Iconoclastic Edict of the Caliph Yazid II, A.D. 721". *Dumbarton Oaks Papers* 9-10 (1956): 23–47; John Edward Atkinson. "Leo III and Iconoclasm". *Theoria: A Journal of Social and Political Theory* 41 (1973): 51–62; cf. Anna Chysostomides, "Creating a Theology of Icons in Umayyad Palestine: John of Damascus' 'Three Treatises on the Divine Images'". *The Journal of Ecclesiastical History* 72.1 (2021): 1–17, arguing that John Damascene's defence of the icons addressed iconoclastic concerns from all three Abrahamic faiths. Also see Geoffrey R.D. King, "Islam, Iconoclasm, and the Declaration of Doctrine", *Bulletin of the School of Oriental and African Studies* 48 (1985): 267–277; and Christian C. Sahner, "The First Iconoclasm in Islam: A New History of the Edict of Yazīd II (AH 104/AD 723)", *Der Islam* 94.1 (2017): 5–56 at 42–54.

[171] Averil Cameron. "The Language of Images: The Rise of Icons and Christian Representation", in *The Church and the Arts. Papers Read at the 1990 Summer Meeting and the 1991 Winter Meeting of the Ecclesiastical History Society*, ed. by Diana Wood (Oxford: Blackwell, 1992), 1–43 offers a detailed analysis of the first phase of iconoclasm, drawing attention to the "intellectual and imaginative framework of contemporary society"; cf. Sidney H. Griffith, "What has Constantinople to do with Jerusalem? Palestine in the ninth century: Byzantine orthodoxy in the world of Islam", in *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies*, ed. by Leslie Brubaker (Birmingham, Aldershot: Ashgate, 1998), 181–194.

[172] See Matthew dal Santo, *Debating the Saints' Cult*, 149–236 and id. "The God-Protected Empire? Scepticism towards the Cult of Saints in Early Byzantium", in *An Age of Saints? Power, Conflict, and Dissent in Early Medieval Christianity*, ed. by Peter Sarris et al. (Leiden: Brill, 2011) on defending miracles in the writings of Gregory and Eustratius; Marie-France Auzépy, "Manifestations de la propagande en faveur de l'orthodoxie", in *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies*, *Birmingham, March 1996*, ed. by Leslie Brubaker (Aldershot: Ashgate, 1998).

[173] Evagrius, *Ecclesiastical History* 4.38 (Bidez/Parmentier).

[174] *Defence* 1.21 (PG 94, 1253).

[175] Robert Bartlett, *Why Can the Dead Do Such Great Things? Saints and Worshippers from the Martyrs to the Reformation* (Princeton and Oxford: Princeton University Press, 2013), 623–624; also see Sidney H. Griffith, "Eutychius of Alexandria on the Emperor Theophilus and Iconoclasm in Byzantium: A Tenth Century Moment in Christian Apologetics in Arabic". *Byzantion* 52 (1982): 154–190 at 188–190.

you to keep pure".[176] These practices, however, reflect precisely the technologies that fourth-century christian fathers adapted to transform/ "Christianise" the pagan landscapes early Christian congregations inhabited. Accordingly, between the sixth and eighth centuries numerous stories emerged about saints coming to the aid of Christian prisoners, who had fell at the hands of their Muslim enemies, or punishing Muslim transgressions against Christian churches or icons, even prompting the perpetrators to convert to Christianity, as a response to iconoclasts who, like Leo, were addressed as "Σαρακηνόφρονες" by the iconodules.[177]

Although iconoclasm was also shaped by internal tensions that were rife during Theophilos' reign,[178] when the conflict had entered its second phase,[179] the Arab-Byzantine conflict offers an additional lens for examining the phenomenon. Furthermore, as already noted by Magdalino,[180] iconoclastic individuals played a key role between 829 and 907 in reviving Byzantine interest in technological miracles. It seems that technology, whether applied to worship or not, holds the key to the cultural competition between the Byzantines and their Arab Muslim adversaries. Thus, as Theophanes Continuatus reports, when John the Grammarian, Theophilos's tutor, was sent to Baghdad in 829 he impressed his host, caliph al-Mamun, by offering him rich presents.[181] The caliph was passionate about Greek learning, especially geometry: when a war-prisoner demonstrated to him the advanced knowledge he had been taught by Leo the Byzantine mathematician, who relied on Euclid's geometry, al-Mamun rushed to invite Leo to his court at every cost; yet, Emperor Theophilos declined to let go the inventor of his roaring lions.[182] Later, another student of Leo, visits the 'Abbasid court and is reportedly questioned by the caliph's learned courtiers at length. Able to quote the Quran in his responses, Leo's student[183]

> ...demonstrated the superiority of the Christian faith, the political legitimacy of the Roman empire, and the fact that the empire was the source of all the arts and sciences in which his interlocutors considered themselves expert.

Although fictional, this story highlights the deeply entrenched conviction of the Byzantines that technological knowledge was God-entrusted, and the emperor had a duty to preserve it. In Magdalino's opinion,[184] the accumulation of stories about Greek intellectuals visiting the 'Abbasid courts during the seventh and eighth centuries point to an attempt to re-accommodate science, particularly astrology, in Christian theology by insisting that God is revealed in His works, rather than hand-made artefacts. In addition, by downplaying the technologies involved in icon and/or relic veneration, while embracing other forms of technological advance, the Byzantine Emperor seeks to allay the eschatological fears of his subjects, and to compete with his Muslim counterparts on spheres of activity that are mutually accepted.

This need was heightened at the time of Theophilos,[185] when ancient scientific manuscripts, including Hero's *Pneumatics* and his *Mechanics* were frantically translated into Arabic in Baghdad.[186] Based on Hero's works, the Banū Mūsà brothers whose father was a close friend of caliph al-Mamun, produced numerous miraculous automata,[187] likely inspiring

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176 Peter Schadler, *John of Damascus and Islam Christian Heresiology and the Intellectual Background to Earliest Christian-Muslim Relations* (Leiden: Brill, 2018), 124 with Jean-Marie Gaudeul, "The Correspondence between Leo and Umar: Umar's Letter Rediscovered?". *Islamochristiana* 10 (1984): 109–157 and further bibliography.

177 Arietta Papaconstantinou, "Saints and Saracens: On Some Miracle Accounts of the Early Arab Period", in *Byzantine Religious Culture. Studies in Honor of Alice-Mary Talbot*, ed. by Denis Sullivan and Elizabeth Fisher (Leiden: Brill, 2012), esp. 329–334; cf. Gerrit Reinink, "From Apocalyptics to Apologetics: Early Syriac Reactions to Islam", in *Endzeiten. Eschatologie in den monotheistischen Weltreligionen*, ed. Wolfram Brandes, Alexander Demandt, Helmut Krasser, Hartmut Leppin, Peter von Möllendorff (Berlin: De Gruyter, 2008), 86 noting the fear that both apocalyptic and apologetic traditions reveal about people converting to the creed of the most powerful leader; indeed, conversion often features in the early miracle accounts.

178 Leslie William Barnard. "The Emperor Cult and the Origins of the Iconoclastic Controversy". *Byzantion* 43 (1973): 13–29 discusses Leo's antagonism with patriarch Gregory II to whom he wrote in 730 that he wishes to be both emperor and priest (βασιλεύς εἰμί καὶ ἱερεύς; ed. by Giovanni Domenico Mansi 1766, 12.975), following the example of emperors before him such as Constantine the Great, Theodosius the Great, Valentinian I, and Constantine IV.

179 Brubaker, *Inventing Byzantine Iconoclasm*, 4– 5. cf. Suzanne Spain Alexander, "Heraclius, Byzantine Imperial Ideology, and the David Plates". *Speculum* 52.2 (1977): 217–237; also, Tommaso Tesei. "Heraclius' War Propaganda and the Qur ān's Promise of Reward for Dying in Battle". *Studia Islamica* 114.2 (2019): 219–247 on Heraclius' promotion of soldiers' martyrdom.

180 Paul Magdalino, "The Road to Baghdad in the thought-world of ninth-century Byzantium", in *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies*, ed. by Leslie Brubaker (Birmingham, Aldershot: Ashgate, 1998), 195 refers to John the Grammarian, St Constantine/Cyril, Photios, Leo Choirosphaktes, as well as Leo the Mathematician who received an invitation to visit the 'Abbasid Court.

181 Magdalino, "The Road to Baghdad", 196f. with Theophanes Continuatus 3.9 (ed. Michael Featherstone, Juan Signes-Codoner 2015, 246).

182 Magdalino, "The Road to Baghdad", 199–200 with Theophanes Continuatus 4.27–29 (ed. id., 262.24–272.22).

183 Magdalino, "The Road to Baghdad", 202.

184 Magdalino, "The Road to Baghdad"S, 212–213.

185 Sypiański, "Arabo-Byzantine Relations", 468–474.

186 Mohammed Abbatouy, "Greek Mechanics in Arabic Context: Thābit ibn Qurra, al-Isfizārī and the Arabic Traditions of Aristotelian and Euclidean Mechanics". *Science in Context* 14.1/2 (2001): 179–247 at 185–186 discussing Hero's *Mechanics*; cf. Jakub Sypiański, "Arabo-Byzantine traffic of manuscripts and the connections between the Graeco-Arabic Translation Movement and the first Byzantine 'Renaissance' (9th-10th Centuries)", in *Byzantium and Renaissances. Dialogue of Cultures, Heritage of Antiquity. Tradition and Modernity*, ed. by Michael Janocha, Aleksandra Sulikowska, and Irene Tatarova (Warsaw: University of Warsaw, 2012); also, Donald R. Hill, *Islamic Science and Engineering* (Edinburgh: Edinburgh University Press, 1993), 59–60, 122–123.

187 Hill, *Islamic Science*, 11–12 and id., "Mechanical Technology", in *The Different Aspects of Islamic Culture. Vol. 4, Science and Technology in Islam. Part 2, Technology and Applied Sciences*, ed. by Ahmad Y. al Hassan, Maqbul Ahmed, and Albert Z. Iskandar (Beirut: UNESCO), 2001, 165–192. It was also said that the caliph al-Mutawakkil (847–861) was a fervent admirer of the Banū Mūsà brothers who created for him a golden tree on whose branches mechanical birds sang. See George Saliba, "The Function of Mechanical Devices in Medieval Islamic Society", in *Science and Technology in Medieval Society*, ed. by Pamela O. Long (New York: New York Academy of Sciences, 1985), 148. For a similar tree at the court of the eleventh century caliph al-Muqtadir, see Hugh Kennedy, *The Court of the Caliphs, the rise and fall of Islam's*

Theophilos' zeal for the mechanical contraptions of the great hall at Magnaura. While Muslims, however, made strides in scientific discoveries and impressed the European courts with their automata,[188] appropriating the knowledge "entrusted to Byzantines by god himself" (see n167), the latter were engrossed in the iconoclastic debate. In places like Phrygia, where Theophilos was born, the zeal for miracles was so extensive that already in the eighth century, bishop Constantine of Nacoleia was forced to take measures against icon veneration, followed by other bishops.[189] In addition, reports about fake miracles were threatening the authority of the dogma. For example, Vigilantius of Calagurris had strongly opposed the veneration of relics already in the fourth century, and his scepticism appears to have been more widespread than often assumed;[190] Emperor Maurice (539–602) had also expressed reservations about the miraculous relics of St Euphemia in Constantinople, raising suspicions that "ῥᾳδιουργικαὶ ἐπίνοιαι", that is, some crafty devices may have been at work.[191] Numerous reports in the writings of Eusebius, Rufinus, Theodoret and others confirm several cases of fraudulent images and statues that were made to appear as if they spoke to praying worshippers – echoing concerns about pseudo-prophets and deceptive miracle workers, already voiced by the evangelists.[192] Accordingly, the sixty-third Canon of the Council in Trullo (692) forbade the circulation of fake martyrologies because they "dishonour the martyrs of Christ and induce unbelief" (ὡς ἂν τοῖς τοῦ Χριστοῦ μάρτυρας ἀτιμάζοιεν, καὶ πρὸς ἀπιστίαν ἐνάγοιεν).[193] In fact, such a story of religious zeal that abuses technology has been reported by Patriarch Eutychius of Alexandria as the reason of Theophilos' iconoclasm; writing in Arabic, Eutychius makes the reign of caliph al-Mutawakkil (see n187) coincide with that of Theophilos. The caliph who, like Theophilos, was known for his penchant for automata, is said to have turned against the Christians when his Christian physicians quarrelled over the issue of venerating icons and one of them used deception to ensure that his rival was punished by the caliph. After reporting the story of al-Mutawakkil, Eutychius continues to explain Theophilos' iconoclasm as the result of another deception, a fake miracle uncovered by Michael, Theophilos' father in a church of Virgin Mary:[194]

> On her feast day, a drop of milk would come out of the breasts of the image. King Theophilus refused to acknowledge this, and he undertook an investigation into the matter. The custodian of the church was found to have drilled a hole into the wall behind the image. He made a perforation into the breasts of the image and introduced a small, thin tube of lead into it. Then he smeared the place over with clay and lime so that it would not be noticed. On the feast day of Lady Mary, he would pour milk into the perforation, and a small drop would come out of the breasts of the image.

According to Eutychius, Sophronius of Alexandria intervened to explain to Theophilos the

greatest Dynasty (London: Weidenfeld and Nicholson, 2004), 153–155.

188 Tayeb El-Hibri, *The Abbasid Caliphate: A History* (Cambridge: Cambridge University Press, 2021), 96–97 for the water-clock that Harun al-Rashid gifted to Charlemagne in 801.

189 PG 93, 77A with Ryden, "The Role of the Icon", 48.

190 David G. Hunter, "Vigilantius of Calagurris and Victricius of Rouen: Ascetics, Relics, and Clerics in Late Roman Gaul". *Journal of Early Christian Studies* 7.3 (1999): 401–430 at 419–429. Note that in 386 Theodosius issued a decree forbidding the transfer of relics or their division in small pieces to counter fraudulent claims for miraculous relics. Maria G. Castello, "The Cult of Relics in the Late Roman Empire. Legal Aspects", in *Public Uses of Human Remains and Relics in History*, ed. by Silvia Cavicchioli and Luigi Provero (London/New York: Routledge, 2020), 38–39 discusses the decree as a state attempt to control the Church, and similarly, Leo's iconoclasm has been understood as an attempt to control the bishops (see Michael Thomas George Humphreys, *Law, Power, and Imperial Ideology in the Iconoclast Era: c.680-850* (Oxford: Oxford University Press, 2014), 83–84, 95–96, and esp. 266–268), yet there is enough evidence to suggest that fraudulent miracles were not unusual and not everyone was keen on embracing the frenzy surrounding holy relics. On Augustine' cautious stance toward miracles, see John A. Hardon, "The Concept of Miracle from St. Augustine to Modern Apologetics", *Theological Studies* 15 (1954b): 229–257; Brown, *The Cult of Saints*, 77–78.

191 Theophylact Simocattes, *History* 8.14 (ed. by Immanuel Bekker 1834, 343–344) with Anthony Kaldellis, "The Hagiography of Doubt and Scepticism", in *The Ashgate Research Companion to Byzantine Hagiography: Volume II: Genres and Contexts*, ed. by Stephanos Efthymiadis (Surrey, UK/Burlington, USA: Ashgate, 2014), 467–468; cf. id. *A Cabinet of Byzantine Curiosities: Strange Tales and Surprising Facts from History's most Orthodox Empire* (Oxford/New York: Oxford University Press, 2017), 116, 135–136, 138–139; cf. Frederik Poulsen, "Talking, Weeping, and Bleeding Sculptures: A Chapter in the History of Religious Fraud". *Acta Archaeologica* 16 (1945): 178–195 at 185–87, 191, 194–95; also see dal Santo, "Contesting the saints' miracles" and id. "The god-protected Empire?" in n173 above.

192 Eusebius, *Ecclesiastical History* 9.2–3 (LCL 265 on a fraudulent statue of Zeus set up to incite hatred against Christians) – Eusebius describes the wonder working of the statue as τερατεία which evokes the warnings of the Evangelists against false prophets who produce "signs and wonders"; see Mark 13:22: σημεῖα καὶ τέρατα. On pseudo-prophets, also see Matthew 24:11 and Luke 21:8; cf. Paul, Rom 15:19; 2 Cor 12:12 and Deut 34:10–12 LXX. Also, Origen, *Against Celsus* 2.50 (GCS 1.173): οὕτως τὰ μὲν τῶν ἀντιχρίστων καὶ τῶν προσποιουμένων δυνάμεις ὡς μαθητῶν Ἰησοῦ σημεῖα και τέρατα λέγεται εἶναι ψεύδους ("so the wonders of the antichrists, and those who pretend to do miracles like the signs and wonders of Jesus' disciples, are said to be "lying"..."); cf. 6.45 (GCS 2.116) and Didache 16:3–5. See Ronald E. Manahan, "A Theology of Pseudo Prophets: A Study of Jeremiah," *Grace Theological Journal* 1.1 (1980): 77–96. For more cases of fraudulent miracles, see Hippolytus, *Refutation of all Heresies* 4.41 (ed. Miroslav Marcovich 1986); Rufinus, *Ecclesiastical History* 2.26 (GCS 9/2, 1032); Theodoret, *Ecclesiastical History* 5.23 (SC 530). Cf. Tomasz Polanski, *Oriental Art in Greek Imperial Literature* (Trier: Wissenschaftlicher Verlag Trier, 1998), 90–91 (on tales of doubting miracles allegedly performed by statues of pagan gods in ancient Syria and Egypt, a common practice aimed at heightening the religious experience of the pilgrims).

193 Eutychius, *Sacrosancta Consilia* col. 1171 (ed. by Philippe Labbe and Gabriel Cossart 1671); Henry Chadwick, *East and West: The Making of a Rift in the Church: From Apostolic Times until the Council of Florence* (Oxford: Oxford University Press, 2003), 66–67; cf. Humphreys, *Law, Power, and Imperial Ideology*, 71; also, see Richard Price and Mary Whitby, *Chalcedon in Context: Church Councils 400-700. Translated Texts for Historians, Contexts 1* (Liverpool: Liverpool University Press, 2009), 162; Harold Allen Drake, *A century of miracles: Christians, Pagans, Jews, and the supernatural, 312-410* (Oxford: Oxford University Press, 2017), 181–198; cf. Harry J. Magoulias, "The Lives of Byzantine Saints as Sources of Data for the History of Magic in the Sixth and Seventh Centuries A.D.: Sorcery, Relics and Icons", *Byzantion* 37 (1967): 259–269.

194 Griffith, "Eutychius of Alexandria", 166 and 174–176.

doctrine of the icons and convinced him to resist from his iconoclasm by reassuring him that "Our honor and reverence are only for the name of this martyr, whose image is here portrayed in these". As Griffith has pointed out,[195] Eutychius' account contains several errors that show he was not following events in Byzantium closely enough to be able to give an accurate list of the succession of emperors, and he had no access to sources written in Greek. Nevertheless, his narrative indicates that icon veneration had become a point of contention between Arabs and Byzantines, and that deception regarding icon veneration was a particularly sensitive topic in their cultural antagonism. Eutychius does not criticize either ruler for being angry at their discovery of fraud; however, both rulers place importance on the matter of truth.

5. Concluding Remarks

Starting from an overview of the development of religious aesthetics from antiquity to the ninth century, this article examined some of the key factors that influenced this process. The systematic employment of technology in religious and other state spectacles from the Hellenistic period onwards gave rise to a culture of the spectacular which gradually acquired political, cultural, psychological, and theological dimensions. Influenced by contemporary political and intellectual developments, particularly Neoplatonism and its role in articulating Christian metaphysics, the veneration of martyrs and icons paved the way for pagan technologies *and* religious aesthetics to be adapted by Christian worshippers, eager to acknowledge that human ability for technological innovation was a sound manifestation of God's providential character. Gradually, numerous sciences such as optics, engineering, and architecture became a powerful tool in the hands of Byzantine Emperors who sought to promote the salvific aspects of themselves and the Empire. This set of aesthetics which afforded Christians and pagans a mutually understood pathway of achieving meaningful spiritual experiences was challenged with the rise of the Arabs in the seventh century. Technologies that the Byzantines monopolized for centuries under divine auspices were increasingly claimed by Arab Muslims who were keen to assert their cultural and doctrinal superiority, encouraged by successive military victories. Understood in conjunction with his iconoclastic views, Theophilos' support of technological progress could be seen as an attempt to modify the Christian aesthetics of the spectacular. By forbidding the veneration of icons, Theophilos was trying to compete with the Arabs in the field of technology while reassuring his subjects that he was able to secure peace without imminent divine intervention. Despite rejecting Theophilos' iconoclasm, however, the Byzantines still acknowledged the benefits of technological advance; after all, for the Byzantines, just like for Heron, Proclus, and their early Christian readers, any miracle is a miracle of God.

[195] Griffith, "Eutychius of Alexandria", 168–174.

6. Bibliographical References

Primary Sources

N.B. Please note that authors quoted from the LCL (= Loeb Classical Library), the SC (Sources chrétiennes), and the GCS (*Die Griechischen Christlichen Schriftsteller*) editions, as well as the Patrologia Graeca and the Patrologia Latina series, edited by Jacques Paul Migne are not listed below for reasons of space. Equally, I do cite individually the translations from the NPNF 1 and 2 translations of early Christian writings (= The Nicene and Post-Nicene Fathers, series 1 and 2), readily available from https://ccel.org/fathers

Amato, Eugenio. *Rose di Gaza. Gli scritti retorico-sofistici e le Epistole di Procopio di Gaza*. Alessandria: Edizioni dell'Orso, 2010.

Bekker, Immanuel. *Theophylacti Simocattae Historiarum Libri Octo*. Bonn: Weber, 1834.

Bidez, Joseph and Parmentier, Leon. *The ecclesiastical history of Evagrius with the scholia*. London: Methuen, 1898–1964.

Blume, Fred H. and Bruce, W. Frier. *The Codex of Justinian: A New Annotated Translation with Parallel Latin and Greek Text*. Cambridge: Cambridge University Press, 2016.

Boese, Helmut. *Procli Diadochi Tria opuscula : De Providentia, Libertate, Malo. Latine Guilelmo de Moerbeka vertente et Graece ex Isaacii Sebastocratoris aliorumque scriptis collecta*. Berlin: De Gruyter, 1960.

Boor, Karl de. *Theophanes, Chronographia*. Leipzig: Teubner, 1883–1885.

Cameron, Averil. *Flavius Cresconius Corippus. In Laudem Iustini Augusti Minoris*. London: Bloomsbury Academic, 2003.

Closs, August Carl. *Jordanis De Getarum sive Gothorum origine et rebus gestis*. Stuttgart: E. Fischhaber 1861.

Diekamp, Franz. *Doctrina Patrum Doctrina Patrum de Incarnatione Verbi*. Münster: Aschendorffsche, 1907.

Dindorf, Wilhelm. *Themistii Orationes, ex codice Mediolanensi: Oratio XI (Δεκετηριανός)*. Leipzig: C. Cnobloch 1832.

Featherstone, Michael and Signes-Codoner, Juan. *Chronographiae quae Theophanis Continuati nomine fertur libri I-IV)*. Berlin: De Gruyter, 2015.

Friedlein, Gottfried. *Proclus. In Euclidem*. Leipzig: Teubner, 1873.

Hamilton, Frederick John and Ernest Walter Brooks (trans.). *The Syriac Chronicle Known as that of Zachariah of Mytilene*. London: Methuen & co, 1899.

Heiber, Johan Ludvig and Stamatis, Evangelos. *Archimedis opera omnia: Volume I*. Berlin: De Gruyter, 1972.

Hennephof, Herman. *Textus Byzantini ad Iconomachiam Pertinentes*. Leiden: Brill, 1969.

Holl Karl. *Epiphanius, Panarion and Ancoratus, 3-vols-in-1*. Leipzig: Hinrichs, 1915–1933.

Hultsch Friedrich Otto. *Pappi Alexandrini collectionis quae supersunt*. Berlin: Weidmann, 1876.

Kiessling, Gottlieb. *Ioannis Tzetzae historiarum variarum Chiliades*. Leipzig: Vogel, 1826.

Labbe, Philippe, and Cossart, Gabriel. *Sacrosancta Concilia Ad Regiam Editionem Exacta Quæ Nunc Quarta Parte Prodit Auctior*, Vol. 6: Ab Anno 649 Ad Annum 787. Paris: Societas Typographica Librorum Ecclesiasticorum, 1671.

Manahan, Ronald E. “A Theology of Pseudo Prophets: A Study of Jeremiah,” *Grace Theological Journal* 1.1 (1980): 77–96.
Mansi, Giovanni Domenico. *Sacrorum conciliorum: nova et amplissima collectio XII*. Paris: H. Welter, 1766.
Marcovich, Miroslav. *Origenes: Contra Celsum Libri VIII*. Leiden: Brill, 2001.
Marcovich, Miroslav. Hippolytus. *Refutatio omnium haeresium*. Berlin, Boston: De Gruyter, 1986.
Mayer, Wendy and Allen, Pauline. *John Chrysostom*. New York: Routledge, 2000.
Mommsen, Theodor and Meyer, Paul Martin. *Theodosiani libri XVI cum constitutionibus sirmonlianis et leges novellae ad Theodosianum pertinentes*. 2 vols. Berlin: Weidmann, 1905.
Moravcsik, Gyula and Romily J.H. Jenkins. *Constantine Porphyrogenitus. De administrando Imperio*. Washington, DC: Dumbarton Oaks, 1967.
Morrow, Glenn R. *Proclus. A Commentary on the First Book of Euclid's Elements*. Princeton, NJ: Princeton University Press, 1970.
Oehler, Franz. *Arnobius adversus nations*. Leipzig: Tauchnitz, 1846.
Paladini, Vergilio and Fedeli, Paolo. *Panegyrici Latini.* Rome: Instituto Poligrafico dello Stato, 1976.
Parker, John. *The Works of Dionysius the Areopagite*. London: James Parker and Co, 1897.
Reinsch, Diether Roderich. *Michaelis Pselli. Chronographia*. Berlin: De Gruyter, 2014.
Reiske, Johann Jacob. *Constantini Porphyrogeniti imperatoris de ceremoniis aulae byzantinae. Corpus Scriptorum Historiae Byzantinae*. Bonn: E. Weber, 1829–1830.
Schatkin, Margaret A. and Harkins, Paul W. *The Fathers of the Church. Saint John Apologist*. Washington, DC: The Catholic University of America Press, 1985.
Schmidt, Wilhelm. *Heronis Alexandrini Opera quae supersunt omnia, vol. I, Pneumatica et automata (in Greek with translation in Latin)*. Stuttgart: Teubner, 1899.
Schöne, Hermann. *Heronis Alexandrini Opera quae supersunt omnia, vol. III, Rationes dimetiendi et Commentatio dioptrica (in Greek with translation in Latin)*. Stuttgart: Teubner, 1976.
Spira, Andreas. *Gregory Nyssa. De anima et resurrectione*. Leiden: Brill, 2014.
Steel, Carlos G. *Proclus. On Providence*, translation. London, New Delhi, New York, Sydney: Bloomsbury, 2007.
Thurn, Hans. *Ioannis Malalae Chronographia*. Berlin: De Gruyter, 2000.
Williams, Frank. *The Panarion of Epophanius of Salamis*. Translation. Leiden: Brill, 2009.
Wright, Frederick Adam (trans.). *The works of Liudprand of Cremona: Antapodosis, Liber de rebus gestis Ottonis, Relatio de legatione Constantinopolitana*. New York: E.P. Dutton and Co., 1930.
Wuensch, Richard. *John Lydus de Mensibus*. Leipzing: Teubner, 1903.
Yeats, William Butler. *The Collected Poems of W.B. Yeats: A New Edition*. Richard J. Finneran (ed.), New York: Mcmillan, 1989.

Bibliography

Abbatouy, Mohammed. “Greek Mechanics in Arabic Context: Thābit ibn Qurra, al-Isfizārī and the Arabic Traditions of Aristotelian and Euclidean Mechanics”. *Science in Context* 14.1/2 (2001): 179–247.
Acerbi, Fabio. “Byzantine Recensions of Greek Mathematical and Astronomical Texts: A Survey”. *Revista de Estudios Bizantinos* 4 (2016):133–213.
Alexander, Suzanne Spain. “Heraclius, Byzantine Imperial Ideology, and the David Plates”. *Speculum* 52.2 (1977): 217–237.
Anagnostopoulos, Thalia. “Aristotle and Byzantine Iconoclasm”. Greek, Roman, and Byzantine Studies 53 (2013): 763–790.
Anagnostou-Laoutides, Eva. “Tyrants and Saviours in Pan. Lat. XII(9): pro-Constantinian Readings of the Aeneid”. *Journal of Late Antiquity* 14.1 (2021): 75–96.
Andrews, Paul. “Pagan Mysteries and Christian Sacraments”. *Studies: An Irish Quarterly Review* 47.185 (1958): 54–65.
Argoud, Gilbert. “Héron d'Alexandrie et les ‘Pneumatiques'”, in Gilbert Argoud and Jean-Yves Guillaumin (eds.), *Sciences exactes et sciences appliquées à Alexandrie*, Saint-Étienne: Publications de l'Université de Saint-Étienne, 1998, 127–145.
Armstrong, Gregory T. “Constantine's Churches: Symbol and Structure”. *Journal of the Society of Architectural Historians* 33.1 (1974): 5–16.
Artemi, Eirene. “The Aspect of the Body in the Writing ‘On the Soul and the Resurrection' by Gregory of Nyssa”. SingiLogos 2.1 (2020): 113–129.
Asper, Markus. “Dionysios (Heron, Def. 14.3) Und Die Datierung Herons von Alexandria”. *Hermes* 129.1 (2001): 135–137.
Atkinson, John Edward. “Leo III and Iconoclasm”. *Theoria: A Journal of Social and Political Theory* 41 (1973): 51–62.
Auzépy, Marie-France. “Manifestations de la propagande en faveur de l'orthodoxie”, in Leslie Brubaker (ed.), *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies, Birmingham*, Aldershot: Ashgate, 1998, 85–99.
Baranov, Vladimir. “The doctrine of the Icon-Eucharist for the Byzantine iconoclasts”. *Studia Patristica* 44 (2010): 41–48.
Baranov, Vladimir. “Visual and Ideological Context of the Chalke Inscription at the Entrance to the Great Palace of Constantinople”, *Scrinium* 13.1 (2017): 19–42.
Bardill, Jonathan. *Constantine: Divine Emperor of the Christian Golden Age*. Cambridge: Cambrdige University Press, 2012.
Barnard, Leslie William. “The Emperor Cult and the Origins of the Iconoclastic Controversy”. *Byzantion* 43 (1973): 13–29.
Barnes, Timothy David. “Emperors and bishops 324–44: some problems”. *American Journal of Ancient History* 3 (1978): 53–75.
Bartlett, Robert. *Why Can the Dead Do Such Great Things? Saints and Worshippers from the Martyrs to the Reformation*. Princeton and Oxford: Princeton University Press, 2013.

Beacham, Richard. *The Roman Theatre and Its Audience*. Cambridge, MA: Harvard University Press, 1991.

Beacham, Richard. "Heron of Alexandria's 'Toy Theatre' Automaton: Reality, Allusion and Illusion", in Kara Reilly (ed.), *Theatre, Performance and Analogue Technology. Historical Interfaces and Intermedialities*, New York: Palgrave Macmillan, 2013, 15–39.

Berger, Albrecht. "Constantine's City: The Early Days of a Christian Capital". *Studia Ceranea* 10 (2020): 11– 29.

Berger, Albrecht. "The Byzantine Court as a Physical Space", Ayla Ödekan, Nevra Necipoglu, and Engin Akyürek (eds.), *The Byzantine court: Source of Power and Culture; Papers from The Second International Sevgi Gönül Byzantine Studies Symposium*, Istanbul 21–23 June 2010. Centre for Hellenic Studies, King's College London, Istanbul: Koç University Press, 2013, 3–22.

Berryman, Sylvia. "Ancient Automata and Mechanical Explanation". *Phronesis* 48.4 (2003): 344–369.

Berryman, Sylvia. "Ancient Greek Mechanics and the Mechanical Hypothesis", in Liba Taub (ed.), *The Cambridge Companion to Ancient Greek and Roman Science*, Cambridge: Cambridge University Press, 2020, 229–247.

Bralewski, Sławomir. "The Porphyry Column in Constantinople and the Relics of the True Cross", *Studia Ceranea* 1 (2011): 87–100.

Bremmer, Jan N. *Initiation into the Mysteries of the Ancient World*. Berlin/Boston: De Gruyter, 2014.

Bremmer, Jan N. "Richard Reitzenstein's Hellenistische Wundererzählungen", in Tobias Nicklas and Janet E. Spittler (eds.), *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, Tubingen: Mohr Siebeck, 2013, 1-19.

Bremmer, Jan N. "The Vision of Constantine", in André Lardinois, Marc van der Poel, and Vincent Hunink (eds.), *Land of Dreams*, Leiden: Brill, 2006, 57–79.

Brentjes, Sonja. "Who Translated Euclid's Elements into Arabic?", in Jaakko Hämeen-Anttila and Ilkka Lindstedt (eds.), *Translation and Transmission: Collection of Articles*, Münster: Ugarit Verlag, 2018, 21–54.

Brentjes, Sonja. "Mathematical commentaries in Arabic and Persian – purposes, forms, and styles". *Historia Mathematica* 47 (2019): 54–66.

Brett, Gerard. "The Automata in the Byzantine 'Throne of Solomon'". *Speculum* 29.3 (1954): 477–487.

Brown, Peter. *The Cult of the Saints. Its Rise and Function in Latin Christianity*. London: Chicago University Press, 1981.

Brubaker, Leslie. "The Chalke gate, the construction of the past, and the Trier ivory". *Byzantine and Modern Greek Studies* 23 (1999): 258–285.

Brubaker, Leslie. *Inventing Byzantine Iconoclasm*. London: Bristol University Press, 2012.

Callahan, John F. "Greek Philosophy and the Cappadocian Cosmology". *Dumbarton Oaks Papers* 12 (1958): 29–57.

Cambiano, Giuseppe. "Automaton", *Studi Storici* 35.3 (1994): 613–633.

Cameron, Alan. "Isidore of Miletus and Hypatia: On the Editing of Mathematical Texts". *Greek, Roman and Byzantine Studies* 31.1 (1990): 103–127.

Cameron Averil. "Constantine and the 'peace of the church'", in Margaret M. Mitchell and Frances M. Young (eds.), *The Cambridge History of Christianity*, Cambridge: Cambridge University Press, 2006, 538–551.

Cameron, Averil. "The Cult of the Virgin in Late Antiquity: Religious Development and Myth-Making", in Robert Norman Swanson (ed.), *The Church and Mary*, Oxford: Oxford University Press, 2004, 1–21.

Cameron, Averil. "Models of the past in the late sixth century: the Life of the patriarch Eutychius", in Brian Croke, Alanna Nobbs, Raoul Mortley, Graeme Clarke (eds.), *Reading the Past in Late Antiquity*, Canberra: Australian National University, 1990, 205–223.

Cameron, Averil. "The Language of Images: The Rise of Icons and Christian Representation", in Diana Wood (ed.), *The Church and the Arts. Papers Read at the 1990 Summer Meeting and the 1991 Winter Meeting of the Ecclesiastical History Society*, Oxford: Blackwell, 1992, 1–43.

Cameron, Averil and Herrin, Judith. *Constantinople in the early eighth century: the Parastaseis syntomoi chronikai: introduction, translation, and commentary*. Leiden: Brill, 1984.

Cameron, Averil. "Images of Authority: Elites and Icons in Late Sixth-Century Byzantium". *Past and Present* 84 (1979): 3–35.

Cameron, Averil. "Corippus' Poem on Justin II: A Terminus of Antique Art?", *Annali della Scuola Normale Superiore di Pisa* 5.1 (1975): 129–165.

Camia, Francesco. "Which relationship between Greek Gods and Roman Emperors? The cultic implications of the 'assimilation' of Emperors to Gods in mainland Greece". *Arys* 16 (2018): 105–137.

Canavas, Constantin. "Automaten in Byzanz. Der Thron von Magnaura", in Klaus Grubmüller and Markus Stock (eds.), *Automaten in Kunst und Literatur des Mittelalters und der Frühen Neuzeit*, Wiesbaden: Harrasowitz, 2003, 49–72.

Carile, Maria Christina. "Holy icon or sacred body? The image of the emperor in the iconoclastic controversy", *Byzantine and Modern Greek Studies* 48.1 (2023): 42–65.

Castello, Maria G. "The Cult of Relics in the Late Roman Empire. Legal Aspects", in Silvia Cavicchioli and Luigi Provero (eds.), *Public Uses of Human Remains and Relics in History*, London/New York: Routledge, 2020, 29–46.

Chadwick, Henry. *East and West: The Making of a Rift in the Church: From Apostolic Times until the Council of Florence*. Oxford: Oxford University Press, 2003.

Chlup, Radek. *Proclus. An Introduction*. Cambridge: Cambridge University Press, 2012.

Chrysostomides, Anna. "Creating a Theology of Icons in Umayyad Palestine: John of Damascus' 'Three Treatises on the Divine Images'". *The Journal of Ecclesiastical History* 72.1 (2021): 1–17.

Christensen, Troels Myrup. "Religious Conflict in Late Antique Alexandria: Christian Responses to 'Pagan' Statues in the Fourth and Fifth Centuries CE", in George Hinge and Jens Krasilnikoff (eds.), *Alexandria: A Cultural and Religious Melting Pot*,

Santa Barbara: Aarhus University Press, 2010, 158–175.

Cormack, Robin. “Away from the Centre: ‘Provincial’ Art in the Ninth Century, Dead or alive? The Byzantine World in the Ninth Century”, in Leslie Brubaker (ed.), *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies, Birmingham*, Aldershot: Ashgate, 1998, 151–163.

Cotter, Wendy. *Miracles in Greco-Roman Antiquity: A sourcebook*. London: Routledge, 1999.

Criscuolo, Ugo. “Iconoclasmo bizantino e filosofia delle immagini divine”, in Stephen Gersh and Charles Kannengiesser (eds.), *Platonism in Late Antiquity*, Notre Dame: University of Notre Dame Press, 1992, 83–102.

Cuomo, Serafina. *Technology and Culture in Greek and Roman Antiquity*. Cambridge: Cambridge University Press, 2007a.

Cuomo, Serafina. *Pappus of Alexandria and the Mathematics of Late Antiquity*. Cambridge: Cambridge University Press, 2007b.

Cuomo, Serafina. “Ancient Written Sources for Engineering and Technology”, in John Peter Oleson (ed.), *The Oxford Handbook of Engineering and Technology in the Classical Word*, Oxford: Oxford University Press, 2008, 15–34.

Curran, John R. *Pagan City and Christian Capital. Rome in the 4th Century*. Oxford: Oxford University Press, 2000.

Danielou, Jean. “Chronologie des Sermons de Saint Gregoire de Nysse”. *Revue des Sciences Religieuses* 29 (1955): 346–372.

Dell’ Isola, Maria. “Montanism and Ecstasy: The Case of Theodotus’ Death (Eus. *HE* V,16,14-15)”, in Adriana Destro and Mauro Pesce (eds.), *Texts, Practices, and Groups, Multidisciplinary Approaches to the History of Jesus’ Followers in the First Two Centuries*, Turnhout: Brepols, 2017, 377–394.

Devecka Martin. “Did the Greeks Believe in their Robots?” *The Cambridge Classical Journal* 59 (2013): 52–69.

De Young, Gregg. “Two hitherto unknown Arabic Euclid Manuscripts”. *Historia Mathematica* 42.2 (2015): 133–154.

Di Benedetto, Stephen. *An Introduction to Theatre Design*. New York: Routledge, 2013.

Dillon, John. “Plotinus and the Transcendental Imagination”, in James P. Mackey (ed.), *Religious Imagination*, Edinburgh: Edinburgh University Press, 1986, 55–64.

Di Segni, Leah. “A Dated Inscription from Beth Shean and the Cult of Dionysos Ktistes in Roman Scythopolis”. *Scripta Classica Israelica* 16 (1997): 139–161.

Di Segni, Leah. “The Greek Inscriptions”, in Michele Piccirillo and Eugenio Alliata (eds.), *Mount Nebo: New Archaeological Excavations, 1967-1997*, volume 2, Jerusalem: Stadium Biblicum Franciscanum, 1998, 433–434.

Djakovac, Aleksandar. “Iconical Ontology of St. Maximus the Confessor”, in Dimitru A. Vanca, Mark J. Cherry, and A. Albu (eds.), *Ars Liturgica. From the Image of Glory to the Images of the Idols of Modernity*, Alba Iulia: Reintregirea, 2017, 57–68.

Dorin, Alan and Anagnostou-Laoutides, Eva. “The Silver Triton: Suetonius Claud. 21.6.13-6”. *Nuncius* 33.1 (2018): 1–24.

Drake, Harold Allen. *A Century of Miracles: Christians, Pagans, Jews, and the Supernatural, 312–410*. Oxford: Oxford University Press, 2017.

Drijvers, Jan Willem. “The Power of the Cross: Celestial Cross Appearances in the Fourth Century”, in Andrew Cain and Noel Lenski (eds.), *The Power of Religion in Late Antiquity*, Farnham/Burlington, VT: Ashgate, 2009, 237–248.

Duffy, John. “Proclus the Philosopher and A Weapon of Mass Destruction: History or Legend?”, in Michael Grünbart (ed.), *Theatron: Rhetorische Kultur in Spätantike und Mittelalter / Rhetorical Culture in Late Antiquity and the Middle Ages*, Berlin/Boston: De Gruyter, 2007, 1–12.

El-Hibri, Tayeb. 2021. *The Abbasid Caliphate: A History*. Cambridge: Cambridge University Press, 2021.

Elsner, John. “The viewer and the vision: The case of the Sinai Apse”. *Art History* 17.1 (1994): 81–102.

Elsner, John. *Imperial Rome and Christian Triumph. The art of the Roman Empire A.D. 100-450*. Oxford: Oxford University Press, 1998.

Elsner, John. “Introduction: the genres of ekphrasis”. *Ramus* 31.1/2 (2001): 1–18.

Elsner John. “Iconoclasm as Discourse: From Antiquity to Byzantium”. *The Art Bulletin* 94.3 (2012): 368–394.

Falkener, Edward. *The Temple of Diana in Ephesus*. London: Day & Son, 1862.

Featherstone, Jeffrey. “Δι’ ἔνδειξιν: Display in Court Ceremonial (De Cerimoniis II, 15)”, in Anthony Cutler and Ariette Papaconstantinou (eds.), *The Material and the Ideal: Essays in Medieval Art and Archaeology in Honour of Jean-Michel Spieser*, Leiden: Brill, 2007, 75–112.

Forness, Philip Michael. *Preaching Christology in the Roman Near East: A Study of Jacob of Serugh*. Oxford: Oxford University Press, 2018.

Freeman, Michelle. “Seeing Sanctity: John Chrysostom’s Use of Optics in His Homilies on the Saints”. *Journal of Early Christian Studies* 31.2 (2023): 171–200.

Gasser-Wingate, Marc. “Aristotle on Induction and First Principles”. *Philosophers’ Imprint* 16.4 (2016): 1–20.

Gaudeul, Jean-Marie. “The Correspondence between Leo and Umar: Umar’s Letter Rediscovered?”. *Islamochristiana* 10 (1984): 109–157.

Germanidou, Sophia. “The time of Constantine the Great as an era of technological achievements -an outline”. *Nis and Byzantium* XII (2014a): 155–162.

Germanidou, Sophia. “Attitudes of Early Patristic Writers toward Technology in the Sphere of Byzantium”. Greek Orthodox Theological Review 59.1/4 (2014b): 41–53.

Goncharko, Oksana Yu. and Dmitry N. Goncharko. “A Byzantine Logician’s “Image” within the Second Iconoclastic Controversy. Theodore the Studite”, *Scrinium* 5 (2019): 163–177.

Goulding, Robert. “Geometry and the Gods: Theurgy in Proclus’s Commentary on the First Book of Euclid’s Elements”, *Perspectives on Science* 30.3 (2022): 358–406.

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

Graf, Fritz. "Religion and Drama", in Marianne McDonald and Michael Walton (eds.), *Cambridge Companion to Greek and Roman Theatre*, Cambridge: Cambridge University Press, 2007, 55–72.

Greene Kevin. "Historiography and Theoretical Approaches", in John Peter Oleson (ed.), *The Oxford Handbook of Engineering and Technology in the Classical Word*, Oxford: Oxford University Press, 2008, 62–90.

Griffith, Sidney H. "Eutychius of Alexandria on the Emperor Theophilus and Iconoclasm in Byzantium: A Tenth Century Moment in Christian Apologetics in Arabic". *Byzantion* 52 (1982): 154–190.

Griffith, Sidney H. "What has Constantinople to do with Jerusalem? Palestine in the ninth century: Byzantine orthodoxy in the world of Islam", in Leslie Brubaker (ed.), *Byzantium in the ninth century: dead or alive*? *Papers from the Thirtieth Spring Symposium of Byzantine Studies, Birmingham*, Aldershot: Ashgate, 1998, 181–194.

Haldon, John F. and Bryan Ward-Perkins. "Evidence from Rome for the image of Christ on the Chalke gate in Constantinople". *Byzantine and Modern Greek Studies* 23 (1999): 286–296.

Halliwell, Stephen. *Between Ecstasy and Truth. Interpretations of Greek Poetics from Homer to Longinus*. Oxford: Oxford University Press, 2001.

Hardon, John A. "The Miracle Narrative in the Acs of the Apostles". *The Catholic Biblical Quarterly* 16.3 (1954a): 303–318.

Hardon, John A. "The Concept of Miracle from St. Augustine to Modern Apologetics", *Theological Studies* 15 (1954b): 229–257.

Headlam, Walter. "Prometheus and the Garden of Eden: Notes for a Lecture by the Late Walter Headlam". *The Classical Quarterly* 28.2 (1934): 63–71.

Heilo, Olof. "The 'Abbāsids and the Byzantine Empire", in Jens Scheiner and Isabel Toral (eds.), *Baghdād, From Its Beginnings to the 14th Century*, Leiden: Brill, 2022, 339–370.

Hill, Donald R. *Islamic Science and Engineering*. Edinburgh: Edinburgh University Press, 1993 (rpr 2022).

Hill, Donald R. "Mechanical Technology", in Ahmad Y. al-Hassan, Maqbul Ahmed, and Albert Z. Iskandar (eds.), *The Different Aspects of Islamic Culture. Vol. 4, Science and Technology in Islam. Part 2, Technology and Applied Sciences*, Beirut: UNESCO, 2001, 165–192.

Humphreys, Michael Thomas George. *Law, Power, and Imperial Ideology in the Iconoclast Era: c.680-850*. Oxford: Oxford University Press, 2014.

Hunter, David G. "Vigilantius of Calagurris and Victricius of Rouen: Ascetics, Relics, and Clerics in Late Roman Gaul". *Journal of Early Christian Studies* 7.3 (1999): 401–430.

Huxley, George Leonard. *Anthemius of Tralles: A Study of Later Greek Geometry*. Cambridge, MA: Eaton Press, 1959.

Insley, Sarah E. *Constructing a Sacred Center: Constantinople as a holy city in early Byzantine literature*. PhD Thesis. Harvard University, 2011.

Ivanović, Filip. *Symbol & Icon. Dionysius the Areopagite and the Iconoclastic Crisis*. Eugene, OR: Pickwick, 2010.

Jensen, Robin M. "Allusions to Imperial Rituals in Fourth-Century Christian Art", in Lee M. Jefferson and Robin M. Jensen (eds.), *The Art of Empire: Christian Art in Its Imperial Context*, Minneapolis: Fortress Press, 2015, 13–48.

Jefferson, Lee M. "Revisiting the Emperor Mystique: The Traditio Legis as an Anti-Imperial Image", in Lee M. Jefferson and Robin M. Jensen (eds.), *The Art of Empire: Christian Art in Its Imperial Context*, Minneapolis: Fortress Press, 2015, 49-86.

Kahlos, Maijastina. "A Christian cannot employ magic", in Richard Flower and Morwenna Ludlow (eds.), *Rhetorical Self-fashioning of the Magicless Christianity of Late Antiquity Rhetoric and Religious Identity in Late Antiquity*, Oxford: Oxford University Press, 2020, 128–142.

Kaldellis, Anthony. *A Cabinet of Byzantine Curiosities: Strange Tales and Surprising Facts from History's most Orthodox Empire*. Oxford/New York: Oxford University Press, 2017.

Kaldellis, Anthony. "The Hagiography of Doubt and Scepticism", Stephanos Efthymiadis (ed.), *The Ashgate Research Companion to Byzantine Hagiography: Volume II: Genres and Contexts*, Surrey, UK/Burlington, USA: Ashgate, 2014, 453–477.

Kaldellis, Anthony. "The Making of Hagia Sophia and the Last Pagans of New Rome", *Journal of Late Antiquity* 6.2 (2013): 347–366.

Karahan, Anne. "Beauty in the Eyes of God. Byzantine Aesthetics and Basil of Caesarea", *Byzantion* 82 (2012): 165–212.

Kennedy, Hugh. *The Court of the Caliphs, the rise and fall of Islam's greatest Dynasty*. London: Weidenfeld and Nicholson, 2004.

Keyser, Paul. "Suetonius 'Nero' 41.2 and the Date of Heron Mechanicus of Alexandria". *Classical Philology* 83 (1988): 218–220.

Kieckhefer, Richard. *Theology in Stone Church Architecture from Byzantium to Berkeley*. Oxford: Oxford University Press, 2004.

King, Geoffrey R.D. "Islam, Iconoclasm, and the Declaration of Doctrine", *Bulletin of the School of Oriental and African Studies* 48 (1985): 267–277.

Kirkegaard, Bradford Andrew. *Emperors and Cities: The Transformation of Sacred Space in Late Antiquity*. PhD Thesis. University of Pennsylvania, 2007.

Kitzinger, Ernst. "The Cult of Images in the Age before Iconoclasm". *Dumbarton Oaks Papers* 8 (1954): 83–150.

Klein, Holger A. "The Crown of His Kingdom: Imperial Ideology, Palace Ritual, and the Relics of Christ's Passion", in Michael Featherstone, Jean-Michel Spieser, Gülru Tanman, and Ulrike Wulf-Rheidt (eds.), *The Emperor's House: Palaces from Augustus to the Age of Absolutism*, Berlin/München/Boston: De Gruyter, 2015, 201–212.

Krueger, Derek. "Christian Piety and Practice in the Sixth Century", in Michael Maas (ed.), *The Cambridge Companion to the Age of Justinian*, Cambridge: Cambridge University Press, 291–315.

Lane Fox, Robin. *Pagans and Christians*. London: Viking/ New York: Knopf, 1986.

Lancaster, Lynne. “Roman Engineering and Construction”, in John Peter Oleson (ed.), *The Oxford Handbook of Engineering and Technology in the Classical World*, Oxford: Oxford University Press, 2008, 256–284.

Latham, Jacob A. “Representing Ritual, Christianizing the pompa circensis: Imperial Spectacle at Rome in a Christianizing Empire”, in Lee M. Jefferson and Robin M. Jensen (eds.), *The Art of Empire: Christian Art in Its Imperial Context*, Minneapolis: Fortress Press, 2015, 197–224.

Latourelle, René. “Originalité et Fonctions des Miracles de Jésus”. *Gregorianum* 66.4 (1985): 641–653.

Lemerle, Paul. *Byzantine humanism: the first phase, notes and remarks on education and culture in Byzantium from its origins to the 10th century*. Trans. Helen Lindsay and Ann Moffatt. Canberra: Australian Association for Byzantine Studies, 1986.

Lewis, Michael and Jonathan Taunton. *Surveying Instruments of Greece and Rome*. Cambridge: Cambridge University Press, 2001.

Lo Bello, Anthony. *Gerard of Cremona’s translation of the commentary of Al-Nayrizi on Book I of Euclid’s Elements of Geometry, with an introductory account of the twenty-two early extant Arabic manuscripts of the Elements*. Leiden: Brill, 2003.

Louth, Andrew. “The Doctrine of the Eucharist in the Iconoclast Controversy”, in Lewis Ayres, and John Behr (eds.), *Selected Essays, Volume I: Studies in Patristics*, Oxford: Oxford University Press, 2023, 359–365.

Louth, Andrew. *The Origins of the Christian Mystical Tradition from Plato to Denys*. Oxford: Oxford University Press, 2007 (2nd ed.).

Lowe, Dunstan. “Twisting in the Wind: Monumental Weathervanes in Classical Antiquity”. *The Cambridge Classical Journal* 62 (2016): 147–169.

Ludlow, Morwenna. *Art, Craft, and Theology in Fourth-Century Christian Authors*. Oxford: Oxford University Press, 2020.

Ludlow, Morwenna. “Science and Technology in Gregory of Nyssa’s *De Anima et Resurrectione*: Astronomy and Automata”. *Journal of Theological Studies* 60.2 (2009): 467–489.

Luttwak, Edward N. *The Grand Strategy of the Byzantine Empire*. Cambridge, MA/London: Harvard University Press, 2009.

Macrides, Ruth, and Magdalino, Paul. “The Architecture of Ekphrasis: Construction and Context of Paul the Silentiary’s Poem on Hagia Sophia”. *Byzantine and Modern Greek Studies* 12 (1988): 47–82.

Magdalino, Paul. “The Road to Baghdad in the thought-world of ninth-century Byzantium”, in Leslie Brubaker (ed.), *Byzantium in the ninth century: dead or alive? Papers from the Thirtieth Spring Symposium of Byzantine Studies, Birmingham*, Aldershot: Ashgate, 1998, 195–214.

Magdalino, Paul. “The History of the Future and Its Uses: Prophecy, Policy, and Propaganda”, in Roderick Beaton and Charlotte Roueché (eds.), *The Making of Byzantine History: Studies Dedicated to Donald M. Nicol*, Aldershot: Variorum, 1993, 3–32.

Paul Magdalino, “The End of Time in Byzantium”, in Wolfram Brandes, Alexander Demandt, Helmut Krasser, Hartmut Leppin, Peter von Möllendorff (eds.), *Endzeiten. Eschatologie in den monotheistischen Weltreligionen*, Berlin: De Gruyter, 2008, 119–134.

Magoulias, Harry J. “The Lives of Byzantine Saints as Sources of Data for the History of Magic in the Sixth and Seventh Centuries A.D.: Sorcery, Relics and Icons”, *Byzantion* 37 (1967): 259–269.

Mainoldi, Ernesto Sergio. “Deifying Beauty. Toward the Definition of a Paradigm for Byzantine Aesthetics”, *Aisthesis. Pratiche, Linguaggi E Saperi Dell’Estetico* 11.1 (2018): 13–29.

Markopoulos, Athanasios. “In Search for ‘Higher Education’ in Byzantium”. *Recueil des travaux de l’Institut d’études byzantines* 50 (2013): 29–44.

Marmer, David Bruce Jay. *The Political Culture of the Abbasid Court, 279-324 (A.H.)*. PhD Thesis. Princeton University, 1994.

Mars, Matthew M. “The Repurposing and Legacy of Innovation”, in Matthew M. Mars, Gary D. Libecap, and Sherry Hoskinson (eds.), *A Cross-Disciplinary Primer on the Meaning of Principles of Innovation, United Kingdom*, North America, Japan, India, Malaysia, China: Emerald, 2013, 51–64.

Marsengill, Katherine L. “The Visualization of the Imperial Cult in Late Antique Constantinople”, in Lee M. Jefferson and Robin M. Jensen (eds.), *The Art of Empire: Christian Art in Its Imperial Context*, Minneapolis: Fortress Press, 2015, 271–306.

Marsengill, Katherine L. *Portraits and Icons: Between Reality and Holiness in Byzantium*. PhD Thesis. Princeton University, 2010.

Martin, Luther H. “Roman Mithraism and Christianity”. *Numen* 36.1 (1989): 2–15.

Masià, Ramon. “On Dating Hero of Alexandria”. *Archive for History of Exact Sciences* 69.3 (2015): 231–255.

Mastronarde, Donald J. *The Art of Euripides: Dramatic Technique and Social Context*. Cambridge: Cambridge University Press, 2010.

Matthews, Thomas F. “The Origin of Icons”, in Ellen C. Schwartz (ed.), *The Oxford Handbook of Byzantine Art and Architecture*, Oxford: Oxford University Press, 2021, 21–30.

Mathews, Thomas F. with Norman E. Muller. *The Dawn of Christian Art in Panel Paintings and Icons*. Los Angeles: J. Paul Getty Museum, 2016.

Matthews, Thomas F. *The Clash of Gods. A Reinterpretation of Early Christian Art*. Princeton, NJ: Princeton University Press, 1999.

Mayor, Adrienne. *Gods and Robots: Myths, Machines, and Ancient Dreams of Technology*. Princeton: Princeton University Press, 2018.

McGlothlin, Thomas D. *Resurrection as Salvation. Development and Conflict in Pre-Nicene Paulinism*. Cambridge: Cambridge University Press, 2018.

MacMullen, Ramsay. “Constantine and the Miraculous”. *Greek, Roman, and Byzantine Studies* 9.1 (1968): 81–96.

Meri, Josef F. “The etiquette of devotion in the Islamic cult of saints”, in James Howard-Johnston and Paul Antony Hayward (eds.), *The Cult of Saints in Late Antiquity and the Middle Ages. Essays on the Contribution of Peter Brown*, Oxford: Oxford University Press, 1999, 163–286.

Millet, Paul. “The Trial of Socrates Re-visited”. *European Review of History* 12 (2005): 23–62.

Moles, John. “Jesus and Dionysus in ‘The Acts of The Apostles’ and early Christianity”. *Hermathena* 180 (2006): 65–104.

Morris, Sarah P. *Daidalos and the Origins of Greek Art*. New Jersey: Princeton University Press, 1992.

Moss, Candida. “Miraculous Events in Early Christian Stories about Martyrs”, in Tobias Nicklas and Janet E. Spittler (eds.), *Credible, incredible. The miraculous in the ancient Mediterranean*, Tübingen: Mohr Siebeck, 2013, 283–301.

Motsianos, Ioannis K. *Φῶς Ἱλαρόν. Ο Τεχνητός Φωτισμός στο Βυζάντιο*. PhD Thesis, University of Thessaly (Volos), 2011.

Nasrallah, Laura Salah. *An Ecstasy of Folly: Prophecy and Authority in early Christianity*. Cambridge, MA: Harvard University Press, 2003.

Nellas, Panayiotis. *Deification in Christ. The Nature of the Human Person*. Translated by Norman Russell. New York: St Vladimir’s Seminary Press, 1987.

Nesselrath, Heinz-Günther. “Wundergeschichten in der Perspektive eines paganen satirischen Skeptikers: Lukian von Samosata”, in Tobias Nicklas and Janet E. Spittler (eds.), *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, Tubingen: Mohr Siebeck, 2013, 37–55.

Neugebauer, Otto E. “Über Eine Methode Zur Distanzbestimmung Alexandria – Rom Bei Heron”. *Kongelige Danske Videnskabernes Selskabs Skrifter* 26 (1938): 3–26.

Nock, Arthur Darby. “Hellenistic Mysteries and Christian Sacraments”. *Mnemosyne* 5.3 (1952): 177–213.

Papaconstantinou, Arietta. “Saints and Saracens: On Some Miracle Accounts of the Early Arab Period”, in Denis Sullivan and Elizabeth Fisher (eds.), *Byzantine Religious Culture. Studies in Honor of Alice-Mary Talbot*, Leiden: Brill, 2012, 323–338.

Peppard, Michael. “Was the Presence of Christ in Statues? The Challenge of Divine Media for a Jewish Roman God”, in Lee M. Jefferson and Robin M. Jensen (eds.), *The Art of Empire: Christian Art in Its Imperial Context*, Minneapolis: Fortress Press, 2015, 225–270.

Piccirillo, Michele. “The Mosaics”, in Michele Piccirillo and Eugenio Alliata (eds.), *Mount Nebo: New Archaeological Excavations, 1967-1997*, volume 2, Jerusalem: Stadium Biblicum Franciscanum, 1998, 265–372.

Polanski, Tomasz. *Oriental Art in Greek Imperial Literature*. Trier: Wissenschaftlicher Verlag Trier, 1998.

Ousterhout, Robert G. “The Sanctity of Place and the Sanctity of Buildings: Jerusalem versus Constantinople”, in Bonna D. Wescoat and Robert G. Ousterhout (eds.), *Architecture of the Sacred: Space, Ritual, and Experience from Classical Greece to Byzantium*, Cambridge: Cambridge University Press, 2012, 281–306.

Paffenroth, Kim. “Jesus as Anointed and Healing Son of David in the Gospel of Matthew”. *Biblica* 80.4 (1999): 547–554.

Parnell, David Alan. “Spectacle and Sport in Constantinople in the Sixth Century CE”, in Donald G. Kyle and Paul Christesen (eds.), *Companion to Sport and Spectacle in Greek and Roman Antiquity*, Chichester, UK and Malden, MA: Wiley Blackwell, 2013, 633–645.

Parry, Kenneth. *Depicting the Word: Byzantine Iconophile Thought of the Eighth and Ninth Centuries*. Leiden: Brill, 1996.

Persig, Anna. “The Language of Imperial Cult and Roman Religion in the Latin New Testament: The Latin Renderings of ‘Saviour’”. *New Testament Studies* 69.1 (2013): 21–34.

Pontani, Filippomaria. “Scholarship in the Byzantine Empire (529–1453)”, in Franco Montanari (ed.), *History of Ancient Greek Scholarship. From the Beginnings to the End of the Byzantine Age*, Leiden: Brill, 2020, 373–529.

Poulsen, Frederik. “Talking, Weeping, and Bleeding Sculptures: A Chapter in the History of Religious Fraud”. *Acta Archaeologica* 16 (1945): 178–195.

Price, Richard. “In Hoc Signo Vinces: The Original Context of the Vision of Constantine”. *Studies in Church History* 41 (2005): 1–10.

Price, Richard and Mary Whitby. *Chalcedon in Context: Church Councils 400-700. Translated Texts for Historians, Contexts 1*. Liverpool: Liverpool University Press, 2009.

Radde-Gallwitz, Andrew. *Basil of Caesarea, Gregory of Nyssa, and the Transformation of Divine Simplicity*. Oxford: Oxford University Press, 2009.

Ramelli, Ilaria. “The Philosophical Stance of Allegory in Stoicism and its Reception in Platonism, Pagan and Christian: Origen in Dialogue with the Stoics and Plato”. *International Journal of Classical Tradition* 18 (2011): 335–371.

Raïos, Dimitris. “La date d’Héron d’Alexandrie: témoignages internes et cadre historico-culturel”, in Gilbert Argoud and Jean-Yves Guillaumin (eds.), *Autour de la dioptre d’Héron d’Alexandrie*, Saint-Étienne: Publications de l’Université de Saint-Étienne, 2000, 19–36.

Rapp, Claudia. “‘For next to God, you are my salvation’: reflections on the rise of the holy man in late antiquity”, in James Howard-Johnston and Paul Antony Hayward (eds.), *The Cult of Saints in Late Antiquity and the Middle Ages. Essays on the Contribution of Peter Brown*, Oxford: Oxford University Press, 1999, 63–82.

Rausch, Manuela. *Heron von Alexandria: die Automatentheater und die Erfindung der ersten antiken Programmsteuerung*. Hamburg: Diplomica Verlag, 2012.

Reinink, Gerrit J. “Heraclius, the New Alexander. Apocalyptic prophecies during the reign of Heraclius”, in Gerrit J. Reinink, Bernard H. Stolte (eds.), *The reign of Heraclius (610-641): Crisis and Confrontation. Groningen studies in cultural change*, v. 2., Leuven: Peeters, 2002, 81–94.

Reinink, Gerrit J. “From Apocalyptics to Apologetics: Early Syriac Reactions to Islam”, in Wolfram Brandes, Alexander Demandt, Helmut Krasser, Hartmut Leppin, Peter von Möllendorff (eds.),

Endzeiten. Eschatologie in den monotheistischen Weltreligionen, Berlin: De Gruyter, 2008, 75–88.

Remus, Harold. *Pagan-Christian Conflict over Miracle in the Second Century*. Cambridge, MA: The Philadelphia Patristic Foundation, 1983.

Rice, Ellen. *The Grand Procession of Ptolemy Philadelphus*. Oxford: Oxford University Press, 1983.

Robinson, Chase. "Prophecy and Holy Men in early Islam", in James Howard-Johnston and Paul Antony Hayward (eds.), *The Cult of Saints in Late Antiquity and the Middle Ages. Essays on the Contribution of Peter Brown*, Oxford: Oxford University Press, 1999, 241–262.

Roby, Courtney. *Technical Ekphrasis in Greek and Roman Science and Literature. The Written Machine between Alexandria and Rome*. Cambridge: Cambridge University Press, 2016.

Rohmann, Dirk. "The Destruction of the Serapeum of Alexandria, Its Library, and the Immediate Reactions". *Klio* 104.1 (2022): 334–362.

Roland, Alex. "Secrecy, Technology, and War: Greek Fire and the Defense of Byzantium". *Technology and Culture* 33.4 (1992): 655–679.

Ruether, Rosemary. *Gregory of Nazianzus: Rhetor and Philosopher*. Oxford: Clarendon Press, 1969.

Rydén, Lennart. "The Role of the Icon in Byzantine Piety". *Scripta Instituti Donneriani Aboensis* 10 (1979): 41–52.

Rylaardam, David. *John Chrysostom on Divine Pedagogy: The Coherence of his Theology and Preaching*. Oxford: Oxford University Press, 2014.

Sahner, Christian C. "The First Iconoclasm in Islam: A New History of the Edict of Yazīd II (AH 104/AD 723)", *Der Islam* 94.1 (2017): 5–56.

Saliba, George. "The Function of Mechanical Devices in Medieval Islamic Society", in Pamela O. Long (eds.), *Science and Technology in Medieval Society*, New York: New York Academy of Sciences, 1985, 141–152.

Santo, Matthew Dal. *Debating the Saints' Cult in the Age of Gregory the Great*. Oxford: Oxford University Press, 2012.

Santo, Matthew Dal. "The God-Protected Empire? Scepticism towards the Cult of Saints in Early Byzantium", in Peter Sarris et al. (eds.), *An Age of Saints? Power, Conflict, and Dissent in Early Medieval Christianity*, Leiden: Brill, 2011, 129–149.

Schadler, Peter. *John of Damascus and Islam Christian Heresiology and the Intellectual Background to Earliest Christian-Muslim Relations*. Leiden: Brill, 2018.

Schibille, Nadine. "Astronomical and Optical Principles in the Architecture of Hagia Sophia in Constantinople," *Science in Context* 22 (2009): 27–46.

Schibille, Nadine. *Hagia Sophia and the Byzantine Aesthetic Experience*. Farnham, Surrey: Ashgate, 2014.

Schiefsky, Mark J. "Technē and Method in Ancient Artillery Construction: The Belopoeica of Philo of Byzantium", in Brooke Holmes and Klaus-Dietrich Fischer (eds.), *The Frontiers of Ancient Science: Essays in Honor of Heinrich von Staden*, Berlin/Boston: De Gruyter, 2015, 615–654.

Schomberg, Anette. "'To amaze the world' –A contribution to the shape and meaning of the water clock in antiquity", in Kai Wellbrock (ed.), *Cura Aquarum in Greece: Proceedings of the 16th International Conference on the History of Water Management and Hydraulic Engineering in the Mediterranean Region*, Athens, Greece, 28–30 March 2015, Clausthal-Zellerfeld: Papierfliegerverlag GmbH, 2017, 301–340.

Shean, John F. "The Destruction of the Serapeum in 391: Religious Violence and Intolerance in an Imperial Age". *Journal of Religion and Violence* 9.2/3 (2021): 149–170.

Shepherd, Massey Hamilton. "The Early Apologists and Christian Worship". *The Journal of Religion* 18.1 (1938): 60–79.

Shmaliy, Fr. Vladimir. "Cosmology of the Cappadocian Fathers: A Contribution to Dialogue Between Science and Theology Today". *Faith and Philosophy: Journal of the Society of Christian Philosophers* 22.5 (2005): 528–542.

Shoemaker, Stephen J. *The Apocalypse of Empire. Imperial Eschatology in Late Antiquity and Early Islam*. Philadelphia, PA: University of Pennsylvania Press, 2018.

Sidoli, Nathan. "Heron's Dioptra 35 and Analemma Methods: An Astronomical Determination of the Distance between Two Cities". *Centaurus* 47 (2005): 236–258.

Sidoli, Nathan. "Heron of Alexandria's Date". *Centaurus* 53 (2011): 55–61.

Simms, Dennis L. "Archimedes and the Invention of Artillery and Gunpowder". *Technology and Culture* 28.1 (1987): 67–79.

Solla Price de, Derek J. "Automata and the Origins of Mechanism and Mechanistic Philosophy". *Technology and Culture* 5 (1964): 9–23.

Souffrin, Pierre. "Remarques sur la datation de la 'Dioptre' d'Héron par l'éclipse de lune de 62", in Gilbert Argoud and Jean-Yves Guillaumin (eds.), *Autour de la dioptre d'Héron d'Alexandrie*, Saint-Étienne: Publications de l'Université de Saint-Étienne, 2000, 13–17.

Stroumsa, Guy. "Myth into Metaphor: The Case of Prometheus", in Guy Stroumsa, Shaul Shaked, and David Shulman (eds.), *Gilgul, Essays on Transformation, Revolution and Permanence in the History of Religions, Dedicated to R.J. Zwi Werblowsky*, Leiden: Brill, 1987, 309–323.

Studer-Karlen, Manuela. "The Emperor's Image in Byzantium. Perceptions and Functions", in Michele Bacci, Manuela Studer-Karlen, and Mirko Vagnoni (eds.), *Meanings and Functions of the Ruler's Image in the Mediterranean World (11th – 15th Centuries)*, Leiden: Brill, 2022, 134–171.

Sypiański, Jakub. "Arabo-Byzantine relations in the 9th and 10th centuries as an area of cultural rivalry", in Apostolos Kralides and Andreas Goutzioukostas (eds.), *Byzantium and the Arab World: Encounter of Civilizations*, Thessaloniki: Aristoteles University of Thessaloniki, 2011, 465–478.

Sypiański, Jakub. "Arabo-Byzantine traffic of manuscripts and the connections between the Graeco-Arabic Translation Movement and the first Byzantine 'Renaissance' (9th-10th Centuries)", in Michael Janocha, Aleksandra Sulikowska, and Irene Tatarova (eds.),

Byzantium and Renaissances. Dialogue of Cultures, Heritage of Antiquity. Tradition and Modernity, Warsaw: University of Warsaw, 2012, 177–194.

Talgam, Rina. “The Ekphrasis Eikonos of Procopius of Gaza: The depiction of mythological themes in Palestine and Arabia during the fifth and sixth centuries”, in Brouria Bitton-Ashkelony and Aryeh Kofsky (eds.), *Christian Gaza in Late Antiquity*, Leiden and Boston: Brill, 2004, 209–234.

Tesei, Tommaso. “Heraclius’ War Propaganda and the Qur ān’s Promise of Reward for Dying in Battle”. *Studia Islamica* 114.2 (2019): 219–247.

Thompson, Trevor W. “Antinoos, The New God: Origen on Miracle and Belief in Third-Century Egypt”, in Tobias Nicklas and Janet E. Spittler (eds.), *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, Tubingen: Mohr Siebeck, 2013, 143–172.

Tybjerg, Karin. “Wonder-making and Philosophical Wonder in Hero of Alexandria”. *Studies in the History and Philosophy of Science* (2003): 34.3, 443–466.

Tybjerg, Karin. “Hero of Alexandria’s Mechanical Treatises: between Theory and Practice”, in Astrid Schürmann (ed.), *Physik/Mechanik. Geschichte der Mathematik und der Naturwissenschaften*, Stuttgart: Steiner, 2005, 204–226.

Ulrich, Roger. “Representations of Technical Processes”, in John Peter Oleson (ed.), *The Oxford Handbook of Engineering and Technology in the Classical Word*, Oxford: Oxford University Press, 2008, 62–90.

Van Belle, Gilbert. “The Criticism of the Miracles in the Fourth Gospel: A Reflection on the Ideological Criterion of the Semeia Hypothesis”, in Tobias Nicklas and Janet E. Spittler (eds.), *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, Tubingen: Mohr Siebeck, 2013, 302–321.

Varona, Patricia. “Chronographical Polemics in Ninth-Century Constantinople: George Synkellos, Iconoclasm and the Greek Chronicle Tradition”. *Eranos* 108 (2017): 117–136.

Vasiliev, Alexander A. “The Iconoclastic Edict of the Caliph Yazid II, A.D. 721”. *Dumbarton Oaks Papers* 9-10 (1956): 23–47.

Verheyden, Joseph. “Talking Miracles – Celsus and Origen in Dispute. The Evidence of contra Celsum I”, in Tobias Nicklas and Janet E. Spittler (eds.), *Credible, Incredible. The Miraculous in the Ancient Mediterranean*, Tubingen: Mohr Siebeck, 2013, 251–282.

Vitrac, Bernard. “Faut-il réhabiliter Héron d’Alexandrie? Faut-il réhabiliter Héron d’Alexandrie?”, in Jacques Jouanna, Michel Fartzoff, and Béatrice Bakhouche (eds.), *L’homme et la science. Actes du XVIe Congrès international et quinquennal de l’Association Guillaume Budé organisé à l’Université Paul-Valéry, Montpellier III, du 1er au 4 Septembre 2008*. Paris, Les Belles Lettres, 2011, 281-296.

Vogel, Karl. “Byzantine Science”, in Joan M. Hussey (ed.), *The Cambridge Medieval History 4/2*, Cambridge: Cambridge University Press, 1967, 264–305.

von Grunebaum, Gustav Edmund. “Byzantine Iconoclasm and the Influence of the Islamic Environment”. *History of Religions* 2.1 (1962): 1–10.

Walker, Brandon. “Performing Miracles: Discipleship and the Miracle Tradition of Jesus”. *Transformation* 33.2 (2016): 85–98.

Webb, Ruth. “The Aesthetics of Sacred Space: Narrative, Metaphor, and Motion in ‘Ekphraseis’ of Church Buildings”. Dumbarton Oaks Papers 53 (1999): 59–74.

Worrell, William H. *The Coptic Manuscripts in the Freer Collection*. New York: Macmillan, 1923.