Translations from Greek into Latin and Arabic during the Middle Ages: Searching for the Classical Tradition

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Byzantium's relationship with what we call "the classical tradition" is central to the development of its civilization and has been extensively discussed by Byzantinists for a number of reasons: since the fifteenth-century Renaissance, European interest in Byzantium was spurred by research on classical antiquity, and Byzantine literary culture was generally treated as a warehouse from which to retrieve information on ancient texts.[1] In addition, Byzantine studies as a modern academic discipline was formed around the end of the nineteenth and the beginning of the twentieth century, when the classical tradition was understood as a constituent part of modern Western culture, while ancient Greece and Rome served as political and aesthetic paradigms for the world's industrialized nations.[2]

Unquestionably, a proper appreciation of Byzantine writing, both belletristic and technical, requires a thorough familiarity with the classical tradition: a select but still extensive part of ancient Greek literary production continued to be studied throughout the Byzantine period, and several high-style Byzantine compositions from the fourth until the fifteenth century successfully reproduced the linguistic register of works dating between the fifth century BC and the second century AD.[3] Yet modern familiarity with the ancient classics until relatively recently

[1] On the search for the classical tradition as a gateway to Byzantine studies, see the introduction in George Ostrogorsky, *History of the Byzantine State* (New Brunswick, NJ, 1969), 1–2, outlining the history of Byzantine studies as a discipline; more recently, see Elisabeth Jeffreys et al., "Byzantine Studies as an Academic Discipline," in *The Oxford Handbook of Byzantine Studies*, ed. Elisabeth Jeffreys et al. (Oxford, 2008), 3–20, at 14.

[2] The bibliography on the reception of the classical tradition from the Middle Ages to the twentieth century is extensive and has been growing fast during the last decade; some recent examples: Lorna Hardwick and Christopher Stray, eds., *A Companion to the Classical Tradition* (Malden, MA, 2008); Craig W. Kallendorf, ed., A *Companion to Classical Receptions* (Malden, MA, 2007); Judith P. Hallett and Christopher Stray, eds., *British Classics outside England: The Academy and Beyond* (Waco, 2009); Caroline Winterer, *The Culture of Classicism: Ancient Greece and Rome in American Intellectual Life, 1750–1900* (Baltimore, 2002); Winterer, *The Mirror of Antiquity: American Women and the Classical Tradition, 1750–1900* (Ithaca, 2007).

[3] Predictably, several observations on medieval Latin literature in Jan M. Ziolkowski, "Middle Ages," in Hardwick and Stray, eds., *A Companion to the Classical Tradition*, 17–29, also apply to high-style Byzantine literature. Christian authors, both in the Latin "West" and in the Greek "East," developed various modes of appropriating pagan texts: they studied them with circumspection or accommodation and reassembled classical elements in ways that suited Christian beliefs and aesthetics, for example, by composing centos or by investing pagan ideas with allegorical meaning. Classicism was an educational goal that involved pursuing a primarily linguistic ideal. The learned and vernacular traditions existed in communication with one another, which means that elements of classicism may be found in both. For example, heroes of the classical repertoire, such as Alexander, appear in prolific medieval vernacular narratives. Ancient visual art clearly influenced its medieval counterpart.

commonly resulted in understanding Byzantine literary production as an inferior imitation of its ancient Greek counterpart that lacks originality and creativity.[4] Byzantinists have debated in which way and how much of the classical tradition was absorbed by Byzantium. Some have highlighted that Byzantium preserved it—a fortuitous event, since it was "a prerequisite for Western renascence";[5] others have refuted such claims, primarily because they imply continuity between the ancient and the medieval world.[6] The third possible approach to the problem, namely to map the variegations in Byzantium's understanding of the classical tradition in the course of its millennial history, has also been undertaken.[7] However, in spite of such extensive discussions by Byzantinists, it is telling that some of the most recent publications on the later reception of the classical tradition largely ignore the Greek-speaking world.[8] This is symptomatic of the overall

Throughout the Middle Ages, the cultural pillars of the literate included not only the classical tradition, but also the biblical and patristic heritage of Christianity.

[4] See, for example, the negative assessments of Byzantine literature by Romilly Jenkins, "The Hellenistic Origins of Byzantine Literature," *Dumbarton Oaks Papers* 17 (1963): 37–52; and by Cyril Mango, *Byzantine Literature as a Distorting Mirror: An Inaugural Lecture Delivered before the University of Oxford on 21 May, 1974* (Oxford, 1975), 3–18; repr. in Cyril Mango, *Byzantium and Its Image* (London, 1984); for an overview of earlier negative criticism of Byzantine literature, including but not limited to its relation with the classical tradition, see Margaret Mullett, "New Literary History and the History of Byzantine Literature: A Worthwhile Endeavor?," in Paolo Odorico and Panagiotis A. Agapitos, eds., *Pour une nouvelle histoire de la littérature byzantine: Problèmes, méthodes, approches, propositions. Actes du Colloque international philologique, Nicosie, Chypre, 25–28 mai 2000* (Paris, 2002), 37–60. For a call for a more nuanced understanding of the relation between Byzantine literature and its ancient counterpart, see Jan Olof Rosenqvist, *Die byzantinische Literatur vom 6. Jahrhundert bis zum Fall Konstantinopels 1453* (Berlin, 2007), 196–201. For an example of nuanced understanding, see Stéphanos Efthymiadis, "Le 'premier classicisme byzantin': Mythes grecs et reminiscences païennes chez Photios, Léon VI le Sage et Aréthas de Césarée," in *Pour l'amour de Byzance: Hommage à Paolo Odorico*, ed. Christian Gastgeber, Charis Messis, Dan Ioan Mureşan, et Filippo Ronconi (Frankfurt am Main, 2013), 99–114.

[5] Herbert Hunger, "The Classical Tradition in Byzantine Literature: The Importance of Rhetoric," in *Byzantium and the Classical Tradition*, ed. Margaret Mullett and Roger Scott, 35–47; Hunger, "On the Imitation of Antiquity (μίμησις) in Byzantine Literature," *Dumbarton Oaks Papers* 23 (1969–70): 15–38.

[6] For an attack on the idea that Byzantium preserved the classical tradition, which is traced to the nineteenth century, see Cyril Mango, "Discontinuity with the Classical Past in Byzantium," *Byzantium and the Classical Tradition* (Birmingham, UK, 1981), 48–57; Mango proposes instead that the outlook of the average Byzantine was not defined by "classical antiquity as we understand it, but by a construct of the Christian and Jewish apologists built up in the first five or six centuries AD. This body of doctrine was very consistently worked out and its ingredients were mostly biblical with an admixture from other sources, both classical and oriental, but always subordinated to the teachings of the Bible. By giving universal currency to this view of the world, Byzantium achieved its distinctive place in the history of thought" (57).

[7] The most recent book-length contribution along these lines is by Anthony Kaldellis, *Hellenism in Byzantium: The Transformations of Greek Identity and the Reception of the Classical Tradition* (Cambridge, UK, 2007).

[8] Kallendorf, ed., *A Companion to the Classical Tradition*, includes a chapter on the Latin Middle Ages but omits Byzantium and the post-Byzantine period; Hardwick and Stray, eds., *A Companion to Classical Receptions*, includes an article on the fourth-century Greek father Basil of Caesarea and his views on Greek tragedy but nothing further on the Byzantine millenium; Hallett and Stray, eds., *British Classics outside England*, omits Greece.

marginalization (frequently through orientalization) of Byzantium in modern narratives of European or world history that Byzantinists have begun to discuss since not very long ago.[9] To a certain extent it also reflects a, until recently, widely held view that Byzantium preserved a fossilized version of its classical heritage without creative elaboration—a position that potentially facilitates the retrieval of ancient Greek literature out of Byzantine manuscripts, as it simplifies the process of identifying and removing Byzantine interventions from the body of ancient texts.[10]

The importance attributed to the classical tradition in shaping Western modernity as it was understood towards the end of the nineteenth and the beginning of the twentieth century also generated an interest in the medieval translations of Greek works into Arabic and Latin, works that were mostly technical and belonged to the fields of philosophy and science. These translations were inventoried and their significance was discussed in works on cultural history, philosophy, and science,[11] which agreed with one another because they were inspired by the same zeitgeist and used mostly the same body of primary and secondary literature (based on its availability in modern editions and translations). Although an exhaustive account of how various ideas on the history of medieval science and philosophy were developed and disseminated in scholarly publications is beyond the scope of the present essay, a brief overview of a few older influential publications in English and other Western European languages is necessary before providing any new discussion of Byzantium's role in the preservation and transmission of the classical tradition to the Arabic and Latin Middle Ages.

The influence of Edward Gibbon's *Decline and Fall of the Roman Empire* (London, 1776–88) on the writing of medieval history (whether of the Latin- or Greek-speaking world), including histories of medieval philosophy and science, in the course of the nineteenth and early twentieth century is hard to exaggerate. Its lasting popularity was not simply a reflection of its author's literary talent, but was especially due to his extensive references to primary sources that could securely guide any future inquiry into the same period. Gibbon remained standard reading among the intellectual and political elite of the British Empire during the end of the nineteenth and the beginning of the twentieth century[12] and greatly influenced

[9] E.g., Averil Cameron, *The Byzantines* (Malden, MA, 2006), 47.

[10] A characteristic example of this attitude in modern classical scholarship is the use of the voluminous output by the twelfth-century author John Tzetzes as a source of information on ancient writers and texts without consideration of what his own agenda may have been, and in which ways it may have colored his selection and presentation of information on Greek antiquity.

[11] The nineteenth- and early twentieth-century catalogs of medieval translations from Greek into Arabic and Arabic into Latin remain useful research tools. For Greek into Arabic, see Moritz Steinschneider, *Die arabischen Übersetzungen aus dem griechisch* (Graz, 1960), originally published in installments in various periodicals between 1889 and 1896 and reprinted in a single volume in 1960; Steinschneider, *Die europäischen Übersetzungen aus dem arabischen bis Mitte des 17. Jahrhunderts* (Graz, 1957), originally published in installments in 1904–5. For the translations from Arabic into Latin, see also the earlier catalog by Ferdinand Wüstenfeld, *Übersetzungen arabischer Werke in das lateinische seit dem XI. Jahrhundert*, Abhandlungen der königlichen Gesellschaft der Wissenschaften zu Göttingen 22/5 (1877).

[12] See the introduction to *Edward Gibbon and Empire*, ed. Rosamond McKitterick and Edward Qinault (Cambridge, UK, 1997), 8–10.

the composition of the eight-volume *Cambridge Medieval History* (1911–36, with subsequent reprints into the 1950s and 1960s), which had been planned by the editor of his work, J. B. Bury.[13] Reflecting the pace at which Byzantine studies developed as an independent academic discipline in Britain, the fourth volume, originally entitled *The Eastern Roman Empire, 717–1453*, received a two-volume second edition in 1967, this time called *The Byzantine Empire* and edited by Joan M. Hussey. It included a chapter on the history of Byzantine science by Kurt Vogel, which to this day remains useful for its breadth and extensive bibliographic coverage, especially given the dearth of modern publications on the subject.[14] Its assessment of Byzantine science reads as follows: "Byzantium is important in the history of science . . . not because any appreciable additions were made to the knowledge already attained by the Greeks of the Hellenistic era, but because the Byzantines preserved the solid foundations laid in antiquity until such time as the Westerners had at their disposal other means of recovering this knowledge."[15]

Another important reference work (itself influenced by Gibbon) was Karl Krumbacher's *Geschichte der byzantinischer Literatur* (1891), a foundational document for Byzantine studies as a modern discipline. It was conceived as part of the well-known (and still ongoing) German series of *Handbücher* begun in 1885 to aid the systematic study of classical antiquity.[16]

The cornerstone for the development of the history of science as a modern discipline was laid down by George Sarton with his multivolume *Introduction to the History of Science* (1927–48), which covers all geographic locations around the globe from the eighth century BC to the fourteenth century AD.[17] Since it would have been impossible to write directly out of the primary sources, Sarton designed it as a guide into future lines of inquiry. Accordingly, he discussed Byzantine science through a limited number of primary sources with the help of Krumbacher's manual, the most up-to-date reference work on Byzantine literary culture at the time. Many of Sarton's ideas on the content and significance of Islamic science (in which he was so vividly interested that he eventually studied Arabic in order to gain firsthand knowledge)[18] were derived from Lucien Leclerc's

[13] *The Cambridge Medieval History, planned by J. B. Bury*, ed. H. M. Gwatkin et al., 8 vols. (Cambridge, UK, 1911–36); on Gibbon's influence, see ibid., 2:vi.

[14] Kurt Vogel, "Byzantine Science," in *Cambridge Medieval History*, 2nd ed., ed. Joan M. Hussey (Cambridge, UK, 1967), 4/2:264–305.

[15] Vogel, "Byzantine Science," 264.

[16] Karl Krumbacher, *Geschichte der byzantinischen Literatur von Justinian bis zum Ende des oströmischen Reiches (527–1453)*, Handbuch der klassischen Altertumswissenschaft, vol. 9/1 (Munich, 1891).

[17] George Sarton, *Introduction to the History of Science*, 3 vols. in 5 (Baltimore, 1927–48). On how this work was conceived and carried out during Sarton's career, see Eugene Garfield, "The Life and Career of George Sarton: The Father of the History of Science," *Journal of the History of the Behavioral Sciences* 21 (1985): 107–17. René Taton, *Histoire générale des sciences*, 3 vols. in 5 (Paris, 1957–64), cannot compare with Sarton's *Introduction* because, as the product of many different authors, it lacks coherence. Within it, Jean Théodorides, "La science byzantine," 1:490–502, omits several important figures and developments, does not offer any considered reflection of primary source material, includes only a few lines of bibliography, and lacks footnotes. The role ascribed to Byzantium in this essay is the preservation of the classical tradition.

[18] See Sarton, *Introduction*, 1/1:vi.

Histoire de la médicine arabe (1876), which emphasized the medieval translations of Greek materials into Arabic, and from Arabic into Latin, as foundational to the development of Western science.[19] Sarton also made frequent reference to Ernest Renan's *De philosophia peripatetica apud Syros* (Paris, 1853), which highlighted the importance of Syriac speakers as links between Greek and Arabic philosophy on the basis of Syriac manuscripts that had been recently acquired by the British Museum.[20]

At around the same time, medieval translations of ancient Greek works into Latin were discussed in Lynn Thorndike's multivolume *History of Magic and Experimental Science* (New York, 1923–58). Thorndike explicated what antiquity and the Middle Ages defined as science partly by focusing on its philosophical background and in this way responded to the streak of Enlightenment thought (also represented by Gibbon) that considered magic and divination as superstition. Though the work is not couched in polemical terms, Thorndike's footnotes occasionally reveal detailed knowledge of Gibbon.[21] A concurrent important contribution was Charles Homer Haskins's *Studies in the History of Medieval Science* (1924), the conclusions of which were further popularized in his *The Renaissance of the Twelfth Century* (1927). Although Haskins was not its inventor, he certainly was the greatest propagator of the idea that the Latin twelfth century represented a period of cultural renewal presaging modernity, a period in which a recovery of the ancient classics was instrumental.[22]

As far as histories of philosophy are concerned, Bertrand Russell's *History of Western Philosophy*, first published in 1945, is perhaps the most famous. Russell received the 1950 Nobel prize for literature mostly on account of this work,[23] which aimed to convey a history of philosophy connected with broader political and cultural developments in each era. This required a historical framework drawn from existing scholarly publications. For its medieval part, Russell's sparse footnotes indicate his extensive use of Gibbon and the *Cambridge Medieval History*.

Further works, also written for the larger educated public, helped disseminate these earlier interpretations of literary and intellectual history. Special mention should be made of the eleven-volume series by Will and Ariel Durant, *The Story*

[19] Lucien Leclerc, *Histoire de la médecine arabe: Exposé complet des traductions du grec. Les sciences en orient. Leur Transmission à l'occident par les traductions latines*, 2 vols. (Paris, 1876).

[20] The idea that during the second half of the seventh century the most important work was accomplished in Syriac, expressed in Sarton, *Introduction*, 1/1:488–90, goes back to Renan.

[21] E.g., Thorndike, *History of Magic*, 1:285, mentions Gibbon's reliance on Ammianus Marcellinus in spite of the latter's attachment to divination.

[22] A handy summary of the role played by the medieval translations of Greek material into Latin can be found in Charles Homer Haskins, *The Renaissance of the Twelfth Century* (Cambridge, MA, 1927), 278–303; for a critique of Haskins's ideas and their reception in later scholarship, see Bernard McGinn, "Renaissance, Humanism, and the Interpretation of the Twelfth Century," *The Journal of Religion* 55/4 (1975): 444–55.

[23] Bertrand Russell, *A History of Western Philosophy, and Its Connection with Political and Social Circumstances from the Earliest Times to the Present Day* (New York, 1945). This work was explicitly mentioned in the award presentation speech by the permanent secretary of the Swedish Academy. See http://www.nobelprize.org/nobel_prizes/literature/laureates/1950/press.html, retrieved 10 October 2013.

of Civilization (New York, 1935–75), which won its authors a Presidential Medal of Freedom in 1977. The fourth volume (*The Age of Faith*, 1950) explores the period between Constantine the Great and Dante in Western Europe, the Islamic world, Byzantium, and among the Jews in the East and West.[24] It is carefully researched and its footnotes and bibliography reference Gibbon, Haskins, and Sarton.

With the help of these and other publications, the medieval and early modern reception of the classical tradition into Arabic and Latin has been fashioned into a history of Western thought that can be summarized approximately as follows: the sciences were born in the ancient Near East, from which place the ancient Greeks received and developed them further and also gave birth to philosophy. Science and philosophy flourished in the Graeco-Roman world until the end of antiquity, when they entered a state of decline in Greek and Latin Christendom.[25] However, after the Arab conquests of the seventh century, they were received by the Muslims, mainly through the ninth- and tenth-century translations of Greek texts

[24] Will Durant, *The Age of Faith: A History of Medieval Civilization—Christian, Islamic, and Judaic—from Constantine to Dante: A. D. 325–1300* (New York, 1950).

[25] The sense that the Greek-speaking East was in decline during the period between the seventh and the ninth centuries, which older scholarship considered as a "dark age," can be traced to concrete statements by Gibbon and their repetition in Krumbacher, *Geschichte der byzantinischen Literatur*, and Alexander Vasiliev, *Histoire de l'empire byzantin* (Paris, 1932), both of which were widely consulted reference books into the second half of the twentieth century: see Stelios Lampakes, "Παρατηρήσεις σχετικὰ μὲ τὶς ὄψεις τῆς ἀρχαιογνωσίας στὸ ἔργο τοῦ Ἰγνατίου Διακόνου" [Remarks on aspects of the knowledge of antiquity in the work of Ignatius the Deacon], in *The Dark Centuries of Byzantium (7th–9th c.)*, ed. Eleonora Kountoura-Galake (Athens, 2001), 109–32, at 109. On the revision of this idea in more recent scholarship, see Maria Mavroudi, "Greek Language and Education under Early Islam," in *Islamic Cultures, Islamic Contexts: Essays in Honor of Professor Patricia Crone*, ed. Behnam Sadeghi, Asad Q. Ahmed, Robert Hoyland, and Adam Silverstein (Leiden, 2015), 295–342, esp. 896–98 and 319–20. The decline of philosophy in the Latin-speaking world is mentioned in Russell, *History of Western Philosophy*, 375. Russell clearly characterizes as "Dark Ages" the four centuries between two important popes, Gregory the Great to Sylvester II (sixth to tenth centuries), 388–400. This is consonant with the decline of science in the Latin-speaking world in the seventh century, as pointed out in *Cambridge Medieval History*, 3:485–538, which deemed Boethius as the last spark before three centuries of darkness until the Carolingian Renaissance. More recently, a lack of philosophical and scientific achievement in Latin after the sixth century is implied in the selection of anthologized texts in Edward Grant, ed., *A Source Book of Medieval Science* (Cambridge, MA, 1974), which skips from Boethius, Macrobius, and Isidore of Seville to authors of the twelfth century and beyond. A revision is evident in more recent scholarship: Jacques Fontaine, "Education and Learning," in *The New Cambridge Medieval History, 500–700*, ed. Paul Fouracre et al., 7 vols. (Cambridge, UK, 1995–2005), 1:735–59, traces the arguments for a violent break in education and culture after the overthrow of the last emperor of the West in 476 to Gibbon and the beginning of its reasoned reversal to Pierre Riché, *Education et culture dans l'Occident barbare* (Paris, 1962). Accordingly, Fontaine argues in favor of a transformation of culture from pagan to Christian instead of the disappearance of culture in the Latin West; yet for the Byzantine Empire he accepts Gibbon's view by depicting a "veritable rupture of cultural traditions" there in the course of the seventh century. A further argument for "some degree of continuity" between the fifth and the eighth centuries in the West is made by Rosamond McKitterick, "Eighth-Century Foundations," in *New Cambridge Medieval History*, 2:681–94; she concentrates on the period before 780, offers manuscript counts, and argues that accidents of survival have made our idea of this period worse than it really is.

into Arabic (sometimes via Syriac intermediaries).[26] This translation movement is thought to have also inspired original contributions until the Islamic world's decline from the end of the eleventh century onwards.[27] This time the rescuer was medieval Europe, where Graeco-Roman philosophy and science were repatriated through a wave of translations and adaptations from Arabic into Latin.[28] This reception was enhanced and placed on a firmer footing in the late fourteenth and especially the fifteenth century, when Byzantine intellectuals arrived in Western Europe, bringing manuscripts of the ancient authors; in this way, the Europeans were able to retrieve Greek philosophy and science directly from its surviving originals without an Arabic intermediary. The facilitation of this final and irrevocable migration of philosophy and science to Western Europe is deemed as Byzantium's last (and perhaps most important) contribution to the development of modern "Western" culture.[29]

[26] A reference work conveying and disseminating the idea, frequently repeated elsewhere in scholarship, that Islamic science is the link between ancient and modern Western science is Aldo Mieli, *La science arabe et son rôle dans l'évolution scientifique mondiale* (Leiden, 1939); for stock taking of earlier work on Islamic science that helped build such an assessment, see E. J. Holmyard, "Islam's Contribution to Science," *Nature* 145 (1940): 4–5. On the importance of the Syriac-speaking translators, see Edward Gibbon, *The Decline and Fall of the Roman Empire*, 6 vols. (London, 2000), 5:408; Russell, *History of Western Philosophy*, 423.

[27] On the older identification of the eleventh century as the beginning of decline in Islamic intellectual history, and argumentation to move "decline" to the sixteenth century, see George Saliba, *Islamic Science and the Making of the European Renaissance* (Cambridge, MA, 2007); for references to earlier periodizations and discussion of Saliba's thesis, see the helpful reviews by Michael Shank, *Aestimatio* 6 (2009): 63–72, and John Walbridge, *Early Science and Medicine* 12/4 (2007): 440–42.

[28] The contours of this narrative are discernible in Gibbon, *Decline and Fall*, 5:402–09, where his footnotes provide its intellectual genealogy. Its outline can also be found in Haskins, *The Renaissance of the Twelfth Century*, 278–84, where, however, the immediate origins of European letters and science are assigned to Greece, from which place they passed to Rome. The importance of the translations from Arabic into Latin done in Spain was emphasized by Ernest Renan, *Averroès et l'averroïsme: Essai historique*, 2nd ed. (Paris, 1861), 200–204; it is also discussed in Charles Homer Haskins, *Studies in the History of Medieval Science* (Cambridge, MA, 1924), 3–5, who talks about "a large body of science and philosophy derived directly from the Greek" (5), a topic he explores further (141–240); yet he insists that "the broad fact remains that the Arabs of Spain were the principal source of the new learning for Western Europe" (5). Although Haskins made an effort to systematically discuss the twelfth-century translations from Greek into Latin, which he deemed important, he could not outline their diffusion and influence, due to "our fragmentary knowledge of conditions in the [Italian] South," where many of the translators had been active (153–54). Durant, *The Age of Faith*, 249, summarized things as follows: "In philosophy, as in science, Islam borrowed from Christian Syria the legacy of pagan Greece, and returned it through Moslem Spain to Christian Europe." David Luscombe, "Thought and Learning," in *New Cambridge Medieval History*, 4/1:461–98, provides a brief account of the twelfth-century translations from Greek and Arabic into Latin but views them as "the resurrection and rediscovery of older materials" (484), and not so much as an effort on the part of the translators and their readers to take account of their contemporary Byzantine or Arabic science. Contrary to Haskins, who considered the twelfth-century translations from Arabic and Greek as central to Latin culture at the time, Luscombe considers them only incidental and remarks that "alongside the process of rediscovery lies a broader process of renewal" (484).

[29] The concluding lines in Ostrogorsky, *History of the Byzantine State*, 572, read as follows: "The Byzantine state was the instrument by means of which Graeco-Roman antiquity survived through the ages, and for this reason Byzantium was the donor, the West the recipient. This was particularly true at the time of the renaissance, when there was such passionate interest in classical civilization and the West found that it could satisfy its longing to explore the treasures of antiquity from Byzantine

As we have seen, the articulation of this narrative took place approximately between the middle of the nineteenth to the middle of the twentieth century, a period that coincides with the expansion and eventual contraction of European colonialism in the Middle East and can be viewed as one of its ideological components,[30] since it provides a historical explanation for modern European economic and political supremacy.[31] One of its paradoxes is that, in its imagined geography, the Greek-speaking world is deemed as "Western" in antiquity but "Eastern" in the medieval period.[32] It largely remains in place in our postcolonial times because

sources. It saved from destruction Roman law, Greek literature, philosophy, and learning, so that this priceless heritage could be passed on to the peoples of western Europe who were now ready to receive it." This is the most widely read introduction to Byzantine studies in the second half of the twentieth century in many European languages. It has achieved the status of a "classic" in the field, for which reason it continues to be read and used for instruction: the tenth paperback printing of the English translation was in 2009.

[30] The discussion of the interaction between Greek thought and Arabic culture was clearly understood as colonialist in the Arab world during the time of European colonial expansion; see, for example, the reactions of the Egyptian students to the teaching of European orientalists at Cairo University in the year 1911 in Donald M. Reid, "Cairo University and the Orientalists," *International Journal of Middle East Studies* 19 (1987): 51–76. On the ideological uses of the Graeco-Roman past during the time of British colonization in Egypt, see Donald M. Reid, *Whose Pharohs? Archeology, Museums, and Egyptian National Identity from Napoleon to World War I* (Berkeley, 2002), 139–71; on the introduction of the Greek and Latin classics to Egypt and the Arab world as part of a larger political project of Western-Oriental modernization, see Ahmed Etman, "Translation at the Intersection of Traditions: The Arab Reception of the Classics," in *Companion to Classical Receptions*, 141–52. On Greek and Latin weighing heavier than Arabic and Sanskrit in the examinations for British civil service and their role in excluding Indians from recruitment to these extremely lucrative positions, see Phiroze Vasunia, "Greek, Latin, and the Indian Civil Service," *British Classics outside England*, 61–93; on the civilizing authority commanded by classics in the system of education prevalent in the British colonies in the Carribean towards the middle of the twentieth century and the use of Periclean Athens as a model of self-governance in Trinidad, see Emily Greenwood, "Between Colonialism and Independence: Eric Williams and the Uses of Classics in Trinidad in the 1950s and 1960s," *Companion to Classical Receptions*, 98–112.

[31] On the mentality, prevalent since the nineteenth century but already present in the eighteenth, that technology and science were instrumental to European supremacy, see Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Ithaca, 1989), 3–16. On the political motivation behind investigating "non-Western" science as ultimately contributing to an identifiable "Western" science that is unique and only arose in early modern Europe, see the polemics between George Saliba and Toby Huff in the following publications: George Saliba, "Seeking the Origins of Modern Science?," *Bulletin of the Royal Institute for Inter-Faith Studies* 1/2 (1999): 139–52; Toby E. Huff, "The Rise of Early Modern Science: A Reply to George Saliba," *Bulletin of the Royal Institute for Inter-Faith Studies* 4/2 (2002): 115–28; Saliba, "Flying Goats and Other Obsessions: A Response to Toby Huff's 'Reply'," ibid., 129–41; Huff, "Review of George Saliba, *Islamic Science and the Making of the European Renaissance*," *Middle East Quarterly* 15/4 (2008): 77–79.

[32] See, for example, Jorge J. E. Garcia, "Philosophy in the Middle Ages: An Introduction," in *Companion to Philosophy in the Middle Ages*, ed. Jorge J. E. Garcia and Timothy B. Noone (Malden, MA, 2003), 2: "Territorially, we need to include not only Europe, but also the Middle East, where important Greek orthodox, Jewish, and Islamic authors flourished." Among a total of 138 authors discussed in the volume, Greek Orthodox are only three: John Philoponus, Maximus the Confessor, and Pseudo-Dionysius the Areopagite. Among them, John Philoponus was posthumously condemned as a heretic on account of his theological interpretation of the Christian trinity; see Christian Wildberg, "John

of its power to explain the shape of the world until recently, but also because even apologists for Byzantium and the Islamic world (which are ultimately marginalized by its implications) find it expedient. For example, Islam's role as foundational to late-medieval and early modern European science continues to be used in order to counter negative evaluations of Islamic civilization as a whole. Similarly, "Oriental" Byzantium, though largely viewed as irrelevant to broader world history, is given an active role in "Western" cultural developments of the early modern period.

At the beginning of the twenty-first century, our understanding of the economic, political, and social history that furnished the background in which this narrative used to fit has changed, in many cases significantly.[33] However, it remains unclear how the history of philosophy and science can be accommodated to this new framework, while Byzantium's literary production continues to be ignored in recent approaches to the history of the Middle Ages. For example, the most recent *Cambridge History of the Byzantine Empire, c.500–1492* (2008) contains no chapter on Byzantine literary culture, although the *New Cambridge Medieval History* (1995–2005) is interspersed with such chapters on its medieval Latin counterpart. Byzantium is also largely absent from general histories of philosophy and science, including those that appeared within the last decade. For example, Anthony Kenny's *Medieval Philosophy* (2005), a remarkably clear and useful reference work, largely ignores developments in Byzantine philosophy except for its fifteenth-century encounter with Italian philosophy as a result of the council of Ferrara-Florence (1437–39) and essentially reiterates the conclusion to the narrative on the history of philosophy and science outlined above: the fall of Constantinople to the Ottomans in 1453 "led to an influx of refugees, bringing with them not only their own knowledge of classical Greek but also precious manuscripts of ancient authors."[34] The possibility that these refugees also contributed their own interpretations of ancient authors, developed within a Byzantine hermeneutical tradition, is not entertained.[35]

More recently, the two-volume *Cambridge History of Medieval Philosophy* (2010) makes a conscious effort to include Byzantine philosophy, as is evident from Katerina Ierodiakonou's chapter entitled "Byzantium," which points out that the Byzantines copied the works of ancient philosophy not to preserve them but to study and reflect on them, and therefore philosophical activity in Byzantium must have existed at least from the ninth century onwards (the date of the earliest

Philoponus," *The Stanford Encyclopedia of Philosophy* (Fall 2008 Edition), ed. Edward N. Zalta, retrieved 11 November 2014, from http://plato.stanford.edu/archives/fall2008/entries/philoponus/.

[33] See also the remarks in Maria Mavroudi, "Occult Science and Society in Byzantium: Considerations for Future Research," in *The Occult Sciences in Byzantium*, ed. Paul Magdalino and Maria Mavroudi (Geneva, 2006), 51–53.

[34] Anthony Kenny, *Medieval Philosophy* (Oxford, 2005), 109; this is vol. 2 of Kenny's *New History of Western Philosophy*, originally published in four separate volumes (Oxford, 2004–2007) and now reprinted in a single volume as Kenny, *A New History of Western Philosophy. In Four Parts* (Oxford, 2010), 339.

[35] See also the comments in Cameron, *Byzantines*, viii.

surviving philosophical manuscripts).[36] However, essays by other authors in the same volume do not take this conclusion on board. The contribution by Dimitri Gutas, titled "Origins in Baghdad," asserts that "philosophy died a lingering death before Islam appeared" and credits the philosopher al-Kindī (c.800–c.870) for resurrecting it with the help of the products of the Greek-into-Arabic translation movement which had been jump-started, after the death of living philosophy in Greek, through "its physical remains in the form of manuscripts and libraries" and the "much reduced, enfeebled, and diluted philosophical curricula and theological applications" of philosophy.[37] In the same volume, John Marenbon's chapter, "The Emergence of Medieval Latin Philosophy," places its beginnings in the eighth century at the court of Charlemagne.[38] Readers of these essays immediately realize that around the year 800 we have evidence of philosophical activity in Latin, Greek, and Arabic. Still, no essay in the volume reflects on this remarkable coincidence and what it may mean for medieval philosophy at large or attempts a comparison or an integrated discussion of philosophical ideas in all three languages. We can be grateful that the volume provides the source materials through which to attempt this in the future through its thematic discussion of major problems in medieval Latin, Arabic, and Hebrew philosophy, as well as its appendices that list medieval Latin translations of Greek Aristotelian works and Greek philosophical and patristic works more widely, as well as Greek translations of Latin philosophical works.[39]

The treatment of Byzantine science has fared equally poorly in modern scholarship. Besides the aforementioned work by Kurt Vogel, the only other available treatments are the chapters on music, mathematics and astronomy, the natural sciences, medicine, and military science in Herbert Hunger's 1978 successor to Krumbacher's manual on Byzantine literary production.[40] These chapters inventory known texts and authors and attempt to assess their role in a grander history of medieval science—however, given the state of the field, such assessments are inevitably limited in number and scope. A welcome recent contribution is Efthymios Nicolaidis's *Science and Eastern Orthodoxy: From the Greek Fathers to the Age of Globalization* (2011), although its interpretation of Byzantine science does not revise the long-held assumptions about it.[41]

[36] See Katerina Ierodiakonou, "Byzantium," *The Cambridge History of Medieval Philosophy*, ed. Robert Pasnau, 2 vols. (Cambridge, UK, 2010), 1:39–49.

[37] Dimitri Gutas, "Origins in Baghdad," *The Cambridge History of Medieval Philosophy*, 1:11–25, at 13.

[38] John Marenbon, "The Emergence of Medieval Latin Philosophy," *Cambridge History of Medieval Philosophy*, 1:26–38.

[39] Michele Trizio, "Greek Aristotelian Works Translated into Latin" and "Greek Philosophical Works Translated into Latin," *Cambridge History of Medieval Philosophy*, 2:793–801; John Demetrakopoulos, "Latin Philosophical Works Translated into Greek," ibid., 822–25.

[40] Herbert Hunger, *Die hochsprachliche profane Literatur der Byzantiner*, 2 vols. Byzantinisches Handbuch im Rahmen des Handbuchs der Altertumswissenschaft, 5. Teil (Munich, 1978).

[41] Efthymios Nicolaidis, *Science and Eastern Orthodoxy: From the Greek Fathers to the Age of Globalization*, trans. Susan Emmanuel (Baltimore, 2011). See the review by Maria Mavroudi, *Catholic Historical Review* 99/1 (2013): 96–99. Part of the problem is that the book, originally written in French, was substantially cut in the course of its translation for publication in English; it is hoped that

Two recent encyclopedias on medieval science, broadly conceived, largely ignore Byzantium.[42]

In order to fit the history of philosophy and science into our more recent understanding of the Middle Ages, it is hardly enough to undermine the assumptions and conclusions of earlier secondary literature. It is much more important to investigate the pertinent primary sources. In the case of Byzantium, this would require a major editorial effort because less than 5 percent of its surviving scientific and philosophical production has been published.[43] In addition, when the primary sources comment on the transmission of knowledge in their contemporary or earlier times, it is important for modern researchers to carefully reconstruct the universe of their authors in order to understand the reasons for the claims that the medieval sources make.[44]

Indeed, in spite of its problems, the grand narrative of the history of philosophy and science outlined earlier is not completely invented. Elements of it can be found in ancient, medieval, and Renaissance sources. The Egyptian and Babylonian origins of science are acknowledged, for example, by Ptolemy, Diodorus Siculus, and the Byzantine tradition of world chronicles.[45] The claim that philosophy and the sciences died out in Christian Byzantium and were transferred to the Islamic world can be found in a number of ninth- and tenth-century Arabic sources, edited and translated from the nineteenth century onwards and mostly taken at face value since.[46] However, Dimitri Gutas has explained that during the ninth to tenth centuries, a time of bitter military struggle with Byzantium in which the

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the French version will be published soon and will treat Byzantine science more comprehensively than the English version.

[42] *Medieval Science, Technology, and Medicine: An Encyclopedia*, ed. Thomas Glick, Steven J. Livesey, and Faith Wallis (New York, 2005), includes articles on medieval Latin and Arabic subjects, but its treatment of Byzantium is limited to a section on hospitals (226, the subject of a relatively recent monograph) and another one on Byzantine cosmography and administrative geography (189), in which the fifteenth-century philosopher Georgios Gemistos Plethon is called "an encyclopedist." In the *Biographical Encyclopedia of Astronomers*, ed. Thomas Hockey (New York, 2007), the only Byzantine figures that appear are those connected with the transmission of Islamic astronomy to Byzantium: Georgios-Gregory Chioniades, Theodore Metochites, and Nikephoros Gregoras.

[43] There is no "official" statistic on this; 5 percent represents my estimate through acquaintance with important manuscript catalogs and published texts (surveyed in Mavroudi, "Occult Science and Society in Byzantium," 39–46) as well as Byzantine manuscripts. It would be possible to recover Byzantine philosophy and science (as well as their Latin, Arabic, and Hebrew counterparts) by publishing not only treatises composed during the Byzantine period but also the marginal annotations made by Byzantine readers in important manuscripts of ancient philosophical and scientific texts.

[44] Many of the problems in studying medieval Latin philosophy outlined in Kenny, *Medieval Philosophy* xii–xiv (rpt. Kenny, *A New History of Western Philosophy*, 257–58), also apply to its Byzantine counterpart. Such shared problems include the inaccessibility of primary source material due to the dearth of modern editions and translations (which is even more acutely felt for Byzantine philosophy); the difficulty of the technical language involved; and modern prejudices on the distinction between philosophy and theology.

[45] For references to primary sources, see Mavroudi, "Occult Science and Society in Byzantium," 48.

[46] Key texts conveying this idea are al-Masʿūdī's tenth-century *Fields of Gold* (*Murūj al-dhahab*), readily accessible in Al-Masʿūdī, *Les prairies d'or*, ed. and trans. Charles Barbier de Meynard and Abel Pavet de Courteille, 9 vols. (Paris, 1861–1917), quoted by Sarton, *Introduction to the History of Science*, 1:637–38; Ibn al-Nadīm, *Kitāb al-fihrist*, ed. Gustav Flügel, 2 vols. (Leipzig, 1871–72), frequently cited by Sarton in his account of ancient Greek and medieval Islamic science; Ibn Abī

Arabs were loosing ground, philhellenism was used to express anti-Byzantinism. Arabic scholars presented themselves as having salvaged the pagan Greek heritage from a people whose conversion to Christianity represented such an ideological and political break from their glorious past that it was leading them to destroy its legacy.[47] Gutas has also clarified that Abbasid society appropriated Greek philosophy and science in order to address its own needs: namely, to negotiate a canonical version of Islam among the different possibilities available at the time; and to legitimize the ascent of the Abbasids to power, both as a dynasty and as individual monarchs.[48] For this reason, Islamic evaluations of Byzantine philosophy and science are not consistent, either in themselves or in how they relate to pagan antecedents, and can even be contradictory. Gutas analyzed a number of examples, most eloquent among which is the work of al-Jāḥiẓ (781–868), a prolific author and the chief panegyrist of the Abbasid regime.[49] In his *Book of Annals*,[50] al-Jāḥiẓ praises the Byzantines for their achievements in philosophy and various branches of science (medicine, astronomy and astrology, arithmetic), literary culture, diplomacy, and practical craft (architecture, carpentry). This praise implies a warning to fellow Muslims: although the Byzantines are generally an enlightened people, they are capable of following the patently irrational beliefs of Christianity. Likewise, the Muslims, also an enlightened people, run the risk of following irrational and unorthodox beliefs regarding their own religion, Islam. In a different text, an anti-Christian polemic titled *The Reply against the Christians*[51]—where the objective is to prove that neither they nor the Jews but only the Muslims posses philosophy (and therefore correct theology)—al-Jāḥiẓ denies that the Byzantines have any philosophy and science of their own; instead, he explains, they falsely appropriated the achievements of the ancient Greeks and pretend this wisdom is theirs, although the Byzantines are Christian and the ancient Greeks were pagan.[52]

Arguments along the same lines were repeated by several authors around the same time and into the next centuries; they eventually became a literary topos picked up from earlier tradition. Central is the insistence that Christianity as a religion and the Christian emperors as its institutional representatives were

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Uṣaybiʿa, *ʿUyūn al-anbāʾ fī ṭabaqāt al-aṭibbāʾ*, ed. A. Müller, 2 vols. (Cairo and Königsberg, 1882–84); Ibn al-Qifṭī, *Taʾrīkh al-ḥukamāʾ*, ed. Julius Lippert (Leipzig, 1903).

[47] Dimitri Gutas, *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early Abbasid Society, 2nd–4th/8th–10th Centuries* (London and New York, 1998), 83–95.

[48] This means legitimizing not only the violent overthrow of the previous dynasty, the Umayyads, but also the regime of Caliph al-Ma'mūn, who ascended the throne after committing fratricide and regicide.

[49] The contradiction was first noticed by Charles Pellat, "Al-Ǧāḥiẓ: Les nations civilisées et les croyanes religieuses," *Journal Asiatique* 255 (1967): 65–90; also expounded by Gutas, *Greek Thought, Arabic Culture*, 85–88.

[50] *Kitāb al-akhbār*.

[51] *Al-radd ʿalā al-naṣārā*; for references, see Gutas, *Greek Thought, Arabic Culture*, 87.

[52] Expounded in detail and with long quotations in Gutas, *Greek Thought, Arabic Culture*, 85–88.

inimical to philosophy and science and caused its destruction, for which reason these intellectual goods no longer exist among the Christians.[53]

This type of anti-Christian Muslim rhetoric appears to have received a tailor-made Byzantine response in at least one surviving Greek text: the *Life of Kosmas of Maiouma and John of Damascus* written in 842–43 by Michael the Synkellos, a Greek-educated Christian from Jerusalem who spent much of his life in Constantinople and belonged to the circle of patriarch Methodios. The *Life* partly contradicts information that we have from other sources and can be patently ahistorical and factually incorrect, so much so that it later received an official ecclesiastical condemnation.[54] This is due not to its author's incompetence but to its intention to serve a wide-ranging agenda that cannot be fully analyzed here. For the sake of the present argument suffice it to rehearse the beginning of the story: Kosmas is a Byzantine monk from Crete, well versed in Greek learning, who is captured by Arab pirates and brought to the emir of Damascus, a Muslim by the name of Mansur. At the time of Kosmas's arrival, Mansur's son (the future Saint John of Damascus) is said to be eight years old and something of an academic prodigy. When it becomes known that Kosmas is extremely learned in the wisdom of the Greeks (*ton Hellenon*, the standard term for pagan Greeks), Mansur's son implores his father to allow him to study with the Christian monk.

[53] Further examples from medieval Arabic sources down to the eleventh century are provided in Gutas, *Greek Thought, Arabic Culture*, 88–95; on the negative evaluations of Byzantine knowledge, especially when compared with its ancient Greek equivalent, as "one of the main themes of the Byzantine image" in Arabic narrative sources, see Nadia Maria El Cheikh, *Byzantium Viewed by the Arabs* (Cambridge, MA, 2004), 100–111 and 194–96. Other Arabic texts find no incompatibility between Christianity and philosophical learning—in fact, they expect to find pagan philosophical texts in Christian institutional custody. Two instances are discussed in Douglas Morton Dunlop, "The Translations of al-Biṭrīq and Yaḥyā (Yuḥannā) b. al-Biṭrīq," *Journal of the Royal Asiatic Society of Great Britain and Ireland* 3/4 (1959): 147–48. The first one can be found in the tenth-century biographical dictionary of physicians by Ibn Juljul, an author born and active in Córdoba, a Muslim state inimical to the Abbasids with whom Byzantium was fighting. Ibn Juljul quotes the narrative of a Christian translator of the late eighth or early ninth century, Yuḥannā b. al-Biṭrīq (or his son, whom the sources frequently confuse with his father because their names are similar) recounting his search for the *Politics* of Aristotle in an ancient temple; there, he found "a devout monk, very learned and understanding, to whom I made myself agreeable and employed finesse, until he gave me access to the volumes deposited in the temple. I found among them the object of my search, which the Commander of the Faithful instructed me to look for, written in gold. So I returned to the victorious presence [the caliph], possessing what I sought." Although the account has been dismissed as fanciful, it does indicate that Ibn Juljul's tenth-century readers expected learned monks to guard books in ancient temples (possibly converted to Christian temples, although the text does not directly say so). A second example is provided by the preface to the *Kitāb al-dhakhīrah* (*Book of the Treasure of Alexander*), a version of the Arabic mirror of princes known as the *Sirr al-asrār* (*Secretum secretorum* in its medieval Latin translation), which includes a collection of hermetic and divinatory texts. In the preface, which is attributed to the known astrologer Muḥammad b. Khālid, the author claims to have found the Greek original of the Arabic translation in a church in Amorium when that city fell to the Muslims in 838 and to have translated it from Greek and *rūmīyah* (the linguistic register of his contemporary Byzantine Greek) at the command of Caliph al-Muʿtaṣim (r. 833–42).

[54] On the historical context for the *Life*'s composition, see *Jean Damascène: La foi orthodoxe 1–44. Texte critique de l'édition B. Kotter (PTS 12)*, introd., trans., and notes by P. Ledrux with the collaboration of Vassa Kontouma-Conticello and G. M. de Durand, Sources Chrétiennes 535 (Paris, 2010), 15–17.

As the boy puts it to his father, he does not want to study only the books of the Saracens (*ton Sarakenon*) but also of the Greeks (*ton Hellenon*). The father gives permission for Kosmas to teach John, provided he will not attempt to convert the boy to Christianity. The point of the hagiographer is clear: the wisdom of the pagan Greeks is not to be distinguished from that of the Christians who still speak the same language.

A similar Byzantine response to the Muslim insistence that philosophy and science were dead among the Christians can be found in the *Life* of Constantine-Cyril, the apostle of the Slavs, which was composed soon after the saint's death in 859.[55] Chapter 6 discusses Constantine's embassy to the Arabs, on which he was dispatched by the Byzantine emperor at the young age of twenty-four and during which he debated with his hosts questions of theology, philosophy, and science. When asked how it was possible for him to know all that he did, he drew an analogy between the Muslim reaction to his erudition and the pride of someone who kept sea water in a wine skin and boasted of possessing a rare liquid. He finally encountered someone from a region by the sea, who explained that only a madman would brag about the contents of the wine skin, since people from his own homeland possessed an endless abundance of sea water. The Muslims are like the man with the wine skin and the Byzantines like the man from the sea because, according to the saint's concluding remark in his response, all learning emanated from Byzantium.[56]

In current scholarship, a more positive evaluation of Byzantine literature is under way: Byzantinists are making a greater effort to understand it in its own terms, rather than judging it as deficient, especially when compared with an idealized ancient Greek literature.[57] As for the junctures in the history of Western thought summarized earlier, the current consensus views the period from the seventh to the ninth century as less dark than previously portrayed. We now believe that literary production did not disappear during this time but only changed in content:

[55] A considerable volume of modern secondary literature that cannot be detailed here has discussed where, when, and by whom the hagiographical dossier on Constantine-Cyril may have been put together. For the purposes of the present argument, suffice it to emphasize the following: there is solid evidence that the Slavic text, such as it survives in a number of mostly much later manuscripts, rests on an important Greek substratum, as is clear from the several untranslated Greek words, the Slavic expressions that are closely modeled after Greek ones, and the proven dependence on a Greek source of the verses inscribed on the Chalice of Solomon from which the saint elicited a prophecy; see Ihor Ševčenko, "The Greek Source of the Inscription on Solomon's Chalice in the *Vita Constantini*," in *To Honor Roman Jakobson: Essays on the Occasion of His Seventieth Birthday* (The Hague, 1967), 1806–17, and reprint in idem, *Byzantium and the Slavs in Letters and Culture* (Cambridge, MA, 1991), 285–98. For a recent summary of earlier scholarship, see Antonios-Aimilios N. Tachiaos, *Kyrillos kai Methodios: Oi archaioteres biographies ton Thessalonikeon Ekpolitiston ton Slavon* (Thessaloniki, 2008), 7–44.

[56] For a translation of this passage into Italian, see Marcello Garzaniti, "Le vite Paleoslave di Cirillo e Metodio," in Anthony-Emil N. Tachiaos, *Cirillo e Metodio: Le radici cristiane della cultura slava* (Milan, 2005), 180–81.

[57] Summarized by Margaret Mullett, "No Drama, No Poetry, No Fiction, No Readership, No Literature," in *A Companion to Byzantium*, ed. Liz James (Malden, MA, 2010), 227–38. See also Catherine Holmes, "Written Culture in Byzantium and Beyond: Contexts, Contents and Interpretations," in *Literacy, Education and Manuscript Transmission in Byzantium and Beyond*, ed. Holmes and Judith Waring (Leiden, 2002), 1–32.

it became more religious, which reflected the decline of urban centers (the hubs of "secular" education in late antiquity), the social need for solace from religion in a world of uncertainty, and the new importance of monasteries as centers of literary production.[58] We are also prepared to accept that most writings by iconoclast authors were lost due to their later condemnation as, for example, the lives of iconoclast saints or the works of the learned patriarch John the Grammarian.[59] Some of us discern a certain hostility to "secular learning" in the seventh to the ninth centuries.[60] However, the evidence for this is derived from hagiographical texts and may, in fact, reflect a tension not between different types of education but different models of leadership for men of religion who, especially if they lacked academic training, could derive their spiritual and institutional authority from their life experience and overall personality. At the same time, an important type of literature surviving from this period, the *erotapokriseis*, couched in question-and-answer form (and therefore seen as geared towards teaching), addresses fields of "secular" learning such as grammar and syntax, medicine (both practical and philosophically based), Aristotelian logic, music, and law.[61] Further, this period produced not only biblical and patristic manuscripts copied and illustrated at the monastery of Stoudios and perhaps elsewhere,[62] but also two of the oldest surviving manuscripts of Dioscorides's second-century herbal, currently in Naples (National Library, MS ex-Vindobonense gr. 1 [Neapol. gr. 1]) and Paris (National Library, MS gr. 2179 [Paris. gr. 2179]).[63] Technical treatises have generally been neglected by scholars other than historians of Byzantine science partly because of the difficulty in dating them precisely: they are generally devoid of references to concrete historical events, and the stability of their technical language over centuries makes it impossible to date them on the basis of literary style; the only chronological indications left are the latest authors they cite and the dates of their earliest surviving manuscripts (generally not earlier than the tenth century and mostly much later).[64] But if Byzantine literary production between the seventh and the ninth centuries continues to be important, as we claim, does the outside

[58] See the arguments and summary of existing literature in Evangelos Chrysos, "Illuminating Darkness by Candlelight: Literature in the Dark Ages," in *Pour une "nouvelle" histoire de la literature Byzantine: Actes du colloque international philologique, Nicosie 25–28 mai 2000*, ed. Paolo Odorico and Panagiotis A. Agapitos (Paris, 2002), 13–24. On monasteries and literary production, see also Peter Hatlie, *The Monks and Monasteries of Constantinople, ca. 350–850* (Cambridge, 2007), 262.

[59] Hatlie, *Monks and Monasteries*, 434–35.

[60] Ibid., 435–36.

[61] Discussed by Chrysos, "Illuminating Darkness by Candlelight," 17–18.

[62] Overview in Hatlie, *Monks and Monasteries*, 412–19.

[63] Maria Mavroudi, "The Naples Dioscorides," in *Byzantium and Islam: Age of Transition (7th–9th Centuries). Catalogue of the Exhibition at the Metropolitan Museum of Art*, ed. Helen Evans with Brandie Ratliff (New Haven, 2012), 22–26.

[64] The statistics relevant to the manuscript tradition of Paul of Aegina's work provide a measure of how late Greek medical manuscripts generally are (as a rule, later than the twelfth century): among approximately seventy manuscripts preserving the whole or parts of Paul of Aegina's work, only five are earlier than the twelfth century (one from the tenth and four from the eleventh). As repeatedly remarked by modern scholarship, with the exception of biblical and some patristic works, no other ancient author survives in as many early codices: see Johan Ludvig Heiberg, "De codicibus Pauli Aeginetae observationes," *Revue des études grecques* 32 (1919): 268–77, at 268; Eugene F. Rice,

world at the time notice? The currently available evidence for at least two fields, medicine and astronomy, suggests that it does.

Every single one of the Byzantine medical authors who can plausibly be placed between the seventh and the ninth centuries was translated, adapted, or quoted in languages other than Greek, some of them very soon after the time that they were writing. Meletios the Monk, credited with a number of works, including Hippocratic commentaries and a treatise *On the Nature of Man*, was used by John the Exarch, one of the earliest authors in Slavic whose name we know, writing in late ninth- or early tenth-century Bulgaria.[65] Paul of Aegina was translated into Latin around the year 800,[66] while a number of Syriac and Arabic authors from the ninth and tenth centuries quote him in abundance.[67] The elusive "Stephen"—variously designated as "the Athenian," "the Alexandrian," or "the astrologer" (*mathematikos*)—to whom treatises on medicine, alchemy, and astrology are attributed is clearly more than one author active between the late sixth and the late eighth century.[68] Stephen's opinion on uroscopy is quoted by the ninth/tenth-century physician Muḥammad b. Zakarīya al-Rāzī.[69] Passages from Paul of Nicea can be found in a number of Latin medical manuscripts written

"Paulus Aegineta," in *Catalogus translationum et commentariorum*, 9 vols., ed. Ferdinand Edward Cranz and Paul Oskar Kristeller (Washington, DC, 1960–2011), 4:146.

[65] On the problem of Meletios's dating, see Robert Renehan, "Meletius' Chapter on the Eyes: An Unidentified Source," *Dumbarton Oaks Papers* 38 (1984): 159–68, at 159, pointing out that the latest author who has been identified as a source for Meletios's writings is Maximos the Confessor (d. 662); on the use of Meletios by John the Exarch, see Robert Browning, "John the Exarch," *Oxford Dictionary of Byzantium*, ed. A. Kazhdan et al., 3 vols. (Oxford, 1991), 2:1069. Accordingly, Meletios can firmly be placed between the seventh and the ninth centuries.

[66] I accept the date given by Lynn Thorndike, "Relations between Byzantine and Western Science and Pseudo-Science before 1350," *Janus* 51 (1964): 1–36, at 5. According to Gerhard Baader, "Early Medieval Latin Adaptations of Byzantine Medicine in Western Europe," *Dumbarton Oaks Papers* 38 (1984): 251–59, at 252, "the third book of [Paul's] medical encyclopedia was translated into Vulgar Latin during the sixth century in northern Italy"; this statement is problematic, given that the latest medical authority quoted by Paul is Alexander of Tralleis (d. 605). Yet a different dating for the Latin translation is given by Rice, "Paulus Aegineta," 147: "In the Medieval Latin West . . . , *De re medica* was virtually unknown. Book III was translated from the Greek into Latin in southern Italy, probably in the tenth century, but the diffusion of this partial translation was extremely limited. After the twelfth century references to Paul and quotations from *De re medica* that were derived from Latin translations of Arabic medical works made his name increasingly familiar, but Western Europe assimilated the work itself, directly and in its entirety, only in the sixteenth century."

[67] On the meager biographical information on Paul and a list of his works, see Peter Pormann, *The Oriental Tradition of Paul of Aegina's "Pragmateia"* (Leiden, 2004), 4–8. The idea that he practiced and taught in Alexandria before and after the Arabic conquest, found only in the Arabic biographical tradition of the tenth century and frequently repeated afterwards, is somewhat suspect and a deduction of the Arabic authors. It contributed to the apocryphal narrative on an uninterrupted transmission of medicine "from Alexandria to Baghdad," on which the modern perception of Byzantine decline and transmission of Greek learning to the Islamic world is also based. On the suspect nature of the "Alexandria to Baghdad" narrative, see Gutas, *Greek Thought, Arabic Culture*, 90–93.

[68] See W. Wolska-Conus, "Stéphanos d'Athènes et Stéphanos d'Alexandrie: Essai d'identitification et de biographie," *Revue des études byzantines* 47 (1989): 5–89.

[69] Fuat Sezgin, *Geschichte des arabischen Schrifttums*, 15 vols. (Leiden, 1967–2010), 3:161. On the connection between this text by Stephen and a number of Latin and Arabic works, see Keith Dickson, *Stephanus the Philosopher and Physician: Commentary on Galen's "Therapeutics to Glaucon"* (Leiden, 1998), 3–5.

between the ninth and the eleventh centuries.[70] The works by Theophilos Protospatharios on uroscopy and by Philaretos on pulses[71] (the two most standard diagnostic methods in the medieval period) were included in the *Articella*, the collection of treatises used for medical instruction in Bologna, Paris, and elsewhere during the later Middle Ages.[72]

The emphasis of these authors on practical application has elicited negative evaluations by modern scholars. The Latin tradition's reception of Greek works of this kind met with the same reaction: for example, modern scholars have complained that the Latin translators of the early medieval period chose not to translate the sophisticated original works of Galen, but simplified Byzantine commentaries on them.[73] This is, of course, in keeping with the understanding that the early medieval world, both Greek- and Latin-speaking, declined after the end of antiquity. More recently, evaluations of early medieval Latin medicine have been more positive, explicitly breaking away from earlier assessments and indicating a similar shift in how Byzantinists and medieval Latinists view their respective fields of study.[74]

As for Islamic medicine, it is credited with picking up the mantle of the classical tradition when it was dropped in Byzantium and Western Europe. Modern scholars considered this the cornerstone of its further development and made use of it to retrieve chapters of ancient Greek medicine not preserved in the surviving Greek manuscripts.[75] However, the avenues through which it received

[70] Earlier scholarship placed Paul of Nicea between the seventh and the fourteenth century, with a preference for the fourteenth (the date of his earliest extant manuscript). He can now be firmly situated between the seventh and the ninth centuries because he quotes Paul of Aegina and because his work's textual tradition is evidently based on an uncial archetype: see *Paolo di Nicea: Manuale medico*, ed. and trans. A. M. Ieraci Bio, Hellenica et byzantina neapolitana, collana di studi e testi 16 (Naples, 1996), 15 and 40. The issue of Paul of Nicea's Latin *fortuna* is complicated, and the close correspondences between the Greek and the Latin texts may be attributed to a common source. However, given that Paul of Nicea's work appears to have been circulating in Southern Italy, it is plausible that the Latin translations found in the ninth- to eleventh-century manuscripts depend directly on his text rather than on a common source. On Paul of Nicea's Latin *fortuna*, see ibid., 15–17.

[71] On the date of Theophilos Protospatharios, see Isabel Grimm-Stadelman, "Theophilos, *Der Aufbau des Menschen*: Kritische Edition des Textes mit Einleitung, Übersetzung und Kommentar" (PhD diss., University of Munich, 2008), 8–42. On the date of Philaretos (possibly c.700), see John Scarborough, "Classical Antiquity: Medicine and the Allied Sciences. An Update," *Trends in History* 4, no. 3/4 (1988), 28 = *History of Medicine*, ed. Rebecca Greene (New York, 1988). Theophilos Protospatharios relied on one of Philaretos's pulse diagrams, which helps establish a relative chronology: see John Pithis, *Die Schriften* Περὶ σφυγμῶν *des Philaretos*, Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften 46 (Husum, 1983), 191.

[72] Gerhard Baader, s.v. "Articella," in *Lexikon des Mittelalters*, ed. Robert Auty et al., 9 vols. (Stuttgart, 1977–99), 1:1069–70.

[73] Baader, "Early Medieval Latin Adaptations."

[74] For a more positive evaluation than Baader's, without, however, reference to the translations of Byzantine materials, see Peregrine Horden, "What's Wrong with Early Medieval Medicine," *Social History of Medicine* 24/1 (2011): 5–25.

[75] Modern scholarship has used Byzantine manuscripts and Byzantine literary culture as a warehouse from which to retrieve Greek antiquity. The importance of using Arabic medical texts and the medieval Arabic translations of ancient Greek texts in order to retrieve ancient medicine is described by Manfred Ullmann, *Islamic Medicine* (Edinburgh, 1978), 31–40. In order to retrieve ancient Greek medicine from Arabic sources, one had to assume and assert, as Ullmann does (xi), that "the crossing of the

ancient Greek medicine were no different from those prevalent in the early medieval Greek and Latin medical traditions: although Galen was by far the most important Greek doctor for Islamic medicine, the texts that became the most influential and diffused were the Arabic translations not of his original texts, but of compendia addressing selections from them. This group of compendia is believed to have formed the basis of medical teaching in Alexandria right before the Islamic conquest and is known as the *Summaria Alexandrinorum*.[76] Similarly, what was known of Hippocratic medicine in Arabic was not so much the original texts of the Hippocratic corpus, but excerpts of Galen's commentaries on them.[77] Clearly, medical practice in Greek, Latin, and Arabic resorted to compendia of the "classics" for the same reasons: Galen's original treatises are numerous, lengthy, and contain contradictions; the compendia offered a unified and harmonized approach to Galen, which is particularly challenging to achieve otherwise.[78] Likewise, Paul of Aegina opened his immensely popular *Epitome of Medicine* with the statement that his purpose was to offer a summary of the best among earlier medical writings (τῶν ἀρχαίων), the volume of which makes it impossible to memorize; he emphasized that he mostly depended on Oribasius (who had already anthologized and systematized Galen) and added nothing of his own, except for the very few things that he found, through experience, to be tried and true.[79] This suggests that what Latin and Arabic physicians and translators were

language barrier has left the contents almost completely unchanged." See also the remarks in Maria Mavroudi, "*Ta'bīr al-ruy'ā* and *aḥkām al-nujūm*: References to Women in Dream Interpretation and Astrology Transferred from Graeco-Roman Antiquity and Medieval Islam to Byzantium. Some Problems and Considerations," in *Classical Arabic Humanities in Their Own Terms: Festschrift for Wolfhart Heinrichs on His 65th Birthday from His Students and Colleagues*, ed. Beatrice Gruendler and Michael Cooperson (Leiden, 2007), 47–67. For a critique of Ullmann's attention to the Greek sources of Islamic medicine, see Emilie Savage-Smith's review of the 1997 reprint of his *Islamic Medicine*, *Journal of Islamic Studies* 13/3 (2002): 335–39.

[76] See Ullmann, *Islamic Medicine*, 10. The *Summaria Alexandrinorum* as a defined group of texts are not known from Greek manuscripts; the selection, collective name, and designation as products of Alexandrian medical teaching are found for the first time in a work by the ninth-century Edessene Muslim scholar Isḥāq b. 'Alī al-Ruhāwī. During the reign of al-Ma'mūn, this information was enriched with anti-Byzantine details, indicating that the need to compile the *Summaria* resulted from the indifference of the Christian emperors for the teaching of medicine, which ran the risk of being altogether lost. It was revived by 'Umar, Alexandria's conqueror, and was later transferred to Antioch, Ḥarrān, and ultimately Baghdad, where it received a new lease of life due to al-Ma'mūn's royal patronage. This narrative was prolifically repeated by subsequent authors for centuries and was shown to be fictitious by modern scholarship (Gutas, *Greek Thought, Arabic Culture*, 90–95). In addition, the large number of Arabic manuscripts containing the *Summaria Alexandrinorum* do not always contain the same selection of texts: see Peter Pormann, "The *Alexandrian Summary (Jawāmi')* of Galen's *On the Sects for Beginners*: Commentary or Abridgment?," in *Philosophy, Science and Exegesis in Greek, Arabic and Latin Commentaries*, ed. Peter Adamson, Han Baltussen, and Martin William Francis Stone, 2 vols., Bulletin of the Institute of Classical Studies Supplement 83 (London, 2008): 11–12. At least one of the Arabic compendia has close correspondences with a text found in a fourteenth-century Greek manuscript: see Pormann, "The *Alexandrian Summary*," 19–22.

[77] Ullmann, *Islamic Medicine*, 11.

[78] Ibid., 10; Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Washington, DC, 2007), 13–14.

[79] Ed. Johan Ludvig Heiberg, *Corpus Medicorum Graecorum*, vol. 9.1 (Leipzig, 1921), introduction. The introductory text is also quoted in Heiberg, "De codicibus Pauli Aeginetae observationes," 268.

interested in was not ancient medicine as such, but the version of it that remained current practice in their contemporary Byzantine world where they encountered it.[80]

Let us now look at astronomy, a field of knowledge not covered in the simplified approach of the surviving *erotapokriseis* or, indeed, of any treatise known to have been written in Byzantium during this period. However, pieces of evidence indicate that astronomy was undeniably studied there. Seventh-century Byzantine astronomy seems to have been stimulated by an official interest in establishing, with perfect exactitude, the calendar of the Paschal cycle and the chronology of world history.[81] One of the oldest surviving Greek astronomical manuscripts, the early ninth-century manuscript now in Leiden, University Library, MS Bibliotheca Publica Graeca 78 (Leidensis BPG 78) preserves a collection of texts ultimately connected with the teaching of Stephen of Alexandria at the beginning of the seventh century.[82] It also contains several marginal notes dated between 775 and 797/798. This suggests a continuity in Byzantine astronomical teaching from the seventh into the early ninth century, which can be supported by additional evidence: the existence of an eighth-century astronomical codex that we no longer have is proven by the fourteenth-century manuscript from Florence, Biblioteca Medicea Laurenziana, Pluteus 28, cod. 48 (Laurent. gr. 28, 48), which contains a list of emperors ending with Leo III (r. 716–41).[83] The lavish Vatican Ptolemy (Rome, Biblioteca Apostolica Vaticana, MS Vat. gr. 1291)—or, perhaps, the lost exemplar from which it was copied—was produced during the reign of Leo's son, Constantine V (741–75), who was also interested in alchemy.[84] All three manuscripts contain Ptolemy's *Handy Tables*, which provided all the data required to calculate the positions of the planets, the positions and eclipses of the sun and moon, and the rising and setting of the stars, suggesting an emphasis on astronomy's practical

[80] The same applies to Syriac medicine received in the Islamic world: it is a vehicle to recapture not Galen per se, but Syriac medical practice of the day (i.e., the parts of ancient medical practice that remained relevant and current): see Ullmann, *Islamic Medicine*, 16.

[81] Paul Magdalino, *L'orthodoxie des astrologues: La science entre le dogme et la divination à Byzance (VIIe–XIVe siècle)*, (Paris, 2006), 37.

[82] Anne Tihon, "Les *tables faciles* de Ptolémée dans les manuscrits en onciale (IXe–XVe siècles), *Revue d'histoire des textes* 22 (1992): 47–88, at 59, and Magdalino, *L'orthodoxie des astrologues*, 37.

[83] Anne Tihon, "L'astronomie à Byzance à l'époque iconoclaste (VIIIe–IXe siècles)," in *Science in Western and Eastern Civilization in Carolingian Times*, ed. Paul Leo Butzer and Dietrich Lohrmann (Basel, 1993), 192–93.

[84] Vat. gr. 1291 has been dated to the reign of Constantine V by David H. Wright, "The Date of the Vatican Illuminated Handy Tables of Ptolemy and of Its Early Additions," *Byzantinische Zeitschrift* 78/2 (1985): 355–62. More recently, Timothy Janz, "The Scribes and the Date of the *Vat. gr.* 1291," *Miscellanea Bibliothecae apostolicae Vaticanae* 10 (2003) (Studi e Testi 416): 159–80, suggested that the Vatican Ptolemy was copied early during the second decade of the ninth century, shortly after the reign of Nikephorus I (802–11) out of an exemplar that listed Byzantine regnal years up to the reign of Constantine V (167). Although Janz does not explicitly state this, it is reasonable to deduce that such an exemplar would have been copied during Constantine V's reign. I am grateful to Paul Magdalino for bringing Janz's article to my attention. On the interest of Constantine V in alchemy, see Mavroudi, "Occult Science and Society in Byzantium," 74.

applications[85]—that is, calendrical and chronological problems—but also astrology; indeed, we know of an astrologer at the Byzantine court in the year 792.[86] Leo the Mathematician, who must have been educated around the end of the eighth century and was active during the first half of the ninth, is perhaps the most famous scientist of the Middle Byzantine period.[87] According to the Byzantine sources, he was invited to become court scientist in Baghdad. Given the limited information on where and how he was educated, one may view him as either a lonely and lofty genius without predecessors, or somebody just inches above his contemporaries who built on an earlier foundation of eighth-century Byzantine science, about which we know very little.[88]

We are likewise poorly informed about Latin astronomy during the "dark ages." But what we do know allows us to discern that during this period, Byzantium and at least some parts of Europe where Latin was used as the language of science were interested in some of the same questions. For example, in sixth- and seventh-century Ireland, as in Byzantium at around the same time, an important astronomical pursuit was calendrical calculation, even before the Irish were faced with the central problem of the Christian calendar, the celebration of Easter.[89] The Irish method of calculation originated in Celtic "folk" astronomy and was based on number, not on Greek geometrical astronomy.[90] By the end of the seventh and the beginning of the eighth century, the work of the Venerable Bede (672–735), one of our main venues for recovering earlier astronomy in Ireland, England, and the Continent, was conversant with both systems. Although we cannot really follow how computus developed between the sixth and the eighth century, it is very likely that Greek geometrical astronomy was encouraged (or introduced?) by Theodore, archbishop of Canterbury.[91] Theodore was born in Greek-speaking Tarsus, seems to have studied in Constantinople, and spent considerable time in Rome before being appointed archbishop of Canterbury at the age of

[85] On Constantine V's interest in astrology, see Magdalino, *L'orthodoxie des astrologues*, 50.

[86] Ibid.

[87] For an overview of the primary sources on his accomplishments and reputation, see Vasileios Katsaros, "Leo the Mathematician: His Literary Presence in Byzantium during the Ninth Century," in *Science in Western and Eastern Civilization*, ed. Butzer and Lohrmann, 383–98.

[88] Driven by the certainty of Byzantine scientific incompetence during the early ninth century, some scholars have dismissed the narratives of the Byzantine sources on Leo as "fairy tales": see Gutas, *Greek Thought, Arabic Culture*, 180. The episode is also discussed in Paul Magdalino, "The Road to Baghdad in the Thought-World of Ninth-Century Byzantium," in *Byzantium in the Ninth Century: Dead or Alive?*, ed. Leslie Brubaker (Aldershot, UK, 1998), 195–214, where it is placed in the context of our improved, but not entirely rehabilitated, image for this period.

[89] This account on Irish computus relies on Stephen C. McCluskey, "Astronomies in the Latin West from the Fifth to the Ninth Centuries," in *Science in Western and Eastern Civilization*, ed. Butzer and Lohrmann, 139–60.

[90] McCluskey, "Astronomies in the Latin West," 144–45.

[91] His knowledge of computus may have been picked up in Constantinople: see Michael Lapidge, "The Career of Archbishop Theodore," in *Archbishop Theodore: Commemorative Studies on His Life and Influence*, ed. Michael Lapidge (Cambridge, 1995), 17; and Michael Lapidge, s.v. "Theodoros v. Tarsos, Ebf. v. Canterbury," in *Lexikon des Mittelalters*, 8:636. Guglielmo Cavallo, "Theodore of Tarsus and the Greek Culture of His Time," in *Archbishop Theodore*, 54–67, emphasizes that we do not know enough about where he studied and when, although Greek was indeed the language of his native Tarsus.

sixty-seven, as an intellectually formed and mature man. His installation must have rekindled interest in computus in his new homeland because soon thereafter, in 673, he convened the synod of Hertford to discuss a number of reforms, including the proper celebration of Easter.[92] If, indeed, the presence of Theodore and his entourage in Canterbury introduced computus based on Greek geometrical astronomy to England and beyond, it must have reflected current practice in the seventh-century Byzantine Empire.[93]

As for contact between Byzantine and Arabic astronomy, two of the most important eighth-century authors writing in Greek on science lived not in the Byzantine Empire but the caliphate: the Chalcedonian Saint John of Damascus (676–749) and the Maronite Theophilos of Edessa, astrologer to Caliph al-Mahdī (r. 775–85).[94] Byzantinists have discussed the fact that during the eighth century, Greek intellectual activity was more intense among the Christians living in the caliphate than in Byzantium, and that the recovery of the ninth century was the result of drawing from the resources of this cultural periphery.[95] Yet there is evidence that at least instrument making was not abandoned in Byzantium: the only published Greek treatise on the construction of a celestial globe was written by the engineer Leontios in the seventh or eighth century.[96] And Byzantine instrument making of the eighth century elicited the interest of the Arabs: the twelfth-century astronomer Ibn al-Ṣalāḥ reports having seen a book with the description of a Greek globe, the astronomical data on which yielded the year AD 738 for its construction.[97] It is impossible to know exactly when Ibn al-Ṣalāḥ's Greek book was translated into Arabic. Paul Magdalino noticed that a number of Greek scholia are based on independent astronomical observations made in Damascus in 829, a year that is specified by mention of the regnal year of Emperor Theophilos.[98] This suggests that they were not copied out of an Arabic source but were made by a Byzantine astronomer in Damascus. It so happens that in 829, Caliph al-Ma'mūn with his team of astronomers and astrologers resided in

[92] On the synod of Hertford, see Hanna Vollrath, s.v. Hertford, Synode v.," in *Lexikon des Mittelalters* 4:2184.

[93] It is impossible to say much more on Latin astronomy because the next substantial sources, chronologically, are Alcuin's correspondence with Charlemagne and astronomical and computistical anthologies composed around the year 809. Alcuin's astronomy is not in the geometrical tradition but is understood as a Pythagorean discipline based on numerical harmonies. More sophisticated texts appeared towards the end of the ninth century: see McCluskey, "Astronomies in the Latin West," 152–53.

[94] On the language in which the work was originally written, see Mavroudi, "Occult Science and Society in Byzantium," 87–89.

[95] See Cyril Mango, "Greek Culture in Palestine after the Arab Conquest," in *Scritture, libri e testi nelle aree provinciali di Bisanzio: Atti del Seminario di Erice (18–25 settembre 1988)*, ed. Guglielmo Cavalo et al., 2 vols. (Spoleto, 1991), 1:149–60; the same idea can be found in the remark by Ihor Ševčenko noted in Chrysos, "Illuminating Darkness by Candlelight," 24.

[96] Edward L. Stevenson, *Terrestrial and Celestial Globes* (New Haven, 1921), 25, n. 18.

[97] Ibn aṣ-Ṣalāḥ, *Zur Kritik der Koordinatenüberlieferung in Sternkatalog des Almagest*, ed. Paul Kunitzsch (Göttingen, 1975), 132 (Arabic) and 72 (German); for dating the coordinates on the globe, see ibid., 18; and Emilie Savage-Smith and Andrea Belloli, *Islamicate Celestial Globes* (Washington, DC, 1985), 15.

[98] Magdalino, "The Road to Baghdad," 209–10.

Damascus, where he received a Byzantine embassy headed by John the Grammarian. A year earlier, in 828, al-Ma'mūn had ordered the preparation of two sets of astronomical observations, which he rejected because they presented big discrepancies in the values for the maximum and minimum altitudes of the sun. In 830, al-Ma'mūn ordered that a new series of observations be carried out from Dayr Murrān,[99] a Christian monastery on Mount Qāsiyūn outside Damascus, using a new set of instruments.[100] Significantly, for caliphs and other Muslim patrons, Christian institutions were a regular source of both Greek manuscripts and of individuals competent in the Greek language. The astronomer in charge of the project, Khālid ibn 'Abd al-Malik al-Marwarrūdhī, designed instruments appropriate for the location and carried out successful observations for longer than a year (c.832). The project was challenging because his copper and iron instruments would warp and expand.[101] It is conceivable that the effort to improve Islamic instruments included consultation and comparison with Byzantine instruments, perhaps also scientists. John the Grammarian's embassy, however, was not the only opportunity for the Arabs to acquaint themselves with Byzantine astronomical practice. Al-Ma'mūn campaigned with his scientists in tow, and we know from the Arabic biographical tradition that his chief astronomer and astrologer, Yaḥyā b. al-Manṣūr, died in Byzantine territory early in the year 830.[102]

Another important shift in the modern scholarly perception of Byzantium is our understanding of the eleventh and twelfth centuries. More than a generation ago, scholarship held that Byzantium's golden period under the Macedonian dynasty ended with the death of Basil II in 1025, while the eleventh century ushered in the beginning of the end for the empire militarily, politically, and economically, a downward slope on which Byzantium continued throughout the Comnenian period. Work done during the last few decades, especially in Byzantine economic history, now yields a different picture: in spite of territorial contraction, the economy was expanding, the urban centers were revitalized, and Byzantium's international consequence waned only after the death of Manuel I in 1180. Instead of being understood as an exception to developments taking place in the rest of the medieval world between the tenth and the twelfth centuries, Byzantium is now seen as comfortably fitting within them and following not its own path of decline but trends that are visible elsewhere in the states that surround it. But if

[99] Sovereigns or governors were frequently accommodated in this monastery, which also had a princely residence built nearby: see Dominique Sourdel, s.v. "Dayr," in *Encyclopaedia of Islam*, 2nd ed., ed. P. Bearman et al., 12 vols. (Leiden, 1960–2002), 2:194; and Dominique Sourdel, s.v. "Dayr Murrān," in *Encyclopaedia of Islam*, 2:198. The role of monasteries as royal and aristocratic retreats in Abbasid society is described in the *Kutub al-diyārāt* (*Books of Monasteries*), a ninth- and tenth-century literary genre focusing on episodes from social life that involve a monastic setting (frequently of festivities and wine drinking).

[100] Len Berggren, "Ma'mūn," in *The Biographical Encyclopedia of Astronomers*, ed. Thomas Hockey et al., 2 vols. (New York, 2007), 2:733.

[101] Marvin Bolt, "Marwarrūdhī," in *Biographical Encyclopedia of Astronomers*, 2:740.

[102] See Benno van Dalen, s.v. "Yaḥyā ibn Abī Manṣūr," in *Biographical Encyclopedia of Astronomers*, 2:1249–50; see also Ibn al-Qifṭī, *Ta'rīkh al-ḥukamā'*, ed. Lippert, 357–59. He was buried in Aleppo and his tomb could still be seen in the thirteenth century.

Byzantium was not in a downward slope in the eleventh and twelfth centuries, does its literature command the attention usually paid to the cultural products of internationally consequential states? The Arabic and Latin evidence suggests a positive reply.

True, between the middle of the ninth century and the middle of the tenth, Baghdad produced a quantity of translations of Greek philosophical and scientific works that was never repeated at the same scale. But a second translation movement from Greek into Arabic took off exactly when the first one died out. This was the translation of Byzantine legal, liturgical, and patristic texts produced primarily in Syria as a result of the Byzantine reconquests of the ninth and tenth centuries and the incorporation of the region of Antioch into the Byzantine state from 969 until 1084. The Crusaders arrived fourteen years after the end of the Byzantine presence in northern Mesopotamia and encountered a renewed Christian culture and institutions as a result—a fact never discussed at any length in modern scholarship on the Crusades. Important texts of this second translation movement include the *Corpus Dionysiacum*, translated in the year 1009 directly from the Greek original by the Emesene scribe Ibn Saḥqūq;[103] the *Hexaemeron* of Basil of Caesarea, homilies of John Chrysostom on Genesis, the Gospel of Matthew, the Gospel of John, and the Letter to the Hebrews; Maximus the Confessor's disputation with Pyrrhus; John of Damascus's *Exposition of the Orthodox Faith*; and an encomium of Nicholas of Myrrha by Andrew of Crete, all of which were rendered into Arabic by the prolific ʿAbd Allāh b. al-Faḍl, active around the middle of the eleventh century.[104] The monastic rules of Nikon of the Black Mountain, written around the same time, were translated into Arabic most probably during his lifetime and became a "classic" of their kind (they were also translated into Slavic).[105] The importance of Constantinople to the international literary universe of the time is evident from the arrival of scholars from the Muslim lands who came there to seek learning, fame, and fortune. Well known among them is the physician, astronomer, and astrologer Symeon Seth, who translated *Stephanites and Ichnelates* (the originally Sanskrit mirror of princes couched as a collection of animal fables and known as the *Panchatantra*), and perhaps also other texts, from Arabic into Greek.[106] Psellos boasted of how admired he was

[103] See Alexander Treiger, "New Evidence on the Arabic Versions of the Corpus Dionysiacum," *Le Muséon* 118/3–4 (2005): 219–40; Treiger, "The Arabic Version of Pseudo-Dionysius the Areopagite's *Mystical Theology*, Chapter 1: Introduction, Critical Edition, and Translation," *Le Muséon* 120/3–4 (2007): 365–93; Cécile Bonmariage and Sébastien Mouraeau, "Corpus Dionysiacum Arabicum: Étude, édition critique et traduction des *Noms divins* IV, 1–9, partie 1," *Le Muséon* 124/1–2 (2011): 181–227.

[104] On his work as translator and original author, see Georg Graf, *Geschichte der christlichen arabischen Literatur*, 5 vols. (Vatican City, 1944–53), 2:52–62.

[105] On the date, historical context, and afterlife of Nikon's rules, see Robert Allison, "Black Mountain: Regulations of Nikon of the Black Mountain," and "Roidion: Typikon of Nikon of the Black Mountain for the Monastery and Hospice of the Mother of God *tou Roidiou*," in *Byzantine Monastic Foundation Documents*, ed. John Thomas et al., 3 vols. (Washington, DC, 2000), 1:377–439. On the Arabic translation, see Graf, *Geschichte der christlichen arabischen Literatur*, 2:64–69.

[106] On his career, see Paul Magdalino, "The Porphyrogenita and the Astrologers: A Commentary on *Alexiad* VI. 7. 1–7," in *Porphyrogenita: Essays in Honour of Julian Chrysostomides*, ed. Charalambos Dendrinos et al. (Aldershot, UK, 2003), 15–31.

by a student from "Babylon" (the medieval Greek designation for Cairo).[107] That these are not empty words is proven by the Constantinopolitan sojourn of Ibn Buṭlān, a Nestorian physician from Baghdad. After visiting Cairo and Antioch, he arrived in Constantinople in 1054; he witnessed the plague that hit the city the same year and was asked by Patriarch Michael Keroularios to compose a treatise on the Eucharist and the use of unleavened bread.[108] An autograph of one of his Arabic works indicates that he finished copying it while staying at the "Convent of the divinely appointed emperor Constantine situated outside of Constantinople" in the year 1058. From Constantinople he returned to Syria and died in Byzantine Antioch in 1066.[109]

Further translations from Greek into Arabic prepared during or later than the eleventh century are hagiographies of the metaphrastic recension, a tenth-century collection of earlier vitae rewritten at a higher linguistic register.[110] In addition, several translations of canon and civil law from Greek into Arabic were made before the thirteenth century: in fact, it has been argued that the first phase of these translations pertains to canon law and must have been complete before 787 because the group of translated texts does not include the second Council of Nicea, which took place that year[111]; the second phase, which took place before the thirteenth century, extended the body of translated texts to include civil law codes such as the *Ecloga* and the *Procheiros Nomos*.[112] New translations of canon law (or revision of the old ones with recourse to the Greek text) continued into the Ottoman period as late as the eighteenth century.[113] Byzantine works on the

[107] On Psellos's student from "Babylon," see his *Letter to Michael Keroularios*, ed. U. Criscuolo, *Epistola a Michele Cerulario* (Naples, 1973), 25, lines 102–10.

[108] On the significance of this encounter for Byzantine political and ideological concerns at the time, see Maria Mavroudi, "Licit and Illicit Divination: Empress Zoe and the Icon of Christ Antiphonetes," in *Transmission des savoirs antiques de l'antiquité à la Renaissance*, ed. Jean-Michel Spieser and Veronique Dasen, Micrologus' Library 60, Società Internazionale per lo Studio del Medioevo Latino (Florence, 2014), 433–37.

[109] See Joseph Schacht and Max Meyerhof, *The Medico-Philosophical Controversy between Ibn Butlan of Baghdad and Ibn Ridwan of Cairo* (Cairo, 1937), 61 (on the plague in Constantinople); 65–66 (on the manuscript he copied while in Constantinople); see also Schacht, s.v. "Ibn Buṭlān," in *Encyclopaedia of Islam*, 3:740.

[110] See Alexander Kazhdan and Nancy Patterson Ševčenko, s.v. "Symeon Metaphrastes," in *Oxford Dictionary of Byzantium*, 3:1983–84; on their Arabic rendering, see Graf, *Geschichte der christlichen arabischen Literatur*, 1:491–96.

[111] A new chronology of Greek-into-Arabic translations of legal texts needs to be worked out, taking into consideration the following: the distinction between "canon" and "civil" law is sharper to modern than to Byzantine eyes; further, the council of 787 was ratified as ecumenical only in 866, when patriarch Photios of Constantinople sent an encyclical letter to the patriarchs of Antioch, Alexandria, and Jerusalem to inform them of its ecumenicity. Into the eleventh century, Byzantine-rite Christians in central Asia still recognized only six ecumenical councils; see Ken Parry, "Byzantine-Rite Christians (Melkites) in Central Asia in Late Antiquity and the Middle Ages," in *Thinking Diversely: Hellenism and the Challenge of Globalisation*, ed. Elisabeth Kefallinos, special edition of *Modern Greek Studies (Australia and New Zealand). A Journal for Greek Letters* 16 (2012), 92–108.

[112] Brief overview in Johannes Pahlitzsch, "The Translation of the Byzantine *Procheiros Nomos* into Arabic: Techniques and Cultural Context," *Byzantinoslavica* 65 (2007): 19–30, at 21, with earlier bibliography. On Arabic translations of Greek canon law before the thirteenth century, see Graf, *Geschichte der christlichen arabischen Literatur*, 2:81–82.

[113] Graf, *Geschichte der christlichen arabischen Literatur*, 1:561. Overview on canon law, 556–64.

organization and ritual life of the church that were translated into Arabic (it is impossible to know on which exact date) include writings of the eighth/ninth-century Saint Theodore of Stoudios[114] and the fifteenth-century Saint Symeon of Thessaloniki.[115] Significantly, the translations of Byzantine canon and civil law codes, like the renderings of Byzantine hymnography into Arabic,[116] were also used by the non-Chalcedonian Christian churches under Muslim rule.

Modern scholars have expressed surprise at how little literary contact between Greek and Latin is in evidence during the twelfth century in Crusader lands, where translation from the Arabic, not from the Greek, is much more frequent.[117] Yet preference for translation from Arabic, even of originally Greek material, is an obvious choice when the translators encounter the texts they will eventually translate in overwhelmingly Arabic-speaking environments. Twelfth-century translators from Greek into Latin were primarily Sicilian, active at the Norman court in Palermo, or Northern Italian, working in both their native towns and Constantinople. The Sicilian archdeacon Henry Aristippus translated the fourth book of Aristotle's *Meteora*, Plato's *Phaedo* and *Meno* (and was thus the first medieval translator of a Platonic text), and Diogenes Laertius's lives and doctrines of the ancient philosophers. Aristippus also commissioned a translation of Ptolemy's *Almagest* (out of a codex brought from Constantinople). Admiral Eugenius of Palermo is credited with translating into Latin the prophecy of the Erythrean Sibyl from Greek ("drawn from the treasure of Emperor Manuel") and Ptolemy's *Optics* from Arabic. Eugenius also prepared (or commissioned) an edition of the Greek *Stephanites kai Ichnelates*, the aforementioned mirror of princes that had been translated from Arabic into Greek by Symeon Seth only a short time earlier.[118] Burgundius of Pisa translated the Greek passages of Justinian's *Digest* and the *Corpus Iuris Civilis*, the *Exposition of the Orthodox Faith* and the *Fount of Knowledge* by Saint John of Damascus, Nemesius of Emessa's *On the nature of Man*, John Chrysostom's ninety homilies on the Gospel of John,[119] about ten works of Galen,[120] and the parts of the *Geoponika* that pertain to winemaking.[121]

[114] Ibid., 1:611–12.

[115] Ibid., 2:89.

[116] On the use of Byzantine hymnography by non-Chalcedonians between the seventh and the ninth centuries, see Sameh Farouk Soliman, "Greek Literary Culture in the Former Eastern Provinces of Byzantium during the First Two Centuries of Arab Rule" (PhD diss., University of Athens, 2007), 22–23 n. 36 (online publication by the Center for Hellenic Studies, http://chs.harvard.edu/wa/pageR?tn=ArticleWrapper&bdc=12&mn=3983); see also Roshdi Wassef Behman Dous, "Η αλεξανδρινή θεία λειτουργία του Μεγάλου Βασιλείου κατά την Κοπτική παράδοση" [The Alexandrian Divine Liturgy by Basil the Great according to the Coptic tradition] (PhD diss., University of Thessaloniki, 1997).

[117] For an overview of Latin literary contacts with Greek and other languages in Crusader lands, see Krijnie Ciggaar, "Manuscripts as Intermediaries: The Crusader States and the Literary Cross-Fertilization," in *East and West in the Crusader States: Acta of the Congress held at Hernen Castle in May 1993*, ed. Krijnie Ciggaar, Adelbert Davids, and Herman Teule (Leuven, 1996), 131–51.

[118] Walter Berschin, *Greek Letters and the Latin Middle Ages* (Washington, DC, 1988), 233–35.

[119] Ibid., 226–31.

[120] See Haskins, *Studies in the History of Medieval Science*, 208; *Galenus latinus*, ed. Richard Durling and Fridolf Kudlien, 2 vols. in 3 (Berlin, 1976–92).

[121] Berschin, *Greek Letters*, 339 n. 89; Francesco Buonamici, "Liber de vindemiis a Domino Burgundione Pisano de Graeco in Latinum fideliter translatus," *Annali delle Università Toscane* 28 (1908):

Leo Tuscus translated the liturgy of Saint Chrysostom at the request of Rainaldus de Monte Catano and the tenth-century work on dream interpretation known as the *Oneirocriticon of Achmet*.[122] Pascal the Roman used the Greek texts of both Artemidorus and the *Oneirocriticon* in order to compose his *Liber thesauri occulti*. He also translated the *Kyranides*, a disputation against the Jews attributed to Anastasius of Sinai, and a life of the Virgin Mary.[123] Both translators were active in Constantinople.

In 1204, when several Byzantine territories were refashioned into Crusader states, new opportunities for translations from Greek into Latin were created. William of Moerbeke, the Flemish Dominican who became Latin bishop of Corinth, learned Greek on the spot and embarked on a program of translation of ancient philosophy that made him famous in Europe.[124] Robert Grosseteste managed to learn Greek in England (we do not know exactly how); his household included two Sicilians, Nicholaus Graecus, whose finesse in Greek and Latin is evident from his translation of Aristotle's *De mundo*, and Robertus Graecus, who has not yet been securely connected with any known literary activity.[125] Grosseteste also had access to John of Basingstoke, who had just returned from service to the duchy of Athens with knowledge of Greek and a collection of Greek books; through him, it seems, Grosseteste procured from Greece a manuscript with the *Testament of the Twelve Patriarchs*, the rendering of which into Latin made Grosseteste's name as a translator.[126] The degree to which Grosseteste approached Aristotle from within a Byzantine hermeneutical tradition is evident from his translation of the twelfth-century collection of commentaries on *Nicomachean Ethics* commissioned by Anna Comnena to Eustratios of Nicea and Michael of Ephesus.[127]

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memoria 3, 1–29. Burgundio's program of translation is clearly driven by the needs of his patrons and his own active search for someone to sponsor his projects: he began translating for the Pisan Pope Eugenius III; after his passing, Burgundio tried his luck with the Sicilian emperors.

[122] Haskins, *Studies in Medieval Science*, 215–18; Maria Mavroudi, *An Arabic Book on Dream Interpretation: The "Oneirocriticon of Achmet" and Its Arabic Sources* (Leiden, 2002), 111–19.

[123] Mavroudi, "Occult Science and Society in Byzantium," 84–85. On both translators, see also Mavroudi, *An Arabic Book on Dream Interpretation*, 111–19.

[124] See James McEvoy, *Robert Grosseteste* (Oxford, 2000), 114. Moerbeke translated Aristotle, Proclus, and Archimedes (out of manuscripts that have subsequently disappeared). The diffusion of his translations was vast: they were used for instruction at the University of Paris and were consulted by Thomas Aquinas. On translations from Greek into Latin during the second half of the thirteenth century, see Edmund Fryde, *The Early Paleologan Renaissance* (Leiden, 2000), 103–43.

[125] Roberto Weiss, "The Study of Greek in England during the Fourteenth Century," *Rinascimento* 2/3–4 (1951): 211 and n. 1. According to Weiss, "it should be made clear that none of the continental translators ever reached the standards of Nicholas the Greek" (219).

[126] On this translation and its manuscript source, see Maria Mavroudi, "Learned Women of Byzantium and the Surviving Record," in *Byzantine Religious Culture: Studies in Honor of Alice-Mary Talbot*, ed. Denis Sullivan, Elisabeth Fisher, and Stratis Papaioannou (Leiden, 2012), 67; McEvoy, *Robert Grosseteste*, 113–21.

[127] On the translation of Byzantine commentaries by Grosseteste, see McEvoy, *Robert Grosseteste*, 119; see also Elisabeth Fisher, "The Anonymous Commentary on Nicomachean Ethics VII: Language, Style and Implications," in *Medieval Greek Commentaries on the Nicomachean Ethics*, ed. Charles Barber and David Jenkins (Leiden, 2009), 145–61.

This rapid look at the twelfth- and thirteenth-century translations from Greek into Latin brings us to the argument, presented earlier, that ancient Greek science and philosophy were known in medieval Latin through translations from the Arabic, while direct recourse to Greek did not take place until the Renaissance. We now know that this argument was created by Renaissance humanists who sought to dismiss earlier scholastic Aristotelianism.[128] Already in 1817, the Orientalist Amable Jourdain, while researching the appearance and influence in Europe of translations of Aristotle from Arabic, encountered the twelfth- and thirteenth-century Latin translations of Aristotle from Greek and published excerpts.[129] Work on the Latin Aristotle carried out or directed by Lorenzo Minio-Paluello in the middle of the twentieth century firmly established that, except for the *De coelo* and part of the *Meteorology* and the *Zoology*, the entire Aristotelian corpus reached the Latin schools from Greek before it did from Arabic.[130] More recently, doubts have been cast on the idea that at least certain Greek scientific texts were reintroduced to Western Europe through the manuscripts brought there by Byzantine scholars in the fifteenth century. For example, the traditional view that Ptolemy's *Geography* was launched in Europe by Manuel Chrysoloras and its 1409 Latin translation by his student Jacobus Angeli has been cast aside by Patrick Gautier Dalché, who has plausibly argued that the *Geography* was not entirely forgotten in Latin scientific culture between the sixth and the fourteenth centuries.[131]

Further, historians of Islamic science have seriously questioned the idea of its decline after the eleventh century. In fact, a number of concepts that eventually came to be considered key for the development of modern European science have been identified in post-eleventh-century Arabic scientific treatises. Examples include the description of pulmonary blood circulation by the Damascene physician Ibn al-Nafīs (d. 1288), which has analogies with Harvey's (published in 1628); or the models of planetary motion proposed in the thirteenth and fourteenth centuries by Naṣīr al-Dīn al-Ṭūsī and Ibn al-Shāṭir that are very close to those of Copernicus.[132] In this context, Byzantium has been seen as an occasional

[128] On the differences between medieval and humanist philosophy, see James Hankins, s.v. "Platonism, Renaissance," in *Routledge Encyclopedia of Philosophy*, ed. Edward Craig (London, 1998). Retrieved 17 February 2012, from http://www.rep.routledge.com/article/C032.

[129] Amable Jourdain, *Recherches critiques sur l'age et l'origine des traductions latines d'Aristote*, 2nd ed. (Paris, 1843). Due attention to early thirteenth-century translations of Aristotle from Greek into Latin is paid by W. H. V. Reade, "Philosophy in the Middle Ages," *Cambridge Medieval History* 5:812–15.

[130] Berschin, *Greek Letters*, 7–8.

[131] Patrick Gautier Dalché, "Le souvenir de la *Géographie* de Ptolémée dans le monde latin médiéval, Ve–XIVe siècles," *Euphrosyne: Rivista de filologia clássica*, n.s. 27 (1999): 79–106; more recently, Dalché, *La "Géographie" de Ptolémée en Occident (IVe–XVI siècle)*, Terrarum Orbis 9. (Turnhout, 2009).

[132] For a refutation of the idea that Arabic philosophy declined after the eleventh century, see Dimitri Gutas, "The Study of Arabic Philosophy in the Twentieth Century: An Essay on the Historiography of Arabic Philosophy," *British Journal of Middle Eastern Studies* 29/1 (2002): 5–25; for the same regarding Islamic astronomy, see George Saliba, "A Redeployment of Mathematics in a Sixteenth-Century Arabic Critique of Ptolemaic Astronomy," in *Perspectives arabes et médiévales sur la tradition scientifique et philosophique grecque*, ed. Ahmad Hasnawi et al. (Leuven, 1997), 105–22, at 113.

transmitter of Islamic science to Europe. For example, more than thirty years ago it was suggested that Copernicus, who could read Greek but not Oriental languages, may have become acquainted with Islamic models of planetary motion through a Greek manuscript containing translations of Islamic astronomical texts.[133]

Enough has been said to highlight that the "classical tradition" was received by the medieval Arabic and Latin literary cultures hand-in-hand with texts reflecting Byzantium's Christian and Roman traditions: biblical, patristic, hagiographical, liturgical, and legal texts. This is to be expected: translations into Latin were generated and received in a Christian environment.[134] It is also well known that the translators of Greek texts into Arabic, either directly from Greek or via Syriac, were, in their overwhelming majority, Christians. This conditioned their intellectual makeup and sometimes even generated public dialogue.[135] For example, the two greatest translators of the ninth century, Ḥunayn b. Isḥāq and Qusṭā b. Lūqā, both wrote treatises to defend their adherence to the Christian faith.[136] In the process of translating, they rendered the ancient pagan originals into versions acceptable, intelligible, and meaningful within their own medieval monotheistic societies. For example, a well-known characteristic of the translations by Ḥunayn b. Isḥāq and his circle was to render the ancient gods as either angels or planets.[137] The transferability of originally Christian notions to a Muslim context is evident from the fact that excerpts from Nemesius's *On the Nature of Man* are quoted (with all the Christian specifics removed) in the alchemical corpus attributed to Jābir b. al-Ḥayyān.[138]

Ancient philosophy and science present a number of incompatibilities with Judaic, Christian, and Muslim monotheism. For example, Aristotle's universe is eternal, and creation from nothing is impossible; God is the cause of motion in the universe but is, himself, unmoved, absorbed in self-contemplation, and completely

[133] For an outline of the research on this topic, see George Saliba, "Revisiting the Astronomical Contacts between the World of Islam and Renaissance Europe: The Byzantine Connection," in *The Occult Sciences in Byzantium*, ed. Magdalino and Mavroudi, 361–74; this article suggests direct transmission to Copernicus from an Arabic source without a Greek intermediary.

[134] Of course, translations from Greek into Latin were rarely made in a climate of political cooperation with or emotional attachment to Byzantium: for example, the hereditary dukes of Naples, originally appointed by Byzantium, became great patrons of translations from Greek during a period when their dynasty asserted its political independence from Constantinople; likewise, the Carolingian translations of Greek material were made in a climate of political antagonism with Byzantium.

[135] Christian intellectuals could create a niche for themselves in Muslim society, but were also subject to pressures. A famous example is the trick played on Ḥunayn b. Isḥāq that caused him to spit on Christian icons and lose the royal trust, as discussed in Gotthard Strohmaier, "Ḥunain b. Isḥāḳ und die Bilder," *Klio* 43–45 (1965): 525–33.

[136] The number could be multiplied: see Samir Khalil Samir, "The Earliest Arab Apology for Christianity (ca. 750)," in *Christian Arabic Apologetics of the Abbasid period*, ed. Jørgen Nielsen and Khalil Samir (Leiden, 1994), 110.

[137] Gotthard Strohmaier, "Die griechischen Götter in einer christlich-arabischen Übersetzung," in *Die Araber in der alten Welt*, ed. Franz Altheim and Ruth Stiehl, 5 vols. (Berlin, 1964–68), 5/1:127–62; see also the examples regarding the Hippocratic oath in Ullmann, *Islamic Medicine*, partly repeated in Pormann and Savage-Smith, *Medieval Islamic Medicine*, 32–33.

[138] See Helen Brown Wicher, "Nemesius Emessenus," in *Catalogus translationum*, ed. Cranz and Kristeller, 6:38. There are at least four different renderings of this text in Arabic; the one in question appears to be the earliest, dating from c.815.

unaware of anything external to himself.[139] This contrasts with the monotheistic belief in a universe created out of nothing by a providential God. Successive generations of medieval commentators in various languages worked on bypassing these difficulties. Receiving a pagan text as digested by the Byzantine tradition meant that at least some of its incompatibilities were ironed out. The same applied to translations from Arabic into Greek: in the tenth century, the translation of the *Oneirocriticon* of Achmet from Arabic into Greek reintroduced a theory and practice in the interpretation of dreams already found in Artemidoros, a second-century writer read in Byzantium at that time.[140] Still, a translation from the Arabic was well received because it reiterated the already familiar in a simpler linguistic register and discussed angels, paradise, hell, and the *tzykanisterion* (the field of a Persian, Arabic, and Byzantine polo game) instead of the pagan gods and the ancient gymnasia.[141]

But if the old narrative on the history of Western thought is no longer tenable, is it possible to propose something else in its place? Common sense suggests (and modern scholarship has occasionally demonstrated) that medieval intellectuals writing in Greek, Latin, or Arabic turned to the "classical tradition" primarily to address their own needs and not out of blind reverence or antiquarianism. The ancient philosophical and scientific texts described a number of fundamental concepts and suggested systems that fit them together to explain, for example, the structure of heaven and earth, the mechanics of planetary motion, and the causes of health and disease. A number of these concepts and systems were organized in voluminous works, many of which were written by Greek-speaking authors in the Roman empire around the end of the first and the second century AD: Galen, Ptolemy, Dioscorides, Artemidoros. As already discussed, theirs are extensive and difficult texts, which required shorter and simplified versions to be put in circulation; yet as they enshrined the system in its full sophistication, the need to return to them for advanced inquiry remained. For example, in the twelfth century the aforementioned Ibn al-Ṣalāḥ found it necessary to discuss in great detail the differences in the numerical values of the coordinates of the fixed stars that could be detected when comparing with one another the several earlier translations of Ptolemy's *Almagest* from Greek and Syriac into Arabic, including their marginal glosses. He did this order to expose mistakes in the transmission of Ptolemy's catalog of 1,025 fixed stars.[142] Subsequent authors used these stars to convey astronomical coordinates, which made them for centuries an indispensable point of

[139] For an outline of the incompatibilities of Aristotelian philosophy with Christianity, see Edward Grant, s.v. "Aristotle," in *Encyclopedia of Science and Religion*, ed. Wentzel Van Huyssteen, 2 vols. (New York, 2003), 1:26–29; on how some of these incompatibilities were treated by the Aristotelian commentators, see Jill Kraye, "Aristotle's God and the Authenticity of *De mundo*: An Early Modern Controversy," *Journal of the History of Philosophy* 28/3 (1990): 339–58, at 339–41.

[140] For evidence of its tenth-century circulation, see Mavroudi, *A Byzantine Book on Dream Interpretation*, 423–24.

[141] Maria Mavroudi, "Late Byzantium and Exchange with Arabic Writers," in *Byzantium, Faith and Power (1261–1557): Perspectives on Late Byzantine Art and Culture*, ed. Sarah T. Brooks, Metropolitan Museum of Art Symposia (New Haven, 2007), 63.

[142] For a discussion of Ibn al-Ṣalāḥ's exhaustive comparison between the coordinates of the fixed stars as recorded in the various translations of the *Almagest* and a tabulation of the almost ninety

reference for astronomy both within and beyond the Islamic world. The fortunes of Dioscorides in Arabic also prove this point: new translations of his botanical work were made, not necessarily because the older ones were not available, but in order to update botanical information and verify anew the identification of plants.[143] As late as the sixteenth century, the Syrian physician Dāwūd al-Anṭākī (d. 1599) composed his voluminous and influential medical compendium based not only on medieval Arabic but also earlier Greek authors; he had learned Greek in order to consult them directly.[144]

Byzantium inherited the knowledge expounded in the texts that belong to "the classical tradition," as well as the texts themselves, by virtue of maintaining a Greek-speaking culture and an institutional (therefore also educational) continuity with the pagan Roman empire. The Latin- and eventually the Arabic-speaking world also inherited a version of this knowledge and some of the same texts, mediated through translation and adaptation. The reason is that the political entities that used Latin (to the west of Byzantium) and Arabic (to its east) had replaced the Roman empire in the same territory; consequently, out of practical consideration, they had to adopt some of the late-Roman intellectual traditions and cultural institutions in order to assert their own legitimacy. The range and resilience of the Graeco-Roman heritage can be aptly illustrated by a mundane example: the fourteenth-century Byzantine description of finger reckoning by Nikolaos Rhabdas is very close to the one given by the Venerable Bede in the seventh/eighth century. The similarity must be due to the currency of such a system in the late-Roman period (at the latest) and its continuity in different geographies over centuries.[145]

The systems of thought proposed in antiquity did not necessarily agree with one another: for example, the Pythagorean planetary system hypothesized circular and regular motion of the sun, moon, and five planets, while some thinkers of Pythagorean and Platonic leanings proposed a heliocentric universe; Aristotle and Ptolemy assumed geocentrism, and Ptolemy's planetary system was based on irregular, angular motion. Sometimes, as we have seen for Galen, even propositions by a single author were not entirely consistent.

Since none of the proposed systems solved all problems, the open questions continued to be discussed in antiquity and the Middle Ages. In fact, given that most extant ancient texts survive in medieval manuscripts, their circulation and discussion in the Middle Ages is the reason we know about them. Such discussions were sometimes written down as commentaries on older texts, which recent scholarship recognizes as important venues for the expression of new ideas. For example, Ibn al-Haytham (965–1039) proposed what is currently deemed the most viable sys-

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instances in his text where he cechks them against one another, see Ibn aṣ-Ṣalāḥ, *Zur Kritik der Koordinatenüberlieferung in Sternkatalog des Almagest*, 77–96.

[143] On the Arabic translations of Dioscorides, see Manfred Ullmann, *Untersuchungen zur arabischen Überlieferung der Materia medica des Dioskurides* (Wiesbaden, 2009) and its review by Dimitri Gutas, "The *Arabic Transmission of Dioskurides*: Philology Triumphant," *Journal of the American Oriental Society* 132:3 (2012): 457–62.

[144] Pormann and Savage-Smith, *Medieval Islamic Medicine*, 170.

[145] See Burma P. Williams and Richard S. Williams, "Finger Numbers in the Greco-Roman World and the Early Middle Ages," *Isis* 86/4 (1995): 587–608, at 593.

tem of planetary motion after the Ptolemaic in a work titled *Doubts on Ptolemy*. Medieval users also adapted and updated the knowledge preserved by the ancient scientific tradition, as the ancient texts themselves occasionally invite users to do.[146]

Subsequent generations of medieval scholars kept returning to the "classical tradition," but not out of reverence for ancient authority, nor because they did not know or could not do any better. It is possible to explain the medieval attachment to the "classical tradition" with a modern equivalent: since the eighteenth century, humanity has lived in a universe conceived and explained along the principles of Newtonian physics. The introduction of relativity about one hundred years ago implies a radical departure from Newtonian cosmology, which, however, continues to serve as the basis on which we understand the world and continues to be included in academic instruction. We do not think of this as scientific stagnation, only as securing a kind of intellectual continuity that serves practical purposes. By analogy, the continued medieval adherence to, for example, the Ptolemaic astronomical system does not indicate lack of awareness of its shortcomings; rather, it is motivated by the fact that it delivered practical results and was an integral part of everyday astronomical practice, especially since it provided the basis for the construction of the most ubiquitous medieval and early modern astronomical instrument, the astrolabe.

The evidence examined so far suggests that Byzantium's contemporaries did not view its literary culture as a warehouse from which to retrieve Greek antiquity intact. They were also interested in its aspects that had to do with Christian culture, Roman institutions, and governance, both independently of each other and as a packaging of the "classical tradition"—always, of course, in order to service their own needs. For this reason, the objective of Byzantium's contemporaries when gazing upon Byzantine literary culture ranged from imitation to emulation to antagonism to refutation. Such literary communication (friendly or not) was possible because Byzantium shared with the Islamic and the Latin Christian world a set of concepts and intellectual traditions that all three had inherited from late antiquity. But exactly this shared background can sometimes obscure for us moderns the degree to which they are interrelated. To give an example: in the introduction to the *Almagest*, Ptolemy revisited Aristotle's division of the theoretical sciences into *physikon*, *mathematikon*, and *theologikon* (physics, mathematics, and theology) and declared the superiority of mathematics over the rest. Towards the end of the thirteenth century, Quṭb al-Dīn al-Shīrāzī (1236–1311), the most prominent student of Naṣīr al-Dīn al-Ṭūsī (whom we mentioned earlier as proposing a model of planetary motion used by Copernicus), in disagreement with his teacher and following Ptolemy, also considered mathematics instead of physics or theology

[146] For example, the second-century astronomer Ptolemy in his *Geography* articulated an open invitation for subsequent generations to revise the data in his work: in a chapter titled "That it is necessary to follow the most recent researches because of changes in the world over time" (1.5), Ptolemy emphasized that readers must follow "in general the latest reports that we possess, while being on guard for what is and is not plausible in both the exposition of current research and the criticism of earlier researches." Quoted from L. Berggren and A. Jones, *Ptolemy's Geography: An Annotated Translation of the Theoretical Chapters* (Princeton, 2000), 63.

as the best way to discover the truth.[147] A year or two after al-Shīrāzī's death, Theodore Metochites began his study of astronomy in Constantinople with a Persian-trained teacher.[148] In the first book of his *Stoicheiosis astronomike*, in laying out the overall plan for the work, he also insisted that the mathematical sciences are the only way to the truth.[149] This is in agreement with one of the important projects of fourteenth-century Latin philosophy launched from the 1320s onwards at Merton College, Oxford: applying procedures of mathematical reasoning to problems outstanding in Aristotelian physics.[150]

If one looks at each tradition in isolation, it is possible to interpret each case as an independent development, since all three had appropriated both Ptolemy and Aristotle. But when all three medieval traditions are investigated in combination, it is possible to catch a glimpse of how they viewed each other's version of the classical tradition and what role Byzantium may have played in this international exchange of ideas.

[147] Jamil Ragep, s.v. "Shīrāzī: Quṭb al-Dīn Maḥmūd ibn Mas'ūd Muṣliḥ al-Shīrāzī," in *Biographical Encyclopedia of Astronomers*, 2:1054.

[148] On the Persian training of Metochites's teacher, see Mavroudi, "Late Byzantium and Exchange with Arabic Writers," 70 and 73 n. 32. Börje Bydén, *Theodore Metochites' "Stoicheiosis astronomike" and the Study of Natural Philosophy and Mathematics in Early Palaiologan Byzantium* (Göteborg, 2003), 260–62, remains agnostic as to where this teacher had been trained (whether he had studied with somebody who had come from Persia or had studied in Persia himself); still, Bydén asserts that the information provided by Metochites on his teacher leads to the general conclusion that Persian astronomy enjoyed prestige in early fourteenth-century Constantinople and was not transmitted exclusively by Chioniades.

[149] References and discussion in Bydén, *Theodore Metochites' "Stoicheiosis astronomike"*, 285.

[150] See Mark Jordan, s.v. "Aristotelianism, Medieval," in *Routledge Encyclopedia of Philosophy*, retrieved 17 February 2012, from http://www.rep.routledge.com.

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